PROCEEDING

ICIRAD 2015

The 1st International CONFERENCE On Innovative Research Across Disciplines

Kuta - Bali, November 18-19, 2015

UNDIKSHA PRESS

PROCEEDINGS
The 1st International Conference on Innovative Research Across Disciplines

Edited by:

Komang Setemen
Kadek Surya Mahedy
I Gede Parta Sindu
Putu Hendra Suputra

November 2015
Held on November 18-19, 2015

Organized by:
Research Institution of Ganesha University of Education

UNDIKSHA PRESS
2015

PROCEEDINGS
THE 1ST INTERNATIONAL CONFERENCE ON INNOVATIVE RESEARCH ACROSS DISCIPLINES

Research Institute of Ganesha University of Education
International Conference Proceeding
International Conference on Innovative Research Across Disciplines
November 18-19, 2015

Editors:
Komang Setemen
Kadek Surya Mahedy
Putu Hendra Suputra
I Gede Parta Sindu
Agus Aan Jiwa Permana

The 1st International Conference on Innovative Research Across Disciplines
-- ICIRAD 2015

Executive Committee:
Dr. I Nyoman Jampel, M.Pd. (Undiksha)
Prof. Dr.Ida Bagus Putu Arnyana, M.Si. (Undiksha)
Prof. Dr. I Wayan Lasmawan, M.Pd. (Undiksha)
Dr. I Gusti Ngurah Pujawan,M.Kes. (Undiksha)
Drs. I Wayan Suarnajaya,MA., Ph.D. (Undiksha)
Prof. Dr. AAIN Marhaeni, M.A (Undiksha)
Prof. Dr. Nengah Suandi, M.Hum (Undiksha)

Reviewer:

Prof. Harry Aveling (La Trobe University)
Prof. Kustim Wibowo, Ph.D (Indiana University of Pennsylvania)
Kongkiti Phusavat (Kasetsart University)
Micehele Petrucci, Ph.D (Indiana University of Pennsylvania)
Prof. Zainal A.Hasibuan, Ir.,MLS, PhD (Universitas Indonesia)
Prof. Richardus Eko Indrajit (Perbanas Institute)
Prof. Dr. Anak Agung Istri Ngr. Marhaeni, M.A. (Undiksha)
Prof. Dr. I Nengah Suandi, M.Hum. (Undiksha)
Prof. Dr. I Wayan Sadia, M.Pd. (Undiksha)
Prof. Dr. I Wayan Santyasa, M.Si. (Undiksha)
Prof. Dr. I Wayan Suastra, M.Pd. (Undiksha)
Prof. Dr. Ida Bagus Putrayasa, M.Pd. (Undiksha)
Prof. Dr. Naswan Suharsono, M.Pd. (Undiksha)
Prof. Dr. Ni Ketut Suarni, M.S. (Undiksha)
Prof. Dr. Ni Nyoman Padmadewi, M.A. (Undiksha)
Prof. Dr. Ni Putu Ristiati, M.Pd. (Undiksha)
Prof. Dr. Nyoman Dantes(Undiksha)
Prof. Dr. Nyoman Wijana,M.Si. (Undiksha)
Prof. Dr. Putu Budi Adnyana, M.Si. (Undiksha)
Dr. Anantawikrama Tungga Atmadja, S.E., Ak., M.Si. (Undiksha)
Dr. Komang Setemen, S.Si., M.T. (Undiksha)
Dra. Luh Putu Artini, M.A., Ph.D. (Undiksha)
Dr.rer.nat. I Gusti Ngurah Agung Suryaputra, S.T., M.Sc. (Undiksha)

Organizing Committee :

Chair : Kadek Yota Ernanda Aryanto, S.Kom, M.T (Undiksha)
Secretary: I Putu Ngurah Wage Myartawan, S.Pd., M.Pd. (Undiksha)
Finance : Made Ari Astrini, A.Md. (Undiksha)
Proceeding : Dr. Komang Setemen, S.Si., M.T. (Undiksha)
Sidang : Dr. Gede Rasben Dantes, S.T., M.T.I. (Undiksha)
Sekretariat : Dr. I Made Tegeh, S.Pd., M.Pd. (Undiksha)

Chair's Welcome Address

Excellencies, Researchers, Ladies and Gentlemen,

As the chairman and on behalf of the organizing committee, I am proudly present here and delighted to welcome you all to the 1st International Conference on Innovative Research Across Disciplines, ICIRAD 2015. This conference was initiated by the Research Institute of Ganesha University of Education to be a forum for all international researchers to share and publish the results of their innovative, excellent, and robust works in the field of education, social science and humanities, as well as science and technology.

ICIRAD 2015 has received in total of 111 abstract and full paper submissions from all three categories. Through our review process, a number of 107 submissions were accepted to be presented and 37 articles were selected out of them and have successfully been published in our proceeding. The attendees are researchers, practitioners, and students with affiliations from four countries, that is, Indonesia, Australia, Thailand, and The Netherlands. The conference is held on 18-19 November 2015 in Grand Inna Hotel, Kuta-Bali, together with our third national conference (SENARI III) which is the strength behind and a milestone in the initiation of our first international conference. We present four speakers representing three countries and the three conference topics; they are Prof. Zainal Arifin Hasibuan, Ph.D from Indonesia to represent the national education standards body (BSNP) and also the association of Higher Education of computer science (APTIKOM), Prof. Harry Aveling from La Trobe University Australia, Prof. Kongkiti Phusavat from Kasetsart University Thailand, and Prof. Sariyasa, M.Sc., Ph.D. from Ganesha University of Education Indonesia. Our speakers will discuss about the current issues and policies regarding research in various fields. And for that, on behalf of all of the committee members, I would like to thank all of our invited speakers for having fulfilled our request to share with us valuable and state-of-the-art information in this event.

Our event would not be possible without the supports of all parties involved. Therefore, on this very occasion, allow me on behalf of the committee to extend our thanks to: (1) the Higher Education Directorate General as the provider of the research funds so that our researchers are able to share and publish their works; (2) Rector of Ganesha University of Education for his full support for the event; (3) the government of Bali Province and Buleleng Regency for their cooperation in our research and service programs; (4) all of the program committee members who have given all of their efforts to prepare and run this event; (5) all of the reviewers in providing us with the selected articles to be presented in our conference; and (6) all the participants for the strong support and participation in our event.

I hope this conference will prove to be a fruitful, inspiring and transformative experience to you, and all of us.

Singaraja, Nopember 2015
Chair of the committee

WELCOME NOTE

Om Swastiastu, Assalamualaikum Warahmatullahi Wabarakatuh, May God Bless us all.

We are offering our most sincere gratitude to Ida Sang Hyang Widi Wasa/Tuhan Yang Maha Esa, God Almighty, for the graces that have been bestowed upon us so that we can all gather here to hold the first *International Conference on Innovative Research Across Discipline* and the third National Seminar on Innovative Research, themed "Reinforcing the Nation's Identity through Innovative, Excellent and Exceptional Research." These convergent conferences were initiated and organized by the Research Institute of Ganesha University of Education. Therefore, I congratulate the Research Institute of Ganesha University for having established this academic vessel that allows lecturers and researchers around Ganesha and universities across the globe to sit together for sharing experiences and knowledge in Science, Technology, Humanity, and Education.

Honourable professors,
Academic publications in acreditted international journals plays an important role in providing a medium for self actualization that allows academicians, scholars and researchers to participate in the global development of science and technology. Countries with the best quality of education and development of science and technology are generally the countries from where the most esteemed international publications come. This is where International Conference on Innovative Research Accross Discipline and National Seminar on Innovative Research come forward to provide the space for researches to publish their research findings. Research is a never-ending process, it doesn't stop with the concluding chapter. It should be disseminated, to reach out to the targeted development in the society, hence preventing university to stand only decoratively like an ivory tower.
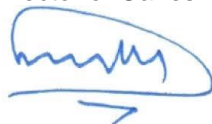
Dear Valued Scholars,
We belong to the 21st Century that is nevertheless the most innovative century in the history of humankind. Whether we want to admit it or not, we are in the middle of the most violent flux of development, where technology is the "driver for change." As technology develops in unprecedented speed, we too have to change and adapt. The only reason that we fail in this age is our ineptitude to read the signs provided by history. If we can stand out, that is because we work hard enough to adapt with these changes.
Respectable researchers,
Thank you for joining our 1st International Conference on Innovative Research Accross Discipline and the 3rd National Seminar on Innovative Research, let me wish you the most fruitful conferences. May these conferences brings plentiful benefits for us, science and technology, the global society, and humanity.

Om Santhi, Shanti, Shanti, Om.

Singaraja, 13 November 2015
Rector of Ganesha University of Education

Dr. I Nyoman Jampel, M.Pd.
NIP. 195910101986031003

Table of Contents

The Effect of Problem-Based Teaching Model and Metacognitive Ability on Improvement in Mathematical Problem Solving Ability of the Students of Polytechnic with Prior Knowledge as Covariable

I Ketut Darma[1] , I Nyoman Gunung[2]

Mechanical Engineering Department of Politeknik Negeri Bali, Bukit Jimbaran
P.O. Box. 80364 Kuta Selatan, Tuban Badung Bali Telp. (0361) 701981 Fax. 701128.

Email: darmaenjung@yahoo.co.id

Abstrak

This study was aimed at finding out: 1) the difference in mathematical problem solving ability between the students facilitated with problem based teaching model and those facilitated with direct teaching model when prior knowledge is controlled 2) the effect of metacognitive ability on mathematical problem solving of the students when prior knowledge is controlled, and 3) the interaction effect between teaching model and metacognitive ability on mathematical problem solving ability when prior knowledge is controlled. This study used a quasi-experimental design by measuring two factors in the 2 x 2 factorial pretes-posttest nonequivalent control group design. Ther sample consisted of 126 students who were divided into 4 groups. The data were collected using mathematical problem solving test and metacognitive questionnaire. Each instrument has been verified both theoretically and empirically. The data were analyzed using Anacova. The results showed that 1) the highest mathematical problem solving ability was achieved by the high metacognitive ability group facilited with problem-based teaching model, 2) when prior knowledge was controlled there was a significant diference in mathematical problem solving ability between the students facilitated with problem-based teaching model and those facilitated with direct teaching model , 3)when prior knowledge was controlled there was a significant difference in metacognitive ability on mathematical problem solving ability, 4) when prior knowledge was controlled there was an interaction effect between teaching model and metacognitive ability on problem solving ability.

Key word : problem-based teaching model, metacognitive and mathematical problem solvin ability

1. Introduction

Mathematics is used as an instrument to support the teaching of other subjects such as Physics, Chemistry, Astronomy, Law, etc. Mathematic calculation becomes the basis of technical sciences (Kline, 1997). Mathematics is a thinking pattern, an organizational pattern, a logical method of proving something. Mathematics is the language that uses terms that are defined carefully, clearly, accurately, using symbolic representation. It is more of a symbolic language about ideas than sounds (Johnson, 1972)

There are three aspects of understanding that have to be acquired by the students in learning mathematics. They are ability to understand concepts, ability to

think and communicate, and ability to solve problems. Mathematical concept understanding is a very important aspect in the principles of mathematics instruction (NCTM, 2000). Understanding and mathematical problem solving are an important element in every teaching in all levels of education, both at school and university levels. The ability to understand and to solve the problem is a strength that becomes the objective of the teaching of mathematics, giving the opportunity to the students to solve problems that are related to daily life, work, and other knowleges (Sumarmo, 2002; Delvin, 2007).

Bell defines mathematical problem solving as solving problems in mathematics

done by people who regard them as problems (Bell, 19782; Duffin, 2000). Branca states that solving problems in mathematics consists in solving narrative problems, nonroutine problems, applying mathematics in daily life or other conditions, and proving and creating something.. problem solving ability is the heart of mathematics and mathematical problem solving can be applied in other subjects, and in daily life (Branca, 1980). Mathematical problem solving ability is a skill that should be mastered by the students in order to be able to use mathematical activities to solve problems in other subjects and in daily life. This ability is very important in mathematics, not only for those who pursue mathematics in the future, but also for those who will apply it in other subjects and in daily life. (Branca, 1980). In addition, in National Research Council document it is stated that experiences that are obtained through mathematical problem solving process will enable the development of mathematical strengths such such as the ability to read and analyze situations critically, to identify existing weaknesses, to detect the possibility of biases, to test the effect of steps taken, and to suggest alternatives of creative solutions to the problem faced. Hence, mathematical problem solving can help someone to understand information spread in the environment more accurately. Problem solving ability is an important aspect in making the students literate in mathematics. Improvement in mathematical problem solving ability can provide students with logical, analytical, systematical,critical, and creative thinking.. by conditioning the students to solve problems, the teacher will make them more analytical in making daily life decisions. Hence, problem solving ability becomes the focus in mathematical teaching in all levels, from primary school to university. By learning how to solve problems in mathematics, the students will find methods of thinking, deligent habit, and curiousity as well as self confidence in inordinary situations, as those that they will face outside the mathematics class. In daily life and workplaces they will become, good problem solvers that can bring forth great benefits.

Basically, teaching is a complex process that needs a professional treatment, since it does not only require a mastery in the skill of teaching but also a mastery in the subject being taught (Laurens, 2011). This indicates that teaching is not easy, since success in teaching is determined by decision making and decision implementation processes. Decision making in selecting strategies, approaches, and implementing what have been selected is the process that needs to be done by a teacher. Hunter states that teaching is based on the premise that the teacher is the decision maker (Hunter, 2004). A teacher needs to consider many things and then he or she decides to select the most important one, both in writing lesson plans, doing the teaching and evaluating the teaching outcomes. The same is true in learning process, in which a good student will start his or her learning activity by planning what to do and decide whether he or she will master what has been learned. Learning is an activity that involves a reflective process of what is done. This condition shows that a reflective process is a useful "tool" that is needed by every teacher and student (Laurens, 2011).

Viewed from the pedagogical perspective, reflection is the main pillar of metacognition. a decision making that is related to teaching will be effective if it is based on metacognitive consideration (Laurens, 2011).

Since a teaching approach to develop understanding of concepts and mathematical problem solving ability is very important, there is a need for mathematics teaching that involves more participation on the part of the students in the learning process. This can be done by introducing an innovative teaching that promotes metacognitive awareness that is designed in such a way to reflect student active participation.

Problem-based teaching (PBL) is a model of teaching that involves students in solving a problem by following scientific processes that enables them to learn knowledges that are related to the problem and at the same time have skill to solve problems (Stepien and Gallager, 1993). PBL as one of the contextual teaching strategies helps the students in developing the ability to think, to solve problems and the intellectual skill to learn as an adult and through their involvement in real situationss or simulations and become autonomous students. PBL can train high level cognitive skill of the students. This model of teaching helps the students to process ready information in their minds and organize their knowledges about social world and the environment. This model of teaching is suitable for developing basic and complex knowledges (Trianto, 2009). In PBL small

groups of students cooperate in solving problems that they and the teacher agreed to solve. When the teacher is implementing PBL, the students tend to use various skills, problem solving procedures and critical thinking. PBL is based on constructivist theory. The teaching starts with a presentation of a real problem the solution to it needs cooperation among the students. In implementing PBL, the lecturer plays the trole: 1) in guiding the students to break down the plan of soving the problem into activity stages, 2) in giving an example about the use of needed skills and strategies to complete the tasks , and 3) in creating a classroom atmosphere (Reigeluth, 1999)

O'Neil & Brown state that metacognition is a process in which an individual is thinking about thinking in an effort to build a strategy to solve a problem (O'Neil & Brown, 1997)[. Whereas Anderson & Kathwohl state that metacognitive knowledge is a knowledge about cognition, in general the same as awareness and knowledge about one's self cognition. Hence, it can be said that metacognition is awareness about what is known and what is not known. While metacognitive strategy refers to the way to raise awareness about thinking process and the teaching that when this awareness is aroused, the individual can control his or mind by designing, observing, and assess what he or she is learning (Anderson & Krathwohl, 2001).

In relation to mathematics teaching, metacognition can play a role in helping the students to solve problems they are facing. Schoenfeld states that there are three different aspects of metacogntion a that are relevant in mathematics teaching,namely beliefs and intuitions, (2) one's knowledge about his or her thinking process, in this case, how an individual analyzes his or her thoughts accurately and (3). Self Awareness or Self Regulation. How an individual controls what he or she has done, problems that he or she have solved and how well he or she uses his or her observation to solve his or her problems (Schoenfeld, 1992).

The utilization of metacognition in mathematics teaching can be see when the students are asked to express mathematical ideas, or to discuss in group. Metacognitive process will occur if there is an interaction among some individuals who are talking about a problem. In the process of solving it, the students will try to understand the problem, plan a strategy for sovling it, making a decision about what to do, and

implement the decision. In such a process, the students ought to monitor and recheck what they have done. When a decision that has been made is not appropriate, then they should try other alternatives or make a consideration. The process of being aware of the presence of an error, monitoring the result and seeking other alternatives are some of the metacogntive aspects that are necessary in solving mathematical problems. Thus, when it is used as an alternative in mathematics teaching, metacognition has many advantages for improving ability to solve problems. This view is reasonable since by developing their metacognitive awareness, the students are trained to always design the best strategy in selecting, remembering, recalling, organizing information they are facing in solving a problem. By developing their metacognitive awareness, the students are expected to have a habit of always monitoring, controlling and evaluating what they have done. This description shows that metacognition is very important in solving problems and in mathematics teaching process. the reality in many mathematics classrooms shows that the students do not use metacognition when solving a problem so that they do not understand what they are learning. Through a teaching activity that is been well designed , the aspects of metacognition will emerge to help the students in understanding the concepts being learned and in solving the problem they are facing.

However, in keeping with the development of cognitive psychology, there is also a development in the methods of assessement of learning outcomes by the teachers, especially for cognitive domain. Currently, the teachers only put an emphasis on the cognitive objectives without paying attention to, particularly, metacognitive knowledge and metacognitive ability. Consequently, the efforts to introduce metacognition in solving mathematical problems to the students are insufficient or even ignonred.

On the other hand, based on the result of observation made of the students and teaching processes in the department of mechanical engineering at PNB it was obtained that in the teaching process the teachers have not structurally implemented a teaching that can solve mathematical problems. The teacher only decide that the students who can anwer correctly have understood the concepts correctly. They tend to inform more on the definion of a

concept. After informing the definition, they give a problem example and its solution. They have tried to improve the students' metacognitive ability. While metacogntive ability is an ability largely supports one to understand concepts in mathematics and problem solving ability. The teachers have also tried to done some innovations in teaching by implementing problem-based teaching in mathematics. However, they still face many problems, one of them is that the students have a great difficulty   in understanding problems.

Mathematics   structured hierarchically, a concept that became the basis for studying the concept further (Hudoyo, 1988). These properties lead to mastery of mathematics in the learning process is influenced by its ability to master math concepts previously. This resulted in the prior knowledge of mathematical   by students before learning affects subsequent mastery learning math concepts

In essence, the mathematical problem solving ability is one form of mathematics learning outcomes.   To determine the effect   of   Problem Base Lerning and metacognitive for mathematical problem solving abilities, necessary to control the prior knowledge score   so that effects can occur are believed to be caused solely by the Problem Base Lerning model and Metacognitive.

The main problems investigated in this study were: 1) Is there any difference in mathematical problem solving ability between the students facilitated with PBL and those facilitated with direct instruction model?, 2) Is there any difference in mathematical problem ability between the students who have high cognitive ability and those with low metacognitive ability? and 4) Is there any interactive effect between models of teaching and metacognitive skill on ability to solve mathematical problems?

2. Methods

This study was conducted in Mechanical Engineering Department of Politeknik Negeri Bali, using quasi-experimental design with two factors in the 2x2 factorial version of pretest-posttest nonequivalent control group design (Tuckman, 1999). The sample selected was 126 students, distributed in 5 classes in 2 study programs.   Random sampling was used for the experimental groups. The experimental design is shown in Figure 2.1.

Teaching Model

		PBL	DI
Metacognitive	HM	Group 1	Group 2
	LM	Group 3	Group 4

Notes:
PBL = Problem Based Learning
DI =Direct Instruction
HM= High Metacognitive Ability
LM = Low Metacognitive Ability

Figure 2.1
Quasi-Experimental Design of the 2x2 Factorial Version

The data were collected using mathematical concept understanding test, mathematical problem solving ability test metacognitive ability test, and lesson plans. Each was verified both theoretically and empirically.

The lesson plans were developed following the teaching models investigated. The teaching models were 1) problem based interuction, 2) metacognitive ability, and 4) direct instruction as control.

The data were analyzed using descriptive analysis, qualitative analysis and the 2x2 Factorial Analysis of Covariance (Anocova). Before they were analyzed, they were subjected to requirement analysis testings, i.e., normality testing, inter-group homogeneity testing, and linearity testing. The normality testing of data distribution was done using multicolinearity testing.   The normality testing of data distribution was done by using Kolmogorov-Smirnov and Shapiro-Wilk statistics,   the homogeneity testing of intergroup variances was done by Levene's Test of Equality of Error Variances, and the the linearity testing was done by deviation from linearity (Santoso, 2002). The results of the testings showed that the statistic values of Kolmogiorov-Smirnov and Shapiro-Wilk of each independent variable has significant value greater than 0.05. Therefore, the distribution and concept understanding and mathematical problem solving abilities are normally distributed. The intergroup   variance-covariance homogeneity testing using Levene's Test of Equality of Error Variances.   The result showed the   F value = 0.031   at Sig. 0.993> 0.05 of concept understanding, and F = 2.198 at sig.0.093>0.05. While the F value for deviation from linearity = 0.704 at sig.0.778 > 0.05. statistical value = 0. 031 with Sig. 0,993> 0,05 for the concept understanding variable, and F = 2,198 with Sig. 0,093 > 0,05. Thus, prior understanding

of problem solving and final ability in mathematical problem solving have a linear relationship.

3. Result And Discussion

The mean (M) and standard deviation (SD) for concept understanding and mathematical problem solving ability together with the category of each before and after the treatment are shown in Table 3.1.Table 3.1 General Description of the Research Data

Groups	M dan SD Problem Solving Ability			
	Pre	Category	Post	Category
PBL-HM	21,63 4,66	Low	62,58 4,9	highest
PL-LM	22,84 4,23	Low	52,11 5,57	high
PBL-HM	23,16 5,86	Low	52,05 5,38	high

DI-LM	22,58 5,38	Low	56,53 4,48	highest

In Table 3. 1 it is apparent that after treatment, PBL-DI groups showed the highest concept understanding and mathematical problem solving ability.

To see the effect of the teaching models and metacognitive on problem solving ability, when prior knowledge was selected as covariable the testing was done consecutively, and the summary of the results of the testings can be seen in table 3.2 as follows.

Table 3.2
Result of the Anocova of the Data about Mathematical Problem Solving Ability with Prior Knowledge as Covariable

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1452.633[a]	4	363.158	14.287	.000
Intercept	11824.449	1	11824.449	465.171	.000
yo	43.317	1	43.317	1.704	.196
TM	161.851	1	161.851	6.367	.014
MA	143.211	1	143.211	5.634	.020
TM * MA	1069.007	1	1069.007	42.055	.000
Error	1804.788	71	25.420		
Total	240028.000	76			
Corrected Total	3257.421	75			
a. R Squared = .446 (Adjusted R Squared = .415)					

Notes:

yo = Covariate (Prior knowledge in problem solving ability)
TM = Teaching Model
MA = Metacognitive

Yo (prior ability in mathematical problem solving ability) has the F value = 1.704 at sig. 0.196 > 0. 05. This condition shows that the covariate variable yo does not have a significant effect on the scores in mathematical problem solving ability. Thus the covariate variable of prior ability does not have any effect on mathematical problem solving ability.

From the source of effect from the teaching model (TM) on mathematical problem solving ability was found the statistical value of F = 6. 367 at sig.0.014 <0.05. These results showed that H_{01} is rejected. It means that there is a significant effect from the teaching model on

mathematical problem solving ability. PBL is better than Direct Instruction model in achieving mathematical problem solving ability (M_{PBL} = 57.34; M_{DI} = 54.32).

This superiority was also proven by the finding of a research by Riasat (2010) in which the learning achievement of the students taught by PBL was better than that taught by the traditional method and there was a significant difference in effectiveness between the traditional method and PLB in teaching mathematical problems. Alfred, David M., & Abayomi (2013) showed that there was a significant difference in the posttest results between that of the students taught by using PBL and that of the students

taught by the traditional method. The learning achievement in advanced mathematics of the students taught by PBL was significantly better than that of those taught by the traditional method (Anggo, 2011)

From the source of the effect of Metacognitive Ability (MA) on mathematical problem solving ability it was found that the Fstatistical F = 5. 634 at sig.0.020 <0.05. These results showed that H_{02} was rejected. It means that there is a significant effect of metacognitive on mathematical problem solving ability. High Metacognitive Ability is superior to Low Metacognitive Ability in concept understanding achievement (MA_H = 73. 05; MA_L = 67.29) and in mathematical problem solving (MA_H = 57. 34; MA_L = 54. 19).

These results are in line with Anggo's finding that showed that metacognitive plays an important role in supporting students' success in solving mathematical problem. Nuryana showed that significantly there is a correlation between metacognitive ability and student learning achievement. A metacognitive involvement in concept learning and problem solving can be supported through the use of contextual and challenging mathematical problems (Kreyenbuhl & Atwood, 1991).

Someone's success in solving problems, especially a mathematical problem is partially dependent on his or her awareness about what he or she already knew and how he or she did it. Metacognive is a word about what he or she knows about himself or herself as an individual who is learning and how he or she controls and adjusts his or her behavior. Metacognitive is a form of ability to see himself or herself so that what he or she does can be optimally controlled. With this ability the student tends to have a high ability in answering mathematical problems , since in every step made a problem arises: "What am I doing?"; "Why am I doing it ?", "What can help me solve this problem" (Suherman, 2003) . Metacognition is an awareness about cognitive ability, and organizing one's cognitive ability. In Mathematics teaching, metacognitive ability plays an important role especially in concepts and problem-solving learning. The involvement of metacognitive in learning and solving problems can be encouraged through the use of challenging mathematical problems. The higher the metacognitive skill the student has the higher will his or her problem solving ability.

Foong believes that teaching through problems provides the chance for the students to build mathematical concepts (Foong, 2002). To solve a problem, a student has to observe, relate, question, find a reason and makes a decision. Success in solving a proble is closely related to the student's thinking process and the level of his or her metacognitive ability. Ibrahim (2003) proves in his study that metacognitive experience is more important in determining success in mathematical problem solving.

From the source of effect of TM * MA (where TM = teaching model and MA = metacognitive ability) on mathematical problem solving ability it was found that F statistical value = 42. 055 at sig.0. 000 < 0.05. These results showed that H_{03} was rejected and H_{a3} accepted. It means that there is a significant interaction effect between TM (PBL versus DI) and metacognitive on mathematical problem solving ability. The effect of the teaching model on mathematical problem solving ability depends on the level of metacognitive ability.

The mathematical problem solving ability in the group of students with a high metacognitive ability facilitated with PBL was better than that of the group of students facilitated with direct instruction. The mean score for mathematical problem solving ability of the group of students with a high metacognitive facilitated with PBL was 66. 579 and that facilited with DI was 52. 12

The mathematical problem solving ability of the group of students with a low metacognitive ability facilitated with DI was better than that of the group of students facilitated with PBL. The mean score of the mathematical problem solving ability of the group of students with a low metacognitive facilitated with PBL was 52.05 and that facilitated with DI was 56.53.

The presence of the interaction can be seen in the form of interaction plot between Teaching Model and Metacognitive Ability in Figure 3.1 as shown below.
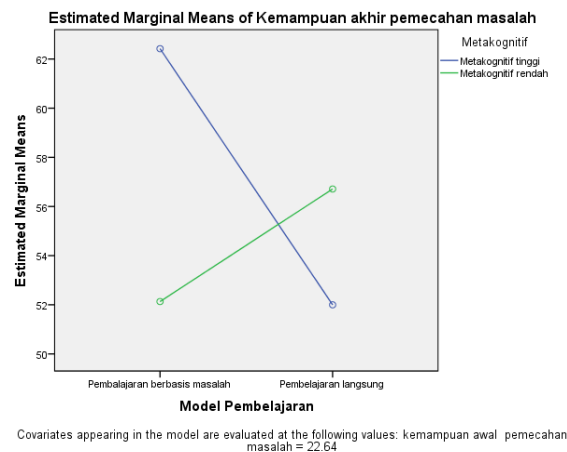
Figure 3.1
Effect of Interaction between Teaching Model and Metacognitive on Mathematical Problem Solving Ability

Figure 3.1 shows that the interaction plot between PBL and DI is not parallel with each other. The position of PBL plot is above that of DI showing that PBL has more effect on mathematical problem solving ability than DI. In the students with a high metacognitive ability the position of PBL plot tends to be above that of DI, showing that PBL tends to have more effect on mathematical problem solving ability than DI. However, for the students with a low metacognitive ability, the effect of MC and DI tends to be on the way around.

The implementation of PBL model to the students with a high metacognitive provides them with the opportunity to explore their ability so that in the course of teaching they are able to develop their ability optimally, since the process of teaching with PBL they are involved actively in finding and understanding the concepts of learning materials that they are learning and are given the opportunity to show their best ability. Thus, the teaching is felt to be more meaningful since involving the students fully in the process.

Whereas for the students with a high metacognitive, if they are taught with Direct Instruction model, in which teaching is centered on the teacher, they will feel under the teacher's control and may become fed up in receiving the learning material since they can only receive the material as far as what the teacher explains to them They do not have an opportunity to explore themselves optimally, and the learning outcome will not be maximal.

The implementation of PBL model to the students with a low metacognitive makes them tense in following the course since in PBL the students are required to develop the ability that they have optimally. The students are oriented to the problems that are related to their daily life, and based on the problem the students are expected to be able to develop concepts that are related to the problem they are facing. The students are required to be active to find and understand the concepts of the material they are learning and to be able to show their ability in doing the tasks alone.

Thus it is very difficult for a low metacognitive student to understand the material since he or she tends to receive what the teacher teaches without any intention of criticizing the problem being given. Mathematics teaching using direct instruction gives more stresses on the teacher's function as an information giver. It is more teacher centered (Eggen & Kauchak. 2012). The teacher regulates closely the teaching and learning process in terms of topic, material and strategy. The objective will be achieved optimally when the teacher is able to demonstrate knowledge and skills correctly that they can be imitated by the students. While the students will passively listen to the teacher's explanations without being actively engaged in the learning. The explanations about mathematical concepts/principles have been designed in such a way by the teacher, starting from theories/definitions/theorems followed by examples and exercises in solving problems. The tasks are strictly organized according to the time alloted. Such situation of teaching does not use metacognitive activities very much. This direct instruction model is very suitable for the students with a low metacognitive since they tend to be less creative and they only receive material to the extent it is explained by the teacher, without trying to find other alternatives in solving problems, as the consequence, their metacognitive ability is not developed.

Understanding Mathematical concepts is the standard of mathematics education that reflects competencies in each level of education. On the other hand, it is the basis for the students to build the ability to solve mathematical problems.

4. Conclusion And Suggestion
4.1. Conclusion
1. Descriptively, the highest mathematical problem solving ability in Politeknik Negeri Bali was

achieved by the group facilitated by PBL with a high metacognitive ability.

2. When prior ability was controlled, there was a significant difference in mathematical problem solving ability between the students in the PBL group and the Direct Instruction group. Concepts understanding and mathematical problem solving ability of the students in PBL were higher that those in the Direct Instruction group.

3. When prior ability was controlled, there was a significant difference in mathematical problem solving ability in each of metacogntive ability groups.

4. When prior ability was controlled, there was a significant effect of interaction between teaching model and metacognitive ability on mathematical problem solving ability.

4.2 Suggestion

1. Problem based Learning model and metacognitive ability that are rooted in the constructivist approach is a suitable alternative in the teaching of applied mathematics especially in achieving mathematical problem solving ability. In implementing the model, it is suggested that teachers take metacognitive ability into consideration. PBL is suitable for use with students with a high metacognitive ability. While Direct Instruction model is suitable for use with the students with a low metacognitive ability.

2. There are four teaching frameworks that need to be referred to, namely (1) the development of problem solving dimension in accordance with the students' needs in particular topics, (2) the determination of objectives in problem solving ability, (3) prediction of performances in problem solving ability, and (4) comprehensive and sustainable assessment.

Acknowledgements

5. References

Anderson, O.W. & Krathwohl, D.R., (2001). *A Taxonomy For Learning, Teaching, and Assessing (A Revision of Bloom's Taxonomy of Educational Objectives)*. New York: Addision Wesley Longman, Inc

Alfred O., F., David M.,& Abayomi A., A., 2013. "Effect of Problem Based Learning on Senior Secondary School Students' Achievemens in Further Mathematics" *Journal Acta Didactica Napocensia*. Volume 6, Number 3, 2013. hlm. 29

Anggo, M. 2011. *Pelibatan metakognisi dalam pemecahan masalah matematika*. Jurnal Pendidikan Dan Pengajaran Ikip Universitas Unhalu Kendari, 1(2), ISSN: 2088-2157

Bell, Frederick H. 1978. *Teaching and Learning Mathematics.* USA: Wm. C. Brown Publisher

Branca, N.A (1980). Problem Solving as a Goal, Process and Basic Skill. Dalam Krulik,S dan Reys,R.E (ed). *Problem Solving in School Mathematics*. NCTM: Reston. Virginia

Duffin, J.M.& Simpson, A.P. 2000. A Search for understanding. *Journal of Mathematical Behavior*. 18(4): 415-427

Devlin, K (2007) *Helping Children Learn Mathematics*. Published by the National Academy Press. Tersedia: http//ww.maa.org/devlin/devlin0907. html. (Mei 2008).

Foong, Pui Yee (2002). Using Short Opend - Ended Mathematics Questions to Promote Thinking and Undestanding . National Institute of Education, Singapore [Online] Provided :http:/www.math.unipa.it/~grim/SiFoong.PDF [23 September 2010]

Hunter,M (2004), Enhanching Teaching, MacMillan College Publication, Co, New York.

Johnson, Rising (1972). *Guidelines for Teaching Mathematics*. Belmont: Wadsworth Publishing Company,Inc.

Kline, Morris. 1997. "Matematika." *Ilmu dalam Perspektif, ed.* Jujun S. Suriasumantri. Jakarta: Yayasan Obor Indonesia.

Laurens, T. 2011. *Pengembangan Metakognisi dalam Pembelajaran Matematika* : dalam seminar Nasional Juli 2011. Tersedia pada : ttp://p4mriunpat.wordpress.com/2011/11/14/metakognisi-dalam-pembelajaranmatematika/ (27 September 2014)

Sumarmo. 2002. *Alternatif Pembelajaran Matematika dalam Menerapkan Kurikulum Berbasis Kompetensi.* Makalah disajikan pada Seminar Nasional FPMIPA UPI: Tidak diterbitkan.

Mohammad Ibrahim, A.J. (2003). *The Effect of Metacognitive Scaffholding and Cooperative Learning on Mathematics Performance and Mathematics Reasoning Among Fifth Grade Student in Jordan.* [Online]. Provided: http://search.yahoo.com/search?p=metacognitive+in+mathematics+education+jo

urnal&fr=yfp-t-501&toggle=1&cop=mss&ei=UTF-8&vc=&fp_ip=ID [10 Oktober 2012]

NCTM. (2000). NCTM: *Principles and Standars for School Mathematics.*[Online].Tersedia: http://krellinst.org/AiS/textbook/Manual/stand/NCTM_stand.html. [20 Juni 2005]

.O'Neil Jr, H.F. & Brown, R.S. (1997). *Differential Effects of Question Formats in Math Assessment on Metacognition and Affect.* Los Angeles: CRESST-CSE University of California.

Paul Eggen &Don Kauchak. 2012. *Strategi dan Model Pembelajaran Mengajarkan Konten dan Keterampilan Berpikir* (Terjemhan Satrio Wahono). Jakarta: Indek

[Reigeluth, C. M. (Ed.). 1999. *Instructional-design theories and models: A new paradigm of instructional theory, volume II.* New Jersey: Lawrence Erlbaum Associates, Publisher.

Riasat Ali, Hukamdad; Aqila Akhter; dan Anwar Khan. 2010. "Effect of Using Problem Solving Method in Teaching Mathematics on the Achievement of Mathematics Students" *Journal Asian Social Science,* Vol. 6, No. 2. February, 2010: hlm. 67-71

Schoenfeld, A.1992. *Hand Book of Researh on Mathematics Teaching and Learning,* Mc Millan Co.New York.

Stepien, W.J., and Gallagher, S.A. (1993) Problem-based Learning: As Authentic as it Gets." *Educational Leadership, 50*(7), 25-8.

Suherman, dkk. 2003. Strategi Pembelajaran Matematika Kontemporer. - : IMSTEP

Trianto. 2009. Mendesain Model Pembelajaran Inovatif Progresif. Jakarta: Kencana Prenada Media Group

Tuckman, B.W. 1999. *Conducting Educational Research.* United States of America: Harcon Brace College Publishers.

IDEOLOGIES CONSTRUCTEDIN PUBLIC POLICY DISCOURSE: READING CRITICALLY THE POLICY DISCOURSE OF CURRICULUM 2013 IN INDONESIA

Sultan, Ahmad Rofi'uddin, Nurhadi, Endah Tri Priyatni

Universitas Negeri Malang, Indonesia
sultan.unm@gmail.com

Abstract

This study aimed to describe and explain a form of ideology which was constructed by the policy makers in public discourse. This study was designed qualitatively and it employed the critical discourse analysis model by Fairclough. There were nine newspaper articles chosen as the data. All of them were written by the policy makers of curriculum 2013 in Indonesia. The data was collected through an observation using read-quote technique. The data was analyzed by applying Creswell spiral model which consists of some steps as follows: (1) organizing, (2) describing and classifying, (3) interpreting, and (4) visualizing. Results of the study revealed that the policy makers constructed various ideologies to create public perception. The ideologies comprise that; (1) the old policy was an unsuccessful effort, (2) the old policy contained errors, (3) the new policy is a new solution to the future, (4) the new policy will serve excellence, (5) the new policy will meet the needs, (6) the new policy success depends on public support, (7) the limitation of the new policy is acceptable. Based on the results, it can be concluded that the public policy texts were strongly related to the ideology practice and power. The policy makers controlled the published discourse through distinguished language features.

Keywords: ideology, public policy, representation, critical discourse

1. Introduction

Language plays an important role in public activities. It has been used as an effective medium to infuse ideology and power. Various language features are utilized to catch public sympathy and attention, create public perception, as well as control their minds and behavior. By way of using language, public discourse is written insomuch to serve the writer's interests (Santoso, 2011).

Language cannot be perceived as a neutral entity. It represents ideology. Fairclough (1989) argues that every text carries ideology. The language features, according to Fairclough, are the means that convey the ideology. Language choices found in a text articulate particular ideology. The vocabulary items, sentences, and the text structure reflect the ideology of the users. Therefore, to understand the ideology of the text producers, the public needs to analyze the texts critically.

Ideology refers to a thinking system underlying social actors' actions.Santoso (2012) asserts that ideology in public discourse can be defined as an effort to articulate ideas systematically. It is done by

text producers to address their consumers. Through naturalized ideology, the text producers can form perceptions and actions to be performed. Thomas dan Wareing (1999) define ideology as beliefs or the results of a thinking process which are implanted by the text producers. In addition to that, van Dijk (2006) states that ideology is a basic belief on which the representation of a particular social group is built.

Public policy is one form of discourse (Fimyar, 2014). Therefore, it is produced within a relationship between power and certain points of view. Public policy discourse can be seen as a message system and as a process (Robertson, 2012). According to Robertson, as a message system, policy owns the ideology nature which is functioned to organize how things work. As a process, policy is perceived as social practice. Public policy is an action which represents institutional concerns. Through discourse analysis, the idea system and the social practice can be revealed. Discourse analysis is a tool that can be utilized to analyze policy which portrays institutional practice of which discourse is produced (Hajer, 2003).

Critical analysis on policy will be able to describe the policy makers' perspectives. In public discourse, the policy makers' ideology is represented through documents produced, policy implemented, individual roles on power hierarchy, and powers implied in public policy (Woodside-Jiron, 2011). According to Woodside-Jiron, the methods used by the policy makers to bring out and develop issues are the main features of a policy analysis. Public policy analysis can explain the relationship between policy makers' perspectives and their products.A critical analysis on policy discourse can reveal the influence of powers in producing dominant discourse and marginalizing another kind of discourse (Hewitt, 2009)

Critical discourse analysis can explain ideology represented in policy texts. An analysis on the use of language in texts will reveal how the texts' writers form, change, and control public opinions. Public policy discourse describes the policy makers' values, purpose, and points of view. Research conducted by Woodside-Jiron (2011) on regulations and reading policy documents in the USA has showed that the texts' producers used the information structure and coherence markers to form public opinions. The results of the research unfolded facts that the theme-rhyme structure and its coherence markers contained particular ideology features. The research emphasized that the public policy discourse was intentionally produced to meet the policy makers' interests.

The policy discourse of Curriculum 2013 in Indonesia belongs to public discourse. Long before it was officially established, the policy implication plan had invited responses, critiques, and even refusals from the society. The policy makers (the government) had utilized mass media to provide feedback to public responses through news items, press conferences, releases, and articles. Opinions written in the newspapers by the officials from the Ministry of Education and Cultural Affairs were very prominent during the time of Curriculum 2013 formulation and initial tryouts. The ministry officials were actively engaged in writing either printed or online newspapers articles. Those massive attempts were interpreted as actions which aimed to influence, form, and control public opinions.

Curriculum 2013 policy texts published in newspapers, elite articles, and other documents were believed to have a particular purpose and serve particular interests. The policy discourse was produced and reproduced to expedite the implementation process of the new policy. From critical perspectives, every discourse exposed to the public carries out specific interests. None of public document is arbitrary in its production and consumption (Santoso, 2011).

The production of ideas through mass media is one of the strategies to construct public opinions on Curriculum 2013 policy.Elites from the Ministry of Education and Cultural Affairs have put an effort into public opinion construction through various texts produced in mass media. The actors of the policy making produced discourse via opinion rubrics published in either printed or online newspapers. The rubrics helped the policy makers to construct, change and lead public opinions. This situation has back-grounded the importance of a critical analysis on the ideology constructed by the policy makers of Curriculum 2013.

This study, thus, aimed to reveal ideologies constructed by the actors of policy making of Curriculum 2013 policy texts in Indonesia. Texts containing opinions written by the policy ma-kers and published in mass media were analyzed using critical discourse approach. The results of this research can be taken as a perspective to understand every public policy discourse.

2. Method

This study was designed qualitatively. The purpose of this study was to describe in detail the ideologies constructed by the public policy makers through texts published in mass media. To reveal the ideologies constructed, this study employed critical discourse analysis model by Fairclough (1989). Fairclough model applies critical approach to texts by three levels of analysis. They are texts analysis, social practice analysis, and sociocultural analysis. In its application, (1) texts analysis is done by involving language features used by the policy makers to reveal the ideology constructed; (2) social practice analysis is done through interpreting the relationship between text and its contexts; (3) sociocultural analysis is to see the connection between text and the society life in which the text is produced.

Data of this research was nine articles written by the officials from the Ministry of Education and Cultural Affairs which were published in either printed or online mass media. The data was collected through

observation with read-quote technique. Observation was then continued by tabulating the data into corpus. The researcher read the texts thoroughly, critically and repeatedly in order to choose the data. The data was analyzed using Creswell spiral model (2013) which consists of the following stages: (1) organizing, (2) describing and classifying, (3) interpreting, and (4) visualizing.

3. Findings

The results of the analysis show that the texts produced by the policy makers constructed different ideologies. They were represented by the language features used in the texts. Ideo-logies constructed by the policy makers of curriculum in Indonesia can be outlined as follows.

3.1 The Old Policy was An Unsuccessful Effort

The actors of policy making tried to form public opinions by creating an image that the old policy was a failure. By doing so, the elites were trying to convince the public that a new policy was urgently needed. Constructing ideology was the policy makers' attempt to legitimate and justify their actions. This form of construction was described as follows.

(1) Tulisan Bambang mengajak publik menengok ke belakang perjalanan Bahasa Indonesia sebagai mata pelajaran (mapel) dari masa ke masa pemberlakuan kurikulum: 1975, 1984, 1994, 2004, dan 2006. Sepanjang perjalanan itu, Bahasa Indonesia ter-nyata **tak kunjung bermartabat**; lite-rasi kepada anak Indonesia tetap saja jeblok. Kenyataan itu agaknya luput dari perhatian Bambang. Kurikulum 2013 menempatkan Bahasa Indone-sia sangat bermartabat.
(In Bambang's persuasive writing, the public can view a flashback on how Bahasa Indonesia developed as a subject at school from year to year of curriculum: 1975, 1984, 1994, 2004, and 2006. Throughout those periods, Bahasa Indonesia has been proven to **be never dignified**; still, Indonesian children literacy has been poor. Bambang missed this point. Bahasa Indonesia has gained its dignity in curriculum 2013).

Context: Feedback provided by the elites towards the experts says that the Curriculum 2013 policy on Bahasa Indonesia subject has weaknesses.

In excerpt (1), the policy makers provided a "counterattack" towards the experts who criticized the Curriculum 2013 policy. The quotation shows that the policy makers' power defined reality with old policy as the background. The use of *"never dignified"* means that the old policy was a failure. By showing that the old policy was unsuccessful, the actors of policy making expected to gain support from the public.

3.2 The Old Policy Contained Errors

The policy makers were trying to construct public opinions by showing mistakes found in the old policy to base their argumentation of the new policy. The actors of policy making revealed the old policy mistakes to create positive perception towards the new policy.

(2) Dengan mencermati KD-nya, maka penyusunan kurikulum bahasa Indo-nesia pada KTSP dapat dikatakan dilakukan dengan setengah berlan-daskan pendekatan struktural dan setengahnya lagi berlandaskan pada pendekatan teks. Bahkan masih ter-dapat pencampuradukan antara kon-sep teks dengan paragraf. **Dengan demikian, dapat dikatakan bahwa kurikulum bahasa Indonesia sejak Kurikulum 1994 sampai KTSP yang didengung-dengungkan berbasis kontekstual adalah tidak sepenuh-nya benar.** Berbeda jauh dengan Kurikulum 2013 yang sepenuhnya berbasis teks.
(Looking attentively at the basic competence (KD), Bahasa Indonesia in KTSP can be said to apply half structural approach and half textual approach. Even, the concept of a text and a paragraph was still overlapping. **Therefore, Bahasa Indonesia curri-culum since 1994 to KTSP which has been known as contextual based was not entirely true.** Curriculum 2013, however, is fully based on texts).

Context: The elites evaluate the old policy by showing its weaknesses compared to the new policy.

In quotation (2), the policy makers attempted to obtain public supports by showing the old policy mistakes and then comparing it to the new policy. The statement "*Bahasa Indonesia curriculum since 1994 to KTSP which has been known as contextual based was not entirely true*" shows that the elites were trying to oppose public perception which against the

new policy. Besides, this image was used to construct public perception that the new policy will be much better than the old one. Negation in that statement functions as a rebuttal towards the public who agreed with the idea that the old policy is still relevant to the present condition.

3.3 The New Policy is a Solution to the Future

The new policy image was created by the actors of policy making by naturalizing perception that the new policy will become a solution to the future. By placing the new policy as a solution, the public can accept it better.

(3) Kurikulum 2013 sebagai bagian dari *intervensipeningkatan mutu* pendidikan, tentu tidak bisa berten-tangan dengan peraturan perundang-undangan yang berlaku.

(Curriculum 2013 as a part of**quality improvement intervention** to educa-tion, of course cannot exist against the laws).

(4) Kurikulum 2013 memang merupakan *instrumen peningkatan mutu* pendi-dikan. Peran guru dan kepala sekolah menjadi pendukung utama agar Kurikulum 2013 dapat secara signi-fikan meningkatan mutu pendidikan dasar dan menengah.

(Curriculum 2013 is an **instrument to improve the quality** of education. The role of teachers and principals is to support Curriculum 2013 so that it can significantly improve the primary and secondary education).

Context: It was stated by the actors to explain the importance of Curriculum 2013 policy.

In excerpt (3) and (4), the actors of policy making used*quality improvement intervention* and *an instrument to improve*to introduce the new policy. The word *quality improvement*is a word maintained by the actors. It means that education in Indonesia has been in a bad condition or that it has poor quality. In addition to that, the word "*intervention"* indicates that there is an urgent need to implement the new policy, while the word *"instrument"* signifies the new policy as a means to achieve education goals. The words chosen portray ideologies which suggest that the new policy should be immediately implemented to improve the quality of education in Indonesia.

3.4 The New Policy Will Serve Excellence

The actors of policy making constructed perception that the new policy will serve excellence compared to the old policy. The ideology construction was done by contrasting the characteristics of both policy.

(5) Pelaksanaan kurikulum 2013 disiap-kan secara matang, mulai menyiap-kan materi buku pelajaran, pelatihan bagi guru dan persiapan lainnya, *sedangkan*sebelumnyatak pernah dilakukan pelatihan guru untuk persiapan kurikulum pendidikan. Sekarang, guru dilatih tetapi masih diprotes.

(The implementation of curriculum 2013 has been well prepared, start from materials in text books and teachers training and others, **while before, teachers training never existed**. Now, teachers training is provided, but it still brings protests).

Context: It was mentioned by the elites to respond to protests delivered by some teachers through a demo.

In citation (5), the actors of policy making made use of coherence marker "*while"*to show the advantage of the new policy. The use of comparison-contrast coherence marker in the utterance had a purpose to compare the old policy with the new one. The actors explained the facts which became the excellence of the new policy. By doing so, the actors displayed the old policy bad image. The perception constructed public opinions that the old policy should be immediately replaced.

3.5 The New Policy Will Meet the Needs

The policy makers formed public perception that the new policy produced will meet present needs. The construction of ideology was done to justify the new policy which was being prepared.

(6) Dalam pembuatan kurikulum terdahu-lu, penetapan mata pelajaran selalu didahulukan, akibatnya anak-anak dibebani banyak mata pelajaran. **Kini dengan Kurikulum 2013, kita ganti paradigmanya, kita teliti dulu apa sih yang diperlukan oleh anak didik kita,** baru dirumuskan dalam mata pelajaran sehingga nanti tidak ada ceritanya anak SD kelas tiga mendapatkan materi mengenai lembaga-lembaga tinggi negara. *Memang tidak salah, tapi untuk apa?*

(In formulating the previouscurriculum, determiningthe subjectsalways came first; as a result, childrenare burdened bymany subjects. **Now with the2013 curriculum, wechangethe paradigm, we examinefirstwhat isneeded byour students**,and then it will be formulatedin the subjectsso thatthere would not bea storythat the third graders in elementary school learn high state institutions.**It was not wrong, butwhat was it for)?**

Context: It was spoken by the elites in a Curriculum 2013 socialization.

Theexcerpt(6) shows that theactorsconvinced the public that thenew policy isproduced in accordance withthe needs ofchildren today.Throughthespeech, the actorwanted toemphasizethat thenew policyhad been carefully consideredandwould beof great benefit tolearners. The actorutilized a rhetorical question"*It was not wrong, butwhat was it for*?". It meansthat thepreviouscurriculum contentcould not fulfill the students' needs. Besides, theactorrepeatedly used pronoun*we* which can ostensiblyinvolve public directly inpolicy formulation. The use of pronoun*we* functioned toinstillthe perceptionthat thenew policyis the result of discussion between policy makersand the public.

3.6 The New Policy Success Depends on Public Support

Thepolicy makersemphasizedthe effect ofpublic supporton the policy implementation success. The actorssoughtto gain supportby showingthe importanceofpublic participation.

(7) Pemerintah tentu ***tidak bisa sendirian*** dalam merealisasikan pembenahan sistem pendidikan. ***Tanpa dukungan segenap lini***, pendidikan yang lebih baik hanyalah angan-angan belaka.
(Government **alone of course are not able** to improve the education system. The dream of better education only stays the same **without any supports from the public)**.

Context: It was told by the elites to explain the implementation of Curiculum 2013.

In excerpt (7), the policy makers used negation*alone are not able*and *without any*

*supports from the public*to illustrate the importance of public support in generating the new policy. This language feature was utilized by the actors of policy making to show that the government has ties to the elements of society. Ideologically, the actors intended to give the message that society also plays an important role. They utilized negations to persuade the public to support the new policy.

3.7 The Limitiation of the New Policy is Acceptable

The policy makers made use of proclamation as a strategy to construct public opinions. They wanted to prove that every policy owns weaknesses. Therefore, it is natural that pros and cons exist during its formulation process.

(8) Fenomena pro dan kontra secara terbuka atau sembunyi-sembunyi di era demokrasi ini tidak bisa dihindari. **Kita sangat menyadari bahwa pada hakikatnya tidak ada di dunia ini yang sempurna termasuk Kuri-kulum 2013**, kecuali kebenaran milik Allah Swt. Karena itu, yang penting kita selalu berusaha mencari solusi yang dijumpai di balik kebijakan Kurikulun 2013 tersebut.
(The open or covertly pros and cons phenomenon in this democratic era is inevitable. **We are all aware that nothing in this world is perfect, including curriculum 2013**, except for the truth belongs to God. Therefore, it is important that we always try to find solutions that lie behind the Curriculum 2013 policy).

Context: Kemdikbud (Ministry of Education and Cultural Affairs) elites responded to a number of Curriculum 2013 policy weaknesses, which were delivered by the elements of society.

In citation (8), the actor realized that the new policy has a number of limitations. He used two proclamations to approve the new policy out of a number of criticisms and shortcomings. They are 1) pros and cons as a natural phenomenon and 2) the perfection belongs only to God.Through those two proclamations, the actor attempted to shape public opinion so that the new policy can be understood and accepted. To influence the public, the policy makers utilized the negation "*nothing in this world is perfect*" and personal pronoun "*we*". The use of negation aimed to proclaim that a shortage of the new policy is a common thing.

Pronoun "*we*" was chosen to embrace the public.

4. Discussion

The findings have showed that the policy makers constructedmany different ideologies in various texts produced. The ideologies produced can be divided into two main parts that are the text producer perspective towards the old policy that has been/being implemented and the perspective of the new policy that will be enforced. Against the old policy, the policy makerscreated the image that the policy was unsuccessful, contained failure, and could not meet the needs. Instead, the new policy was legitimized with a good image; it is needed and it will provide future success. The ideological construction can be understood as an attempt that was made by the policy makers to gain legitimacy and public support for the enforcement of the new curriculum policy. The results of this research are in line with van Dijk's (2006), which suggests that ideology has the function to legitimize actions. Through the construction of an ideology, the actors of policy making legitimized the new policy as a policy which is good, true, eternally, and needed by the public.

In the process of producing ideas, the policy makers placed themselves as the right party; on the other hand, those who critiqued the policy acted as a wrong party. The policy makers dominantly controlled public discourse which is published as articles. This finding is similar to what Fairclough (1989) believed that one of the forms of power is an opportunity to get wider access. The actors of policy making had an access to writing opinions in mass media, holding a press conference, and becoming the news resources. Wider access was used to create an image towards the new policy established as well as to construct public perception. The opportunity to get wider access was due to their social status; as an official, someone with authority, and a policy maker.

An analysis on text dimension shows that the policy makers utilized language features which contain ideologies. The ideologies constructed were represented by various language features, including; 1) negation, 2) vocabulary items struggled, 3) comparison-contrast coherence marker, and 4) pronouns. Those features have become tools to carry the policy makers' ideology. They reflect the policy makers' belief, perspectives, and way of thinking towards curriculum policy in Indonesia. This is in line

with Santoso's idea (2012) that language produced in texts represents the writer's perspectives and way of thinking.

Negative sentences wereone of language features which wasdominantlyused in the texts produced by the curriculum makers. The high frequency of negations use was due to comparative method applied by the policy makers; they compared the old policy to the new policy. In the ideas presented, the policymakers created a bad image of the old policy. To describe the old policy, they utilized negative sentences. Expressions found in this context include; *never dignified, not entirely true,* and *never existed*. Those expressions marginalized the old policy. On the other hand, that negation was also used by the policy makers to engage the public emotionally in the new policy. This was reflected in the use of negation *government alone are not able*, *the dream of better education only stays the same without any supports from the public.* The use of this language feature can be interpreted as an attempt to touch the reader's emotions. This finding is consistent with Santoso (2012) who defines ideology as a systematic attempt to institutionalize the idea by using language as the main medium.

The actorsof policymaking repeated the use of *quality improvement*. Santoso (2002) mentions that using a word repeatedly indicates a vocabulary struggle. The "*quality improvement*" was used repeatedly to show that the old policy has not succeeded in improving the quality of education. It was also aimed at legitimizing the new policy as a policy needed to change the quality of education. Integrating "*quality improvement*"with the word*intervention*and *instrument* is the policy makers' effort to convince the public that policy makers would make steps and need means to achieve the quality improvement through the implementation of the new policy. The finding is in line with the view which suggests that the choice of word or specific lexical item describes the attitude of the author/speaker on the topic written/spoken(Mayr, 2008). The words *quality improvement, intervention*, and *instrument*contain an ideology which is intentionally chosen by the texts producers.

Coherence markers were utilized by the policymakers to create a dichotomy between the new policy and the old policy. By using *"while",*they put both of them in two opposite sides. The use of comparison-contrast markers facilitate the public to

compare both policies. The results of the analysis shows that the actors of policy makingincluded the coherence markers in the texts as a means of marginalizing (creating a negative image) the old policy and at the same time, promoting a good image of the new policy. This is in accordance with the opinion stated by Fairclough (1989), which suggests that each choice of language has a certain ideological significance.

Personal pronoun *we*was used by the actors of policy making to engage the public in formulating the new policy. The use ofpronoun *we* has made an impression that the public is a part of the policy. The new policy was initially begun as a common property (between the public and the policymakers). The situation would be different if the actor usedpronoun *we (my groups)* or *me*; it would create a gap between the policy makers and the public. By utilizing pronoun *we* (you and I), the policy makers together with the public were announced as the owner of the policy. There was no distancebetween them. This is in line with Fairclough's idea (1989), which suggests pronouns *we*indicates ideological significance which implies unity and togetherness between the parties involved in the discourse.

The results of the analysis on the texts dimension refined previous research findings by Woodside-Juron (2011). The research was conducted on reading policy documents in the USA. Their findings suggested that the texts producers made use of information structure and coherence markers to shape public opinions. It was found that negation and vocabulary items chosen by the policy makers contained an ideology to create a good image of the new policy.

From the discourse practice perspective, the results of the present research depicted that the actors of policy making defined public critiques on the new policy as refusals, ignorance, and perplexity. Those perspectives distorted texts produced by the actors. Their points of view reflected on texts were influenced by bureaucracymental. In a *top-down* bureaucratic culture, the elites/the officials control the policy-making process while the public act as the recipients.

From the sociocultural perspective, the textsproduced by the policy makers can be explained from two aspects, social and political access. The policymakers have wider access to communicate with the media

through interviews, press releases, press conferences, and news. As the authorities, they can easily socialize, hold trainings, and publish articles. The potential access is used to form public opinions, to control their beliefs, attitudes, and their perception. The society life in democratic country like Indonesia has contributed to the efforts. Unlike in the previous period where policy making never involved public participation, the democratic era makes the policy makers interpret public critiques as a refusal.

This finding is similar to Alméciga's (2012) about language learning policy in Columbia. It was found that policy discourse produced by the Ministry of Education in Columbia was oriented to maintaining ideology. The findings of this research and the Alméciga's have revealed that public policy discourse is strongly related to power. The policy makers representing the country control the texts distributed to the public. The power and the authorities that they hold are used to convince the public to accept the new policy as a need. The policy makers need to create a good image of a new policy which has invited critiques and protests from the public.

5. Conclusion

The results of this research show that the actors of policy making constructed various ideologies in argumentative texts produced in mass media. These ideologies which were represented through texts are the efforts made by the actors to legitimize the new policy. They created a good image of the policy and left an impression that it would be needed by the public. Those findings emphasize that public policy discourse is tightly bound to the ideology practice and power.

The policy makers utilized language features to shape and influence public perception. The results of the analysis indicated that 1) negations, 2) vocabulary items struggled, 3) comparison-contrast coherence markers, and 4) pronouns were used by the actors in their produced texts. These features helped them to portray the failure of the old policy and promise the public that the new policy is the best solution to the future so that they need to support the decision.

Many different ideologies are constructed to image public policy. It is done to show that the authorized party has an access to control the texts production. Public perception is controlled by the actors of policy making who have power and access.

Therefore, a critical analysis on public policy discourse is worth doing to explain how ideology is embedded into a policy.

6. References

Alméciga, W. Y. E. 2012. Identity-Forming Discourses: A Critical Discourse Analysis on Policy Making Processes Concerning English Language Teaching in Colombia, *Profile, 15*(1): 45-59.

Creswell, J. W. 2013. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (*Third Edition).* Los Angeles, London, New Delhi, Singapore, Washington DC: Sage

Fairlclough, N. 1989. *Language and Power.* New York: Longman, Inc.

Fimyar, O. 2014. What Is Policy? In Search of Frameworks and Definitions for Nonwestern Contexts, *Educate*, *14*(3): 6-21.

Hajer, M. 2003. A Frame in The Fields: Policy Making and The Reinvention of Politics. In Hajer and Wagenaar (Eds.), *Deliberative Policy Analysis: Understanding Governance in the Network Society* (page 88-110). Cambridge: Cambridge University Press.

Hewitt, S. 2009. *Discourse Analysis and Public Policy Research.* Centre for Rural Economy Discussion, Paper Series No. 24, Newcastle University.

Mayr, A. 2008. *Language and Power: An Introduction to Instutional Discourse.* London and New York: Continuum.

Robertson, S. L. 2012. Signposts in 'Doing' Critical Transnational Educational Policy Analysis. Bristol: The Centre for Globalisation, Education and Societies, University of Bristol, Bristol, UK.
*Online.*http://susanleerobertson.com/publications/

Santoso, A. 2011. *Membaca Wacana Publik Secara Kritis*. Naskah Pidato Pengukuhan Guru Besar dalam Bidang Ilmu Wacana yang Disampaikan dalam Sidang Terbuka Senat Universitas Negeri Malang pada Tanggal 26 Oktober 2011.

Santoso, A. 2012. *Studi Bahasa Kritis: Menguak Bahasa, Membongkar Kuasa.* Bandung: Mandar Maju.

van Dijk, T. A. 2006. Ideology and Discourse Analysis,*Journal of Political Ideologies*, *11*(2): 115-140.

Thomas, L. and Shan Wareing. 1999. *Language, Society, and Power: An Introduction.* USA and Canada: Routledge.

Woodside-Jiron, H. 2011. Language, Power, and Participation: Using Critical Discourse Analysis to Make Sense of Public Policy. Dalam Rebecca Rogers (Ed.), *Critical Discourse Analysis in Education* (page 154—182). New York & London: Routledge*.*

The English Proficiency of Nursing Science Students in Palembang, South Sumatra

Agus Wahyudi [*]

Program Studi Ilmu Keperawatan, STIK Bina Husada Palembang, Indonesia[1]

wahyudiagus.aw@gmail.com

Abstract

The study was aimed at finding out how the D3 nursing science students perceive their own English proficiency. The data were collected using a TOEFL test. For the purpose of the study, 120 students had been selected by using pusposive random sampling technique as the research sample. The findings of the study showed that 65.51% of the students were in elementary level of English proficiency. It meant that the students can only make questions and short statements and have limited communication ability and often repeat a lot while communicating. The results showed that in term of semester, 5th semester students English proficiency was higher than 1st and 3rd semester, in term of school Poltekkes is better than that of other schools

Keywords: English proficiency, Nursing Science Students, South Sumatra

1. Introduction

As an international language, English plays an important role in making people acquire knowledge, information, skills in communication in order to compete with other people in the international level. For example, those who master English can easily communicate with people from other countries in English and can read scientific books written in English. In Indonesia, there is a great demand for the people to learn English both in formal education and in non-formal education. In order to take an active part or even to survive in the present state of technological advancements and rapid growth of the globalization, someone has to have proficient mastery of the English language.

Language proficiency is a person's skill in using a language for a specific purpose (Richards, 1997). It refers to the degree of skills with which a person can use a language. It can be seen as a goal and thus be defined in terms of objectives or standards. These can then serve as criteria to assess proficiency as an empirical fact, that is, the actual performance of given individual learner or groups of learners. Proficiency ranges from zero to native-like proficiency. The zero is not absolute because the second language learner as speaker of at least one other language, his first language, knows language and how it functions.

Proficiency may be measured through the use of proficiency test; it is a test which measures a person's skill in using a language for a specific purpose. McKeuon (2005:2) argues that having been developed in the mid 1960s, the TOEFL has become the major standard of measuring proficiency in English as a second or foreign language throughout the world.

One of the tests used to measure the students' English proficiency is TOEFL. The purpose of the Test of English as a Foreign Language (TOEFL) is to evaluate the English proficiency of people whose native language is not English. The test was initially developed to assess the English language proficiency of international students desiring to study at colleges and universities in the United States and Canada, and this continues to be its primary function. Furthermore, students need TOEFL practice scores to apply for a job or to further their study, because language proficiency refers to the degree of skill with which a student can read, write, speak or understand the language. In order to go abroad, a nurse, besides having skills in nursing, the students should fulfill the TOEFL requirement. The English proficiency requirement for a nurse is 550 in the USA, 500 in the Middle East for TOEFL, 700 in the Australia for IELTS. The salary offered by the abroad hospital is quite amazing, it ranges from 11 million to 60 millions per month, while in Indonesia their salary ranges from 1 million to 5 millions per month and depends on the hospital policy.

Over a period of three years from 2007 to 2009, on of the education Companies called Education First (EF) ranked the English proficiency among a broad population in 44 countries and territories. The results showed that Asia's performance was lower than expected, in light of the amount spent on private English training and Indonesia was in the 34th rank or in the very low proficiency level out of 44 countries and territories in the survey (EF : 2011)

Moreover, PPNI (*Persatuan Perawat Nasional Indonesia*) reported that there are 100.000 unemployed nurses in Indonesia, due to the low growth of the hospital and the inability to speak a foreign language. Ironically WHO reported that the world still needs 2 million nurses.

Based on my preliminary interview on some nursing science students' opinion about English, that some students like English and some do not. For those who like English, they usually find it easy to lean the language and for those who do not like English, they usually find it difficult to learn. The students who do not like English think that English is difficult in terms of grammar and pronunciation. According to Bandura (1986:390), many students have difficulty in school not because they are incapable of performing successfully, that they have learned to see themselves as incapable of handling academic skills. Furthermore, the lecturers gave information that the students were not really active in learning English. They had bad score in English subjects and seldom checked out books from library to get references.

2. Methods

The researcher used descriptive study in conducting the present research. In this research, he would like to find out nursing science students' English proficiency of five health schools in Palembang, South Sumatra, Indonesia.

One of the tests used to measure the students' English proficiency is TOEFL (Test of English as a Foreign Language). The Test of English as a Foreign Language, or TOEFL evaluates the ability of an individual to use and understand English in an academic setting. The TOEFL test used was paper based TOEFL (PBT) in which speaking skill is not tested in this kind of test.

The writer used the TOEFL scoring as it is ranged in table 1:

Table 1

TOEFL-PBT scores and proficiency

Score	Proficiency level	Description
380	Elementary	Basic, simple conversations
450	Intermediate	- Initiates conversation - Emerging grammar skills - Can read simple texts
550	Working	Meet routine social demands
630	Advanced	Approaching native proficiency

Source: http://www.kaptest.com

The population of this study is the 1st, 3rd, and 5th semester students of D3 nursing school students of AKPER Depkes, AKPER Kesdam II/Sriwijaya, AKPER Aisyiyah, Stikes Siti Khadijah and Stikes Muhammadiyah which consists of 360 males and 742 females in the academic year of 2011/2012.

3. Discussion of Results

From the data obtained it was found that the number of female students was 59 and the male students was 57 (4 students were excluded because of the data were not complete). The participants of this study represented five nursing science schools in Palembang-Akper Kesdam II Sriwijaya, STIK Siti Aisyah, STIK Siti Khadijah, STIK Muhammadiyah, and Poltekkes Palembang. They were asked to indicate their English proficiency.

The data were also analyzed to see the mean score and standard deviation of students' English proficiency based on school, gender and semester.

Table 2
Students' English proficiency based on school, gender and semester.

No	Variables Measured		English Proficiency	
			Mean	SD
1	Average		367.25	29.921
2	School	Kesdam II	358.63	22.525
		Aisyiyah	348.00	19.391
		Siti Khadijah	378.52	36.789
		Muhammadiyah	359.96	26.565
		Poltekkes	393.65	19.862

3	Gender	Male	367.51	27.545
		Female	367	32.285
4	Semester	Semester 1	356.62	29.753
		Semester 3	369.60	25.135
		Semester 5	376.63	32.239

The mean of the students' English proficiency was 367.25 (Standard Deviation = 29.921). The highest score was 443 and the lowest score was 300. Based on school, Poltekkes got the highest mean, in term of gender, both female and male got the same mean, and in term of semester, the 5th semester got the highest mean of all semesters.

The English proficiency was grouped into four categories; advanced, working, intermediate and elementary. Based on TOEFL test result, it was found that 0 (0%) students in advanced and working categories, 40 (34.49%) were in intermediate category and 76 (65.51%) were in elementary category. Figure 1 describes students' English proficiency

English Proficiency
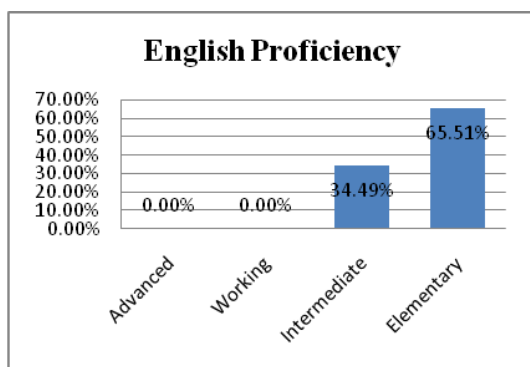
4. Conclusion

Reviewing from the aspect of English proficiency, that is reading comprehension, it was found out that Indonesian students scored an average 402 in the reading literacy, whereas the mean international score was 493 or in the 57th rank out of the 65 countries participated in the survey (PISA, 2009). International Indonesian English Foundation (2004) said that students with TOEFL score between 350-399 may only use memorized phrases in emergencies, can only make questions and short statements and have limited communication ability and often repeat a lot while communicating. In line with those statements above, some students with TOEFL score below 380 can be said to having high tendency to only guess the answers. Meanwhile, only a few of them (34.46%) are able to talk about the topic that he or she is familiar with, to have limited English capability and competency, and to repeat a lot while communicating.

Furthermore, the exposure to English in Indonesian students' proficiency is very limited. It is different if English is used as a second language in the content where English is used in daily communication. The limitation of the use of English as the target language makes it difficult for the students to practice their English. It must also be affected by their attitude and motivation with the fact that English subject may seem to be difficult for Indonesian students since English as a foreign language in Indonesia.

In line with the findings of this study, the fact that students' English proficiency of Poltekkes is better than that of other schools (mean=393.65) since in the selection process, one should fulfill several requirements and the tests. Furthermore, the students must be from natural science program. Students with high ranks are usually directed to natural science and those who have low ranks are directed to social science program. Therefore, it can be interpreted that students in natural science program are usually those who have got high motivation to learn including English.

5. References

Arikunto, S. (1996). *Prosedur penelitian*. Jakarta: BumiAksara.

Asher, R.E., & Simpson, J.M.Y. (1994). *Attitude surveys: Question answer process.* In Brown, K. (Ed). *The Encyclopedia of Language and Linguistics* (pp. 254) Oxford: Pegamon Press, Ltd.

Astaman, A. (2009). *Motivating the reluctant language learner*. Retrieved from http://lana-cometorich.blogspot.com/2009/07/motivating-reluctant-language-learner.html. Accessed on February 7th, 2011

Bandura, A. (1986). *Social Foundations of Thought and Action:* A Social Cognitive Theory. Englewood Cliffs, N.J.: Prentice Hall.

Fakeye, D. O. (2010). Students' personal variables as correlates of academic achievement in English as a second

language in Nigeria. *Online Journal*, retrieved from http://www.krepublishers.com/02-Journals/JSS/JSS-22-0-000-10-Web/JSS-22-3-000-10-Abst-PDF/JSS-22-3-205-10-775-Fakeye-D-O/JSS-22-3-205-10-775-Fakeye-D-O-Tt.pdf accessed on June 7th, 2011.

PD IPM Kabupaten Jombang (2009) *Gerakan Iqra* (Online). Retrieved from http://download.mobinity.net/?m=Nwstnmxkyonvrv SRKCFq29. Accessed on March 22th, 2012

Lifrieri, V. (2005).*A sociological perspective on motivation to learn EFL: The case of escuelasplurilingües in Argentina*. Pittsburgh, PA: Pittsburgh University

OECD (2010) *PISA 2009 Results: Executive Summary*. Retrieved from www.oecd.org/publishing.corrigenda on March 3rd, 2012.

The Indonesian International Education Foundation (2004). *TOEFL*. Retrieved from http://www.iief.or.id/index.php?option=com_frontpage&Itemid=1. Accessed on August 15th, 2011

Wiersma, W. (1991). *Research methods in education,* (5thed). Needham Heights, MA: Allyn and Bacon

Williams, M., & Burden, R.L. (1997). *Psychology for language teachers: A social constructivist approach*. New York, NY: Cambridge University Press.

Zaitun (2009) The relationship between students' self perceived English proficiency and their performance in the test of English as a foreign language. (Unpublished master's thesis), Graduate school of Sriwijaya University, Palembang.

Cultural Values of the story of Ki Lapidin, Ki Asmidi, and Ki Samidin as Character Education Tools In Subang, West Java

Ani Rachmat, Lina Meilinawati R, Nani Darmayanti, Eni Karlieni,
Nandang Rahmat, Muhamad Adji

Faculty of Humanities, Padjadjaran University, Bandung, Indonesia

anirachmat@gmail.com

Abstract

This work is devoted to the analysis of the legends of *Ki Lapidin, Ki Asmidi, and Ki Samidin* in Subang, West Java. Recently, the term called character education has become a rising issue in schools, and it has slowly but surely begun to show its importance in the curriculum. The character of *Ki Lapidin* is regarded as a personal role model of kindness, responsibility, dignity, fairness and honesty to the society. Even thoug he was a heroic outlaw in Subang, he is always portrayed as "robbing from the rich and giving to the poor", he was a freedom fighter opposing oppressive of the Dutch. In our research we were guided by a set of theoretical and empirical methods of research. To obtain interpretive glosses of the communicative material we used ethnographic methods. The result shows that Ki Lapidin Ki Asmidi, and Ki Samidin are representation of fighter, who fought for the right in their own way. They are symbol of integrity of people.

Keywords: legend, cultural value, character education

1. Background

The study of folklore is the study of the cultural behavior of the people who live collectively in a community, for folklore is a documentation of the cultural wealth and diversity of a people. Bascom (1965:3-20) proposes four functions which folklore serves: (a) folklore as a system of projection that reflects the collective imagination of the people who created it; (2) folklore as a system that validates the cultural institutions of a people; (3) folklore as a means of education; (4) folklore as a means control to ensure that the social norms are observed by members of a community. Thus, the study of folklore and myth is also the study of the cultural behavior of the people among whom folklore and myth circulate.

The notion is seconded by Dundes (1965), who argues that basically, folklore is closely related to a collective tradition from which traditional knowledge is derived. In it is embedded traditional knowledge on which the life of a people's ancestors was based. At present, however, as Sims (2011) asserts, there is much more to folklore than mere traditional knowledge. Folklore is also an informal resource of learning about the world, faith, culture, and tradition. All these are uniquely and creatively expressed through the various elements of folklore, namely music, customs, practices, behavior, and materials.

A tradition results from people's perception about their natural, social, and environment. As Sedyawati (1995) underlines, from oral tradition (oral literature), one can learn about cultural facts: genealogy, cosmology, history, philosophy, ethics, morals, system of knowledge, and linguistic features. This kind of holistic expression of cultural facts that makes tradition (i.e. myth and folklore) remain significant even at the present time.

Folklore is part of oral literature. Hutomo (1991) explains that oral tradition includes (1) oral literature, (2) traditional technology, (3) knowledge circulating outside a kingdom's center or metropolis, (4) elements of religion and belief beyond the formal boundaries of major religions, (5) forms of art developing outside a kingdom's center or metropolis, and (6) customary law. The study focuses on non-metropolitan regencies, where traditional values are still strongly adhered to.

West Java is a unique province where two contrasting identities co-exist: the identity of urban communities living in the Jabodetabek area (around Jakarta) and the identity of the traditional village communities. The study takes traditional village communities as its object on the grounds that they still adhere to folklore.

Each village usually has its own folklore. The study focuses on the villages in Subang Regency, West Java, where a number of

folktales are still circulating. Certain proverbs and figurative expressions originating from these folktales are still used to educate the younger generation. Such a practice is exemplified in the way the three folkltales, namely *Ki* Lapidin, *Ki* Asmidi, and *Ki* Samidin, circulate among the people. Not only are these folktales very popular among the Subang people, but they are also sources of some proverbs or figurative expressions that are widely used in the everyday life of the people.

The paper is an attempt to inventory and document folklore from which proverbs or figurative expressions originate. The results of the inventory are analyzed by using a lingua-cultural approach to examine the interconnection between the folklores and the daily practices of the people.

2. Theoretical Background
2.1 Lingua-culturology

Lingua-culturology is an important approach in linguistics. Developing within the anthropocentric paradigm and attempting to interpret linguistic phenomena from cultural perspectives, lingua-culturology is concerned with how language and culture are interrelated. As Kartushina (2003) argues, the cultural background structured by a certain mindset and cultural formulation is a basis for lingua-cultural perception and cognition.

Because of its focus on the culture and mentality of a nation, lingua-culturology contributes to the nurturing of mutual understanding and respect in cross-cultural communication processes (Vasileva, 2002).

A study on worldview through the use of language in general and proverbs in particular enhances the scope of linguistics. Through cognitive approaches, language is seen not only as a system of lexical, grammatical, and phonological units, but also as a system of norms of communicative behavior within a certain social and ethno-cultural sphere and as a "verbal system of knowledge about the world" (Susov, 2007).

2.2 Folklore as a Foundation of Character Education

One of the functions of folklore is to educate (Bascom, 1965). When adopted in the processes of formal, non-formal, and informal education, folklore as a medium of education can nurture the character of the younger generation towards a better future (Sibarani, 2013).

Folklore can also be used to facilitate learning and teaching process. Based on the propaganda theory, folklore is also an effective medium of propaganda (Sibarani, 2013: 8).

Sibarani (2013) further argues that folklore enables ideas to be communicated within the entire scope of human life. The propaganda theory has placed folklore as a tool, means, or medium. Folklore is a vehicle to attain the goal of the many aspects of life. Provided that proper selection or adjustment is in place, folklore as a means of education can be used in the teaching of all disciplines of knowledge.

Value system is at the center of the cultural structure of a society. Value system is both a basic phenomenon and problem in human life. The value system represented in folklore is an important resource for improving a learner's knowledge.

3. Results and Analysis

Proverbs or figurative expressions are commonly used not only in literary texts, but also in conversations among native speakers of a language. Verbalization of character education through the use of proverbs is a practice common to all languages. Centuries-old proverbs reflect how the speakers of a language perceive human nature in general and specific realities in particular. Proverbs are "a collection of a nation's wisdom, constituting a part of the organized phraseology of a language" (Kunin, 2005). Therefore, paremiology, the study of proverbs/sayings/figurative expressions, is useful not only within the cognitive and cross-cultural framework, but also within an axiological framework, for paremia always includes moral, a guide to what is perceived as good or bad. In other words, while paremia constructs worldview, it also constructs an important part of a phenomenon which Alefirenko calls the value-semantic space of a language (Alefirenko, 2009).

As Danandjaja (1983) exemplifies, the part of a culture called folklore can include folk language, traditional sayings, riddles, folk poetry, folk prose such as myths, legends and folktales (jokes and anecdotes), folk songs, folk theater, folk games, beliefs, folk fine arts, folk music, and sign language. Similarly, Iskandar et al. (2004) also include folk riddle and poetry as types of folklore. The analysis of the three folktales circulating in Subang Regency focuses on "traditional proverbs" that remain in use among the local people.

3.1 The Plot

a. *Ki* Lapidin Folktale

During the Dutch occupation period, the people of Subang lived in poverty. They could not eat as they wanted. People were starving. Yet, there were some who lived in luxury. Those who lived an extravagant life were the Dutch or those who worked for them. However, those who were more fortunate did not care about those who were not. An old man called *Ki* Lapidin—*'ki'*: literally grandpa, a form of address for an elderly man—felt sympathy for the suffering of the people. Being a brave man, *Ki* Lapidin helped his neighbors by stealing. He stole from the rich and gave what he stole to the poor.

Many a times had *Ki* Lapidin been arrested and was brought to a trial. However, thanks to his sharp wit, he was always able to get away from punishment. It was his skill of arguing that made him famous. However, one day he was once again caught, but this time, his eloquence failed him. *Ki* Lapidin was sentenced to death by hanging. He accepted his fate. Yet, he had one condition. Before he was hanged, he wanted to hear his favorite song "Kembang Gadung" sung for him.

The story is the source of the figurative phrase "*tampik Lapidin*", an expression used to refer to a person who is skilled in evading blame by arguing.

b. *Ki* Asmidi Folktale

Once there was an old man called *Ki* Asmidi. He was a greedy man who never shared anything equally. He always found a way to get a bigger share. One day he was going to divide his crop. He found a place where he could share his crop his way. He found a spot on the ground that had been stepped on by a water buffalo. He divided to crops on the ground, but made sure that his was put exactly on the spot where the buffalo had made a deep impression on the ground. Perhaps the ground was still wet when the buffalo stepped on it. Thus, the crop piles looked the same, but actually *Ki* Asmidi got a bigger share, thanks to the buffalo's footstep.

This folktale gave birth to the figurative phrase "*babagi* Asmadi" (literally sharing à la Asmadi) to refer to a situation where a person shares something unequally.

c. *Ki* Samidin Folktale

Ki Samidin was a lucky man. He broke wind very often. Every time he did it, it always made a loud sound. In the village where *Ki* Samidin lived, an empty house had long been abandoned by its owner. The head of the village planned to allow someone to live in it and take care of the house. He made a public announcement that whoever could break wind and made the loudest sound would get the house. The winner was predictable. *Ki* Samidin made sure that he made the loudest sound.

Until today, when one gets a fortune out of luck, the expression "*ladang hitut meunang balé*" (owning a house by farting) is still used.

3.2 Character Education in *Ki* Lapidin, *Ki* Asmidi and *Ki* Samidin Folktales

As Sibarani (2013) argues, folklore is a strategic medium to express important ideas in all aspects of life. In other words, folklore is an effective medium of education. Bascom (1965:3-20) proposes four functions which folklore serves: (a) folklore as a system of projection that reflects the collective imagination of the people who created it; (2) folklore as a system that validates the cultural institutions of a people; (3) folklore as a means of education; (4) folklore as a means control to ensure that the social norms are observed collectively by members of a community. The following paragraphs will discuss how the four functions of folklore are fulfilled by the three folktales from Subang above.

a. Ki Lapidin, Ki Asmidi, & Ki Samidin: Projection of Collective Imagination

The three folktales are a projection of the collective imagination of the people among whom they circulate. Members of a community generally share a notion of an ideal life. This is what is called a collective imagination. The three folktales represent the collective imagination of the Subang people.

In the tale of *Ki* Lapidin, there are two aspects of collective imagination. The first is related to the notion that social gap normally exists in any society. There are people who live in poverty and starvation, and there are those who live in abundance. The second is related to a longing for a leader who can lift people out of such a deplorable life. Yet, this ideal is not fulfilled. The absence of such a character is compensated by the presence of a hero. The hero is represented by the character *Ki* Lapidin, a brave man who gives food to the poor by stealing from the rich. Based on the interview with some informants, what *Ki* Lapidin does comes

from "a good intention; the means may be bad, yet the end is good". This trait is comparable to that of Robin Hood, who robs the rich to help the poor. In this case, the people who adhere to the folktale may not be wrong in judging *Ki* Lapidin's character for in their perspective, the good value exceeds the wrong.

The story of *Ki* Asmidi reflects a didactic collective notion that a greedy person will not get honor out of their greed. All the versions of the story, which were gathered through interviews with informants, have no closure. Without an end, it is difficult to draw any conclusion about the collective imagination reflected in the folktale. However, the didactic value against *Ki* Lapidin's trait is so strongly reflected in the story that it finally ended up as a figurative expression still used today.

Ki Samidin's story presents another aspect of collective imagination. Being rich without any effort is a wish many people may have despite the opposite reality. However, luck could happen to anyone, and *Ki* Samidin is luck to win a house only by "farting loudly". Thus, until today, people allude to *Ki* Samidin's story to express their envy of or criticize someone who gets luck without hard work.

b. Ki Lapidin, Ki Asmidi, and Ki Samidin: Validation of Cultural Institutions

Soerjono Soekanto defines social institutions as a collection of norms related to the activities to fulfill basic needs in the life of a community. Generally, social institutions function:

a. to provide a guidance of conduct to overcome social problems;
b. to maintain social integrity;
c. as a means to control the social behavior of community members.

The three stories discussed in this paper attempt to serve all the functions of social institutions above. The end of the story, when *Ki* Lapidin finally meets his death by hanging, serves as a guidance that despite the figurative expression "*niatna sae-lampahna awon-hasilna sae*" (good intention, bad means, yet good end), what *Ki* Lapidin does is still wrong.

Similarly, people allude to *Ki* Asmidi's story to refer to a greedy person. Despite the absence of an end, the story is a lesson for people to avoid greed. The story is perpetuated in the form of a saying that becomes a guide of conduct.

The story of *Ki* Samidin exemplifies how the third function of social institutions work as a

means of social control. Luck befalls anyone. Those who are unlucky should accept other people's luck with an open heart. The story of *Ki* Samidin serves as a reminder that a one's life is unpredictable and that one should not envy someone else's luck.

c. Ki Lapidin, Ki Asmidi, and Ki Samidin: Means of Education

People are constantly bombarded with information, including stories (folktales) and myths. From generation to generation, both folktales and myths even serve as a set of "rules" for their adherents. Thus, folktales have been used as a means of indirect education. Folktales contain noble individual, social, religious moral values.

As the following table illustrates, the three folktales studied contain these three values.

Table 1: Moral value of the folktales

Moral Values in the Three Folktales			
Means of Education	**Individual Moral Value**	**Social Moral Value**	**Religious Moral Value**
Ki Lapidin	Willing to sacrifice himself and help others.	People should help one another. The have should help the have not.	A crime is a crime, even if the intention is noble.
Ki Asmidi	Untrustworthy; self-deceiving	Unfair, greedy, causing others loss	There is no blessing in gaining fortune by deceiving others
Ki Samidin	Steadfast. Life is often unpredictable.	Do not envy other people's fortune.	One should be thankful for all the fortune he/she has.

a. Ki Lapidin, Ki Asmidi, and Ki Samidin: Means to Control Social Norms

Social norms are unwritten rules that regulate the way people should conduct their life in society. Social norms imply moral sanction as an important element of social control. According to David Berry (1982), the main element of a norm is the social pressure on individuals to observe norms. Norms as a non-material element of culture can prevent one from acts of vice or negative influences from others. Norms or social codes of conduct basically provide guidelines on how one should behave in social life. Soedjono Dirdjosisworo (1985)

defines social codes of conduct as a set of written or unwritten rules on what is socially considered as a good or decent and bad or indecent conduct.

The social norms taught in the three stories are documented as figurative expressions, of which meaning is presented in the following table.

Table 2: Figurative expression

	Figurative Expression	Social Norm
Ki Lapidin	**"*Tampik Lapidin*" (Arguing à la Lapidin)**	**One who is skilled in evading blame will one day fail to do so.**
Ki Asmidi	**"Babagi Asmidi" (Sharing à la Asmadi)**	**One must be fair in all trades.**
Ki Samidin	**"*Ladang Hitut Menang Bale*" (Owning a house by farting)**	**Life is sometimes full of luck and surprises. One should not envy other people's fortune. One should be thankful for what he/she has.**

4. Conclusion

The oral tradition that has been passed down to many generations is still worth preserving, as it is still relevant until today. Adjustment must be made as time changes. Folklore contains values and norms that are still relevant for the collective life of people. Folklore can serve as a filter against the negative effects of the progress of science and technology in this globalized world. The three folktales that circulate in Subang Regency reflect the values and norms that still characterize the people of Subang. People can still adhere to the folktales in their collective life.

5. References

Alefirenko, N.F. (2009). Frazeologija i Paremiologija. Mosccow: Flinta.Nauka

Bascom, William. (1965). Four Functions of Folklore. Englewood Cliffts. NJ Pretice.

Danandjaja, James. (1984). Folklor Indonesia: Ilmu Gosip, Dongeng, dan Lain-Lain. Jakarta: Grafiti.

Danandjaja, James. (1988). "Pendekatan Folklor dalam Penelitian Bahan-bahan Tradisi Lisan". Dalam Pudentia (ed.). *Metodologi Kajian Sastra Lisan*. Jakarta Yayasan Obor Indonesia dan Yayasan Asosiasi Tradisi Lisan.

Dundes, Alan (ed). (1965). The Study of Folklore. New Jersey. Prentice-Hall, Inc.

Dundes, Alan. (2007). Meaning of Folklore . Utah: Utah State University.

Hutomo, Suripan Sadi. 1991. Mutiara yang Terlupakan; Pengantar Studi Sastra Lisan. Surabaya: Hiski Jatim.

Kartushina, E.A. (2003). Gendernye aspekty frazeologii v massovoj kommunikatsii. Izhevsk. Russia.

Kunin, A.V. (2005). Kurs frazeologii sovremennogo anglijskogo iazyka. Dubna. Russia.

Sibarani, Robert. 2013. Folklor Sebagai Media Dan Sumber Pendidikan: Sebuah Ancangan Kurikulum Dalam Pembentukan Karakter Siswa Berbasis Nilai Budaya Batak Toba in *Folklor Nusantara: Hakikat, Bantuk, dan Fungsi, /Suwardi Endraswara, ed.*

Sedyawati, Edi. 1995. "Kedudukan Tradisi Lisan dan Ilmu-Ilmu Sosial dan Budaya". Makalah Semiloka Tradisi Lisan Nusantara 1-21 Juni di Malang.

Sims, C. Martha. 2011. Living Folklore. Utah: Ohio State University.

Susov, I.P. (2006). Istoriya iazykoznaniia: [uchebnik] federalynoe agenstvo po obrazovaniiu, Tver. Russia.

Vasileva, G.M. (2001)Lingvokulturologicheskie aspekty russkoj neologii. SPb. Russia

Dealing with the Students' Foreign Language Anxiety in Speaking Course

I Putu Indra Kusuma, Luh Diah Surya Adnyani

English Education Department, Ganesha University of Education, Singaraja-Bali

Indrakusuma.eed@gmail.com

Abstract

One major failure in mastering speaking skill was caused by Foreign Language Anxiety (FLA). Thus this present study aimed at investigating Foreign Language Anxiety of English Education Department's students. This study belonged to descriptive study in which the participants involved were 70 out of all EED's students in the second semester in the academic year of 2014-2015. The data was collected through administering FLCAS questionnaires and it was described qualitatively. The results showed that students' FLA ranged from poor to very high where the highest amount (46 students) was in high category. However, there were some solutions for both lecturers and students to conduct to reduce the students' FLA. Based on the above results, it can be concluded that the FLA's amount of EED's students was high and it should be decreased by implementing some solutions.

Keywords: *Anxiety, Foreign Language Anxiety, Foreign Language Anxiety in Speaking Course*.

1. Introduction

Being able to speak in English becomes one of everybody's great intensions since it has become the most spoken language in many aspects in the world. Especially, for the countries in which English is treated as foreign language. For example In Indonesia, Many efforts such as joining in English courses, learning English from early ages, etc., has been conducted to have this skill.

Somehow, some of Indonesians still fail in achieving this speaking skill. They find themselves are difficult to speak in English when they are involved in such situations which requires them to use English as the medium of communication. It seems hard to recall all expressions they have learned in English courses they got since elementary until Senior high schools.

Even, the students of English departments in some situations face difficulties in speaking English, especially talking with native speakers. They found some difficulties such as responding with inappropriate expressions, a delaying situation to think about the correct expressions to respond to, freezing up, forgetting words and expressions, etc. In fact, as the students of English departments, they have learned all the expressions in English, they have practiced all situations by using English, and they use English in their daily courses.

Furthermore, an investigation had been conducted in English Education Department Ganesha University of Education to investigate the early semester students of English Education Department. Based on the preliminary observation conducted, it was found that most students did not actively speak in English. Furthermore, few students spoke slowly and sometimes they revised their grammar during the communication. These facts were supported by the result of interview where they confessed that they were less-confident and were afraid of using English when they found their mates were good at using English in communication. Therefore, those affect their scores in speaking course. Probably, all situations stated above were caused by one of the major factors that was anxiety**.**

Anxiety is the subjective feeling of tension, apprehension, nervousness, and worry associated with an arousal of the autonomic nervous system (Spielberger, 1983 in Horwitz, 2001). In relation with learning, Horwitz (2001) states that anxiety has been found to interfere with many types of learning and has been one of the most highly examined variables in all of psychology and education.

Anxiety can be categorized into three types such as *trait anxiety* which refers to anxiety as an aspect of personality, *state anxiety* which refers to an apprehension experienced at a particular moment in times as a response to a definite situation, and *situation-specific anxiety* is related to

apprehension unique to specific situations and events.

Dealing with speaking skill and aforementioned situations, the type of anxiety which mostly deals with speaking is situation-specific anxiety. As stated by Horwitz et al. (1986) in Horwitz et al. (1986) "when anxiety is limited to the language learning situation, it falls into the category of specific anxiety reaction". For more specific, they defined Foreign Language Anxiety (FLA) as a term of situation-specific anxiety which deals with speaking ability. To support above explanation, Foreign Language Anxiety (FLA) as stated by Han (2013) is associated with speaking in foreign language learning. Furthermore, Horwitz (2001) stated that foreign language anxiety was responsible for students-negative emotional reactions to language learning and FLA itself is generally viewed in public speaking.

Foreign Language Anxiety (FLA) is "a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process" (Horwitz et al., 1986 in Han, 2003). Furthermore, Horwitz et al. (1986) state that foreign language anxiety covers three uni-dimensions such as communication apprehension, test anxiety, and fear of negative evaluation.

Communication apprehension is a type of shyness characterized by fear of or anxiety about communicating with people. Test-anxiety refers to a type of performance anxiety stemming from a fear of failure. Furthermore, Fear of negative evaluation is an apprehension about others' evaluations, avoidance of evaluative situations, and the expectation that others would evaluate oneself negatively (Horwitz et al, 1986).

Talking about the speaking ability possessed by the students of English Education Department as shown by the results of preliminary observation above, it was urgent to investigate students' FLA since they were prospective English teachers and they were expected of being able to speak in English fluently in every situation in the classroom.

Therefore, this study purposed at investigating The FLA of EED's students in speaking course.

2. Methods

This study belonged to a descriptive study. The participants were 70 students out of all EED's students in the second semester in the academic year of 2014-2015. The data was collected through administering 33 items of questioners using Likert Scale about Foreign Language Classroom Anxiety Scales (FLCAS) which was developed by Horwitz et al. (1986). Then, the data was described qualitatively.

3. Discussion of Results

By administering 33 items of questioners using Likert Scale about Foreign Language Classroom Anxiety Scales (FLCAS), it was found that the descriptive statistic of the scores of students' FLA were as shown by the table below:

Table 1 Descriptive Statistics of Students' FLCAS

Mean	121.41
Std. Deviation	13.98
Variance	195.46
Minimum	86
Maximum	144
Range	55

Based on the data above, it can be seen that the minimum score of students' FLA is 86 where the minimum score of the questionnaire itself was 33. Somehow, the maximum score of students' FLA is 144 where the maximum score of the questionnaire itself was 165. It means that the maximum score of students' FLA almost touches the end limit of FLA. What a surprising result since the respondents were the students of English Education Department where their daily course commonly use English as the media of communication.

The data about students' FLA, especially in frequency of each category can be seen in the following distribution table.

Table 2 Data distribution of Students' FLCAS

No	Category	Interval Class	Frequency (Students)	Relative Frequency (%)
1	Very Poor	33 – 59	0	0.0
2	Poor	60 – 85	0	0.0
3	Average	86 – 111	14	20.0
4	High	112 – 137	46	65.7
5	Very High	138 – 165	10	14.3
	Total		70	100

The data above shows that none of the students belongs to very poor category, as well as in the poor category. There are 14 students belong to average category. Most

of the students, about 46 students belong to high category. The rest of them, about 10 students belong to very high category. In other words, the data above shows that 56 out of 70 students have high FLA.

What numbers found since they are students whose majors are in English and later on they will become English teachers who will mainly use English and specifically, talk in English to their students. Furthermore, this result is not really good for the institution because this kind of anxiety can affect their performances in speaking skill. Moreover, they are in the early semester of their years at the university. In this case, they still have years to spend at the University at being anxious every time they deal with English where exactly this kind of situation will not be good for them.

As stated above, high FLA could affect their performances in speaking skill. This assumption was underlined by some previous studies which examined the relationship between anxiety and language learning. Those studies have been conducted since 1960's as stated by Horwitz (2001) that scholars have entertained the possibility that anxiety interferes with second language learning and performance. Somehow, specific studies about the relationship between foreign language anxiety were started over a decade later. Some experts such as Kleinmann (1977), Scovel (1978), Horwitz *et al* (1986), Young (1991), etc. have proven that FLA has relationship with the bad performances happen during learning foreign language, especially in speaking skill. Specifically, as stated by Horwitz (2001) that foreign language anxiety was responsible for students-negative emotional reactions to language learning and FLA itself could affect people to do bad performances at public speaking.

It is possible this high results of FLA are caused by some factors such as environment, students' characteristics, and learning process as supported by Han (2013) "researchers have identified a large number of sources of foreign language anxiety, which generally fall into four major categories, namely, the classroom environment, learner characteristics, the target language, and the foreign language learning process itself". In contrast, Young (2001) states that language anxiety arises from: 1) personal and interpersonal anxieties; 2) learner beliefs about language learning; 3) instructor beliefs about language teaching; 4) instructor-learner interactions;

5) classroom procedures; and 6) language testing. However, from the two scholars above, we can predict that FLA may arise from learners, classroom environment, and the learning process itself. Of course, it needs further research to investigate the factors cause high FLA in EED's students.

This high result of Students' FLA and the factors stated above should become the major concerns of the institution to deal with. The institution should find the solutions, specifically for all recent students who have high FLA in speaking course and majorly, those who will study at English Education Department since this institution produces prospective English teachers every year. Of course no student wants to be taught by incompetent teachers who are afraid of speaking in English, especially using English at public. Therefore, some solutions should be conducted to solve this problem.

Over a decade, scholars have proposed some many suggestions and solutions to cope high FLA. Some studies have been done as conducted by Horwitz *et al.* (1986), Foss and Reitzel (1988), Young (1991), etc. Most of their solutions are the solutions for teachers and students since overcoming the FLA is not only the responsibility of the students, but also the responsibility of teachers as the ones who conduct the instructions in the classroom. Therefore, the solutions propose in this paper to deal with high FLA must be conducted by both lecturers and students. An easy solution which may be proposed by most scholars is playing games. Instructors should be able to choose the appropriate games to create fun and enjoyable situations during instructional process. By having this fun and enjoyable situations, perhaps, the students will feel much more comfortable and not being afraid of the learning process happened. The other solutions for the lecturers as proposed by Worde (2003), there are some solutions for instructors to overcome FLA in the classroom such as (1) Pick topics to teach that are relevant to the students, (2) Try and make the learning fun, (3) Try to create a sense of community where the students feel more comfortable in front of each other. One suggestion made was to have the students sit in a circle, and (3) Avoid calling on people or putting them on the spot. These solutions perhaps can cope the three uni-dimensions (Communication Apprehension, Test anxiety, and Fear of negative evaluation) which create FLA. In additions, Foss and Reitzel (1988) suggested that instructors should ask the students to verbalize their

fear or to write their fear on the board. So, the students will recognize that they are not the only ones who have FLA. Then, together instructors and students discuss about how to cope their fears in dealing with language learning. To support this suggestion, Horwitz (1988) recommended that instructors should discuss with the students about their reasonable commitment in successful learning. Instructors should be sensitive in observing the students' conditions in learning process and try to figure out the solutions for them. Another suggestion which is appropriate to cope students fear in using English as media of communication is proposed by Leigh (2009). She recommended that instructors might implement a strategy as she called as "Happy Mistakes Zone". This strategy requires instructors to avoid correcting the students' mistakes in using English in the early of the lessons. By implementing this strategy, students do not need to fear working on perfect grammar, but rather they can just talk without feeling judged. This allows students to get a feel for fluency and letting go.

Talking about the solutions for the students, there are some recommendations as proposed by some scholars. Worde (2003) proposed a recommendation namely "Be aware". It means the students should know about their fear in language learning. Their selves are the great source of arising high FLA. Therefore they should be able to notice their fear and know that they are not alone. Fear of speaking in front of people is normal and so is performing in another language, even if it is just with your friends. Babu (2007) in Leigh (2009) proposed a recommendation as Leigh called as "Be prepared". There is not much that a student can do should the teacher have an assignment that involves speaking in front of the class or performing in some ways. However, the student can prepare ahead of time and by doing so, decrease the chances of feeling humiliated from being corrected. Being prepared also relieves stress which allows the brain to concentrate, get over irrational fears, make decisions and increase self-confidence. Another recommendation was proposed by Foss and Reitzel (1988). Foss and Reitzel suggested journal writing as a good way to help reduce language anxiety. From their journals, students can learn to recognize feelings of inadequacy. Then, probably they may find the solutions related to their fears. It may work if the students themselves want to cope their fears

and recognize the importance of being successful in language learning. Therefore, in conducting this strategy, instructors need to motivate the students to cope their own fears.

The solutions proposed above are expected to be able to decrease the high FLA. Whereas, aforementioned solutions probably do not cover all the solutions for decreasing high FLA. Somehow, as good instructors, we should be able to figure out the solutions which fit with the students' characteristics, environment, and learning process.

5. Conclusion

Based on the above findings and discussion, it can be concluded that having high FLA is not good for the students and may cause bad performances in speaking as examined by so many scholars from years to years in which FLA causes bad performances in speaking. However, there are some solutions for both instructors and students in many ways to decrease the number of high FLA possessed by the students.

7. References

Foss, Karen A. & Armeda C. Reitzel.(1988). *A Relational Model for Managing Second Language Anxiety*. TESOL Quarterly. p.437-454.

Han, Luo. (2013). *Foreign Language Anxiety: Past and Future.* Chinese Journal of Applied Linguistics. (Volume 36). p.442-464. Taken from https://www.academia.edu/10090536/A_Review_of_Foreign_Language_Anxiety. Retrieved on September, 1st , 2015.

Horwitz, Elaine K. (1988). *The Beliefs about Language Learning of Beginning University Foreign Language Students*. Modern Language Journal. (No. 72). p.283-294.

Horwitz, Elaine K. (2001). *Language Anxiety and Achievement.* Annual Review of Applied Linguistics. (Volume 21). p.112-127. USA: Cambridge University Press.

Horwitz, Elaine K., Horwitz, Michael B., & Cope, Joan. (1986). *Foreign Language Classroom Anxiety*. The Modern Language Journal. (Volume 70). p.125-132. UK: Blackwell Publishing.

Leigh, Amanda. (2009). *Overcoming Foreign Language Anxiety*. p.1-21. Waterloo: University of Waterloo. Taken from https://uwaterloo.ca/french-studies/sites/ca.french-studies/files/uploads/files/Amanda%20Leigh%20-%20Workreport.pdf. Retrieved on on September, 1st , 2015.

Worde, R Von. (2003). *Students' Perspectives on Foreign Language Anxiety*. Inquiry. Vol 8,1: p.1-15 Virginia: Virginia Community College System.

Young, D. J. (1991). *Creating a Low-Anxiety Classroom Environment: What Does Language Anxiety Research Suggest?* Modern Language Journal. (Volume 75). p.426-439. UK: Blackwell Publishing.

TECHNO GEOMETRY: ENRICHING LEARNING OF GEOMETRY WITH TECHNOLOGY

Sariyasa

Mathematics Education Department
Ganesha University of Eduaction, Singaraja, Indonesia

Email: sariyasa64@yahoo.com

Abstract

The ultimate goal of this research was to produce teaching material of plane geometry for junior high school in Bali. A development study was conducted which was expected to run over a period of three years. It followed Plomp's development model with five phases, i.e. (a) preliminary investigation, (b) design, (c) realization/construction, (d) test, evaluation, and revision, and (e) implementation. In the first year, only preliminary investigation and design phases were done. Need assessment, analysis of situation, and theoretical review were conducted in the first phase. In the design phase, a possible solution to the problems found in the previous phase was formulated. The data were collected through interview and questionnaire given to 36 junior high school mathematics teachers selected from four regencies in Bali. The data reveal that one of the problems is teachers' difficulties in delivering geometry instruction. This is partly due to the unavailability of appropriate learning media. Computer-aided learning is a promising solution to this problem. Using dynamic mathematics software, it is possible to establish learning environment so students can construct geometry concepts and fully engage in the learning process. Based on this, it is decided to develop teaching material equipped with media created using dynamic geometry software. The media are limited to certain topics in plane geometry. The teaching material has some features: it contains more contextual pictures and problems, describes the use of geometry concept in daily life, provides in school and out of school activities (paper folding activities, geogebra activities), presents geometry proofs in the form of narrative, two column, and diagram proof. This teaching material will be realized and be tested in the last three phases of Plomp model.

Keywords : Plomp development model, interactive visualization, interactive manipulation, paper folding, geogebra.

1. Introduction

School geometry is learned through various representation such as diagram, figure, and graphics. These representation are contextual description of geometrical concepts or ideas and are tools for conceptualization process (Stephen dan Tchoshanov, 2001). Traditionally geometry is taught by pencil and paper which results in difficulties in implementing these representation accurately. Textbooks on geometry are equipped with illustrations demonstrating these representations, but since these illustration are statics ones, they cannot totally describe visual description of dynamical process in constructing geometry concept. Dynamic visualization of an object depends on students' ability to construct dynamic geometry in their cognitive. It is in this respect that most students failed to develop their understanding of geometry concept. Consequently learning geometry is considered a burden for most students who eventually might be demotivated to learn geometry.

The disadvantage of traditional approach in geometry instruction has been pointed out by Rahim (2002). Maragos (2004) has stated that "in a traditional geometry course, students are told definitions and theorems and assigned problems and proofs; they do not experience the discovery of geometric relationships, nor invent any mathematics" . In line with this, Reys et al., (2006) has suggested that geometry "is best learned in a hands-on active manner, one that should not rely on learning about geometry by reading from a textbook".

One solution to problems arising in geometry instruction is to create technology-aided learning environment by utilizing computer. The integration of computer in the instruction will assist students to imagine geometry concept and to make observation (Dogan, 2010). Some studies have shown that technology can be used in the instruction and give positive impact on the quality of the instruction (see for instance Garofalo, et al., 2000; McPherson and Tyson, 2006; Keong, Horani, and Daniel, 2005). In

addition, Dede (2000) has indicated that "technology can be used to strengthen student learning and enhance pedagogy".

The use of technology in the instruction has some benefits. It provides students with greater chances of study (Roberts, 2012), improve students' engagement (White, 2012) and encourage discovery learning (Bennet, 1999). With the aid of computer, a *Dynamic Geometry Environment* (DGE) is established using *Dynamic Geometry Software* (DGS) for geometry instruction. The use of DGS with explorative technique is highly recommended in mathematics instruction in order to improve the understanding of mathematics concepts (Stacey, 2007). Olive (2000) has said that "dynamic geometry could turn mathematics into a laboratory science." Delivering geometry instruction in a way that can stimulate curiosity and encourage exploration may improve the quality of students' learning. Encouraging students to discuss and share their ideas, and to clearly build their argument will certainly improve their mathematics competencies. Hence, one goal of using DGS is to provide learning environment which enables students to explore mathematics ideas by themselves, so they take advantage of technology to produce knowledge.

There are some softwares that belong to the DGS class, for instance Cabri, WinGeom, Euclide, Cindrella, GSP, and GeoGebra. The choice of GeoGebra in this research is due to the following: it is free, it is easy to operate, it is widely used, and it has features to do interactive exploration. GeoGebra enables construction and animation of geometry objects so the exploration and investigation are easily carried out interactively by both teachers and students. This feature give possibility to study geometry object by manipulating, analyzing, conjecturing, and testing. These activities help students to understand and master geometry concept better and easier. Dogan (2010) has found that GeoGebra positively affects students' learning achievement and improves motivation. Study by Haciomeroglu and Andreasen (2013) has shown that students' understanding of mathematics improved after using DGS. Some studies have proved that students engage more during class activities, students show greater motivation to learn, and students have significantly greater learning growth (Baharvand, 2001; Burkhead, 1998; Dixon, 1995; Freeman dan Crawford, 2008; Mouza, 2008; Yousif, 1997; Ysseldyke, et al., 2004).

In DGE learning environment aided by GeoGebra, students have freedom to explore, to make conjecture, to discover, and to experiment in a way that cannot be done with just pencil and paper (Jones, 2000). DGE provides feature that enables extensive and instant manipulation that allow students to try as many examples as possible in time of second and gives immediate feedbacks.

To optimize DGE-oriented geometry instruction, it is necessary to develop explorative geometry teaching material. The teaching material is equipped with GeoGebra and paper folding activities so that students can do visualization, exploration, investigation, and interaction in their efforts to construct geometry concept by themselves. Visualization helps students to imagine or even to manipulate abstract concepts so students can grasp better understanding of the concept. Therefore, geometry teaching material with GeoGebra will produce meaningful and joyful instruction for students and consequently, internalization of concepts is expected to occur smoothly. This is supported by the opinion of Falcade, et al. (2007) that the use of technology in education has promising potency in internalization process.

2. Method

This research is a development one aimed at developing geometry teaching material for Junior High School (SMP) equipped with GeoGebra and paper folding activities. The development process follows Plomp development model consisting of five phases, that is (a) preliminary investigation, (b) design, c) realisation/construction, (d) test, evaluation, and revision, and (e) implementation. The five phases is planned to be conducted in three-year time where in the first year, only preliminary investigation and design were completed. In the phase of preliminary investigation, need assessment, analysis of situation, problem definition and theoretical review were conducted. In the phase of design, a possible solution to problems identified in the preliminary investigation was formulated. The other three phases will be completed in the second and third year of the research. In the investigation phase, the following activities has been done (1) analyzing lesson plan and syllabi , (2) analyzing textbook currently in use, (3) observing geometry instruction, (4) identifying problems in geometry instruction, and (5) identifying teachers' need toward geometry teaching material.

A sample of 36 mathematics teachers was chosen based on some circumstances. The teachers were taken from 12 SMP in Buleleng, Tabanan, Jembrana, and Karangasem regencies which represented Northern Bali, Southern Bali, Western Bali, and Eastern Bali respectively. From each regency, three SMP were chosen and each

SMP sent three mathematics teachers (teachers of grade 7, 8 and 9) to take part in this research. SMPs involved are SMP Negeri 1, 2, 3 Singaraja; SMP Negeri 1, 2, 3 Tabanan; SMP Negeri 1, 2, 3 Negara; SMP Negeri 1, 2, 5 Amlapura.

The sources of data were relevant references, teachers, students, and school principals. Data were gathered using technique of documentation, interview, and questionnaire. Instruments used are questionnaire, interview guidance, and documentation guidance. Data were then analyzed descriptively.

3. Results and Discussion

Need assesment was carried out qualitatively in the form of analysing syllabi for geometry of grade 7 and 8, analyzing textbook, a sample of lesson plan, and quesionaire.

The results of need assesment gave the following findings. In regard to textbook, teachers indicated that there were some drawbacks such as lack of figures especially those related to everyday life, contents are not deep enough, lack of concept proving, physical appearance is not quite interesting, and language is a bit hard to understand. Teachers also indicated that they need textbook that can provide more material and deeper so that teachers has enough knowledge of geometry. Teachers expect the textbook to contains material on geometry constructions. In geometry, construction and drawing are two different things. The differences are easily shown using GeoGebra. Proving concepts is considered essential for teachers. Regarding geometry instruction, teachers stated that they have difficulty in delivering some geometry concept to studets. The result of questionnaire revealed that one main problem concerns with the availability of media that can visualize concepts. Teachers are aware of the importance of media, but they do not fully utilize media in the geometry instructon. If they use media, then their media is static, it is not capable of being manipulated and explored. The idea to incorporate computer in the instruction was welcomed by teachres enthusiastically. Teachers expect media that are dynamic and manipulative so demonstration of a concept can be done by just changing the figure on the computer screen. It is not necessary to create the figure again and again. According to teachers, such a media can save time and is attractive to students.

Based on interview with teachers and disussion among researchers team, geometry topic for grade 7 and 8 that are suitable for computer-aided media are triangle, quadrilateral, circle, transformation, and basic concept of geometri.

From the result of need assement, it was agreed that a solution is offered in the form of teaching materaial combined with GeoGebra and papaer folding activities. The teaching material will prepare in a form of book, containing teaching materials on plane geometry with dept and width that are beyond curriculum requirement. The book also equipped with geometry construction and proving process. The book contains students activities based on GeoGebra and paper folding.

The following example shows a media to derive formula of area of a circle. Usually, media for this purpose involve circle cutting into some sectors, then these sectors are arranged in such a way that it form paralelogram, triangle, or rectangle.

Media developed by researcher use slightly different approach. It is adopted from Azad (2009). There are no circle cutting. With the aid of GeoGebra, circle region is covered by colourful ribbons. The longest ribbon is placed close to circumference, then the next ribbon is placed after the first one and so forth. Look at Figure 1. Approaching the center of circle, the length of ribbons become shorter. Finally, the whole area is covered by ribbons. Next, the ribbons are removed form the area and then are arranged in a right angle triangle. The area of the triangle is obviously equals the area of the circle. In this way, the area of the circle can be formulated.
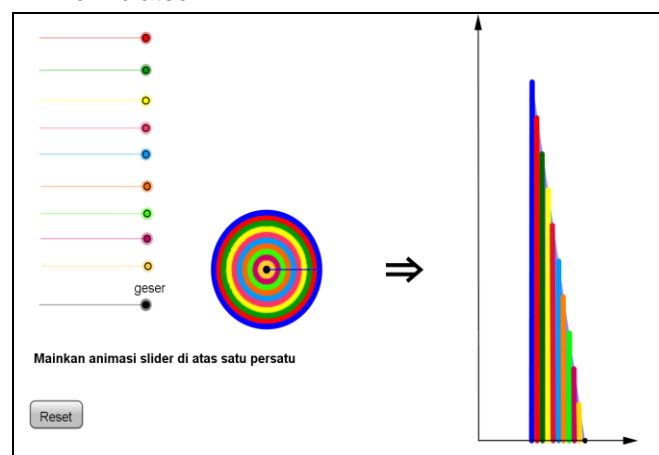

Figure 1. Screenshot of GeoGebra window for area of a circle

4. Conclusion

Geometry instruction in school (SMP) has not been run to the expected level. One possible cause is the lack of availability of suitable media. In addition to this, teachers has claimed that they need textbook on geometry with content exceeded those demanded by curriculum. In response to this, it is necesary to develop teaching materials on geometry that are appropriate to the teachers' need. The teaching materials is prepared in the form of a book equipped with students activities involving GeoGebra and paper folding.

5. References

Baharvand, M. (2001). A comparison of the effectiveness of computer-assisted instruction versus traditional approach to teaching geometry. California State University, Dominguez Hills. From http://search.proquest.com/docview/304749388?accountid=12725.

Burkhead, M. (1998). The role of Geometer's Sketchpad in developing mathematical knowledge. The University of Texas at El Paso. From http://search.proquest.com/docview/ 304468554?accountid=12725.

Dede, C. (2000). Emerging influences of information technology on school curriculum. *Journal of Curriculum Studies,* **32**, 281-303.

Dixon, J. K. (1995). Limited English proficiency and spatial visualization in middle school students' construction of the concepts of reflection and rotation. *Bilingual Research Journal* **19**, 221-247.

Dogan, M. (2010). The role of dynamic geometry software in the process of learning: GeoGebra example about triangles. From http://www.time2010. uma.es/Proceedings/Papers/A026_Paper.pdf

Falcade, R. et al. (2007). Approaching functions: Cabri tools as instruments of semiotic mediation. *Educational Studies in Mathematics,* **66**, 317-333.

Freeman, B., & Crawford, L. (2008). Creating a middle school mathematics curriculum for english-language learners. *Remedial and Special Education,* **29**, 9 – 19.

Garofalo, J., et al. (2000). Promoting appropriate uses of technology in mathematics teacher preparation. C*ontemporary Issues in Technology and Teacher Education,* **1**, 66-88. From http://www.citejournal.org/vol1/iss1/current issues/mathematics/article1.htm

Haciomeroglu, E. S. dan Andreasen, J. B. (2013). Exploring calculus with dynamic mathematics software. *Mathematics and Computer Education*, **47**, 6-18.

Jones, K. (2000). Providing a foundation for deductive reasoning: Students' interpretation when using dynamic geometry software and their evolving mathematical explanations. *Educational Studies in Mathematics*, **44**, 55–85.

Keong, C. C., Horani, S., dan Daniel, J. (2005). A study on the use of ICT in mathematics teaching. *Malaysian Online Journal of Instructional Technology* (*MOJIT*) **2**, 43-51.

Laborde, C. (2001). Integration of technology in the design of geometry tasks with cabri-geometry. *International Journal of Computers for Mathematical Learning,* **6**, 283-317.

Maragos, C. (2004). Building educational scenarios with "Sketchpad". From http://hermes.di.uoa.gr/edugames/sketchpad/ScetchPad.pdf

McPherson, R. F., dan Tyson, V. (2006). Creating your own interactive computer-based algebra teaching tools: A no programming zone. *Contemporary Issues in Technology and Teacher Education* 6, 293-301.

Mouza, C. (2008). Learning with laptops: Implementation and outcomes in an urban, under-privileged school. *Journal of Research on Technology in Education,* **4***,* 447-472.

Olive, J. (2000). *Implications of Using Dynamic Geometry Technology for Teaching and Learning.* Paper presented in the Conference on Teaching and Learning Problems in Geometry.

Rahim, M. H.(2002). A Classroom Use of Geometer's Sketchpad in a Mathematics Pre Service Teacher Education Program. From http://math.unipa.it/~grim/Jrahaim.

Roberts, G. R. (2012). Technology and learning expectations of the net generation. In *Educating the Net Generation*. Diana G. Oblinger and James L. Oblinger (Eds.). EDUCAUSE.

Stacey, K. (2007). Using Dynamic Geometry Software to Motivate and Assist Problem Solving with Algebra. EARCOME 4.

Stephen J. P. dan Tchoshanov, M. A. (2001). The Role of Representation(s) in Developing Mathematical Understanding. *Theory Into Practice*, **40**, 118-127.

Yousif, A. E. (1997). *The effect of the Geometer's Sketchpad on the attitude toward geometry of high school students.* Ohio University. From http://search.proquest.com/docview/ 304363361?accountid=12725.

Ysseldyke, J., et al. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. *Journal of Applied School Psychology,* **24**, 1-28.

Patterns Investigation as a Pre-Algebraic Activity

Ratih Ayu Apsari[1], F.H.J van Galen[2]

Mathematics Education, Ganesha University of Education, Singaraja, Indonesia[1]
Mathematics Education-Freudenthal Institute for Science and Mathematics Education, Utrecht University, Utrecht, the Netherlands[2]

email: ra.apsari@gmail.com[1]

Abstract

Algebra is commonly taught as a mathematics topic in secondary school. It is acknowledged as a gatekeeper of all high school mathematics (Brawner, 2012) due to its relation to other branches of mathematics. However, many students worldwide had been struggling in learning algebra (Capraro&Joffrion, 2006; Egodawatte, 2011; Jupri, Drijvers, & van den Heuvel-Panhuizen 2014). Studies have pointed out that at least part of the problems in learning algebra are caused by the lack connections between algebra and arithmetic, the mathematics which is supposed to be pre-requisite knowledge (Dekker &Dolk, 2011). Hence, pre-algebraic activitiesare needed to fill the gap. The current study is aimed to design a learning trajectory which can provide a smoother bridge between arithmetic and algebra. The paper is a part of a larger study which has employed design research as its method. The study shows that pattern investigations can be used to prepare elementary students to generalize a series. This will be helpful when they learn algebra in secondary school.

Keywords : algebra, arithmetic, pre-algebra, design research

1. Introduction

Over many years the difficulties of learning algebra in secondary school have been attributed to the gap between what is learned in elementary and in secondary education (Dekker &Dolk, 2011). Mostly, algebra has been taught as a 'new branch' of mathematics with no relation with other mathematical domains, including arithmetic which actually is the base of algebra itself. Lee & Wheeler (1987) state that the gap between algebra and arithmetic leads to the inability to see algebra as the generalization of arithmetic.

To bridge the gap from arithmetic to algebra and to start algebraic lessons in early grades, National Council of Teachers of Mathematics (1989) recommends the use of pattern investigations. One way to use pattern activities is to use number patterns which are embodied in visual representations. A number of previous studies which have used this approach (see Ma, 2007; Vogel, 2005; Herbert & Brown, 2000; Carraher, Martinez, &Schliermann, 2008) have pointed out that pattern investigations can be useful and they recommend to start this kind of algebraic lessons in earlier grades.

Though a number of studies have pointed out the usefulness of pattern investigation activities as preliminary algebraic lesson, the academic system in Indonesia is not familiar with preliminary algebra lesson. This leads students to assume that algebra has no intertwinement with other branches of mathematics and this may at least in part, explain the students' low performances in algebra (as indicated in TIMSS 1999, TIMSS 2007, PISA 2009 and PISA 2013).

In this study we will discuss how designing pre-algebraic activities can prepare students in elementary school for learning algebra when they enter secondary school. Pattern investigation is chosen as the main activity. In line with the aim to design a local instructional theory in learning algebra using pattern, the research question addressed here is "*how can patterns investigations be used as a pre-algebraic activity*"?

2. Method

The aim of this study was to design an innovative learning trajectory in pre-algebraic activity that would supports students in learning algebra. To accomplish that we also need to understand how the designed materials will work when they are used in a real classroom. Given these two important aspects of the present study, design research was chosen as the research approach. Three steps of design research were applied in this study: preliminary design, teaching experiment and

retrospective analysis (Bakker & van Eerde, 2015). The teaching experiment consist of two cycles. In each cycle, different group of students participated. The first cycle was implemented in a small group with four students of VB MIN 2 Palembang. During the first cycle, the researcher acted as the teacher. The findings of the first cycle was used to revise the designed learning trajectory which was used in the next cycle. The second cycle was implemented in a whole class of VA MIN 2 Palembang, with 32 students and their mathematics teacher. This paper will be focused on the result of the second cycle.

The data were collected from students' written works, field notes, audio and video taping during the teaching experiment. The gathered data were analyzed qualitatively to get a deep understanding of how pattern investigation can be used as a pre-algebraic activity.

Five lessons with pattern activities were designed in this study. The learning materials were designed according to the tenets of Realistic Mathematics Education (RME). Hence, the learning did start by exploring *realistic* phenomena. The term realistic is not restricted to the real world problems, but more to the things students can imagine. In this study we used the context of dancing and focused on regularities on it. Also, the designed learning materials should be related to other topics in mathematics or other knowledge. Hence, in this study the pattern activities combined concept of arithmetic, algebra and geometry. Furthermore this study promotes the use of models, which aims to bridge the students' conceptualization from "reality" in the real world to the "abstract world" in mathematics (Treffers, 1987). In line with the principles of RME, we designed classroom environment which provide a chance for the students to do their own construction. And finally, the interaction between students and teacher should be in three directions: students to students, students to teacher, and teacher to students.

3. Discussion Of Results

We started our teaching experiment by observing the classroom culture in class VA MIN 2 Palembang. We interviewed the mathematics teacher in the chosen class and discussed the overview of the present study. We also tested the students' ability in arithmetic as a pre-requisite for working with the designed materials.

From the analysis of the students' works in the pre-test, we found that they had sufficient understanding in arithmetic, which is showed by their ability to do basic arithmetic operations and to continue a simple number series. Furthermore, we noticed that the students had a strong will to do one by one counting; they lacked effort to search for more efficient strategies in non-routine problem. This tendency can be shown in the following pre-test problem: "Determine whether the following picture has odd or even beads", see Figure 1.

Figure 1. Does this picture has even beads? Why?

We had expected the students to notice the relation between the paired-color beads and the meaning of 'even', as it is tiring to count the beads one by one since there are so many beads. However, to solve this problem, most students in fact used counting by one method. The following Figure 2 showed the solution of one of the students.

Figure 2. Example of students' work to solve the beads problem

This finding underlines the usefulness of conducting research in the field of pre-algebra, as it shows that the students' sense of structure is still limited. According to Zazkis&Liljedahl (2002), sense of structure

is the ability to create self-reference. This is useful to develop the ability to generalize, the core of learning algebra. From the solutions given by the students, as in the example of Figure 2, we can conclude that the students know which numbers are even and which numbers are odd, but most of them were not developing more advance strategy to determine whether the beads on the Figure 1 come with odd or even numbers.

We conducted the first lesson on March 16, 2015. The teacher started the series of lessons by proposing a plan to participate in Palembang Expo, an annual event in Palembang. The students were told that they were going to perform a Saman Dance, from Aceh. Each students would get a number that showed their position in the dancing group and indicate the colors of their costume, as shown in Figure 3.

Figure 3. Illustration of the number

As a start the students were asked to check the color of the costume used by the students with number 9 and 10. The students had no difficulty in answering this preliminary question. After that, the teacher asked the students to work in pairs, with the person next to them, to find out the color of costume used by the 12th, 25th and then the 100th dancers. It was our hypothesis, that the students would use a listing method, by making groups of 10 (finding the color used by the 10th students and then multiplying up till the needed numbers) and that they would discover the odd/even rule (the students with odd numbers will use red, students with even numbers will use white).

In the real classroom situation, the students were using the strategies that we had predicted. One of the pair used a halving method. This means, the students start by stating a number and then finding a half of it. The students of our focus group kept counting until they found the color of the costume that was used by the 25th. However, when they had to find the color of the costume of the 100th dancer, they developed another idea and used the halving method. The arguments of the students can be seen in the following Fragment 1.

Fragment 1: Halving

[1] Researcher	:	If you continue to count
[2]		it, how will you find the
[3]		costume color
[4]		of the 100th dancer?
[5] Arkam	:	Divide.
[6] Researcher	:	Divide by what
[7]		number?
[8] Naurah	:	Divide by two.
[9] Researcher	:	Divide by two? And
[10]		then?
[11] Arkam	:	Halving 50.
[12] Naurah	:	Halving again.
[13] Arkam	:	25 is red, and 25 + 25 add again until you get 100, that also red.

Fragment 1 shows how the choice of reference number is important. When the students tried to use 25 as their reference and doubled it, they drew a wrong conclusion with respect to the 100th number. During the discussion, however, Arkam and Naurah realize that something was wrong in the way they used halving method. Arkam started questioning whether 100 is even or odd number. Arkam and Naurah might realize it a bit later, but some other pairs got an insight that they merely need to distinguish odd and even numbers from the first time they saw the illustration as is showed in Figure 3.

This kind of problem seems helpful to develop an awareness of the global view of the pattern. Instead of seeing the number and the color as separate objects, it will more efficient to point out the unit pattern, which is the smallest arrangement that is repeated in the series. In this case the unit pattern is red and white, as these two colors is going to repeat forever— or until the latest number of students.

In the next meeting we discussed about the *V*-pattern, which was embodied in a dance formation. The context is the same as in the first lesson, which was about cultural event. Given the first four *V*-dance formations that are shown in Figure 4, the task is to find out the number of dancers in the 100th formation.

Figure 4. The *V*-formation

In the third meeting the problem focuses on a square pattern, while in the fourth meeting the students have to transform the square into rectangular pattern. The lesson series was ended by halving the rectangular into triangular pattern in the fifth lessons. In all these lessons the task focuses on how to find out the number of dancers in a certain

number of formations. It starts by a small number of formations and continues with bigger numbers. The aim is to encourage students to use more and more efficient strategies. In each lesson, we gave the students drawings that illustrated the given pattern problems (like the illustration of the *V*-formation in Figure 4). The visualization of the patterns had two roles, it illustrated the problem and it could be used as a model to check the structure of the pattern.

4. Conclusion

Based on our analysis of the findings, we conclude that investigation of patterns can be used as a meaningful pre-algebraic activity that will support the students' development of structure sense. When students build their own reference in a certain pattern, they will be able to see the global structure of the pattern and formulate a general conclusion. As we already pointed out, however, it is important to create situation that encourage the students feel the need of general formula, as they cannot rely on the drawing, listing or recursive formula method.

5. Acknowledgement

6. References

Bakker, A., & Van Eerde, H. A. (2015). An introduction to design-based research with an example from statistics education. In A. Bikner-Ahsbahs, C. Knipping, & N. Presmeg (Eds.), *Approaches to Qualitative Research in Mathematics Education* (pp. 429-466). New York: Springer. doi:10.1007/978-94-017-9181-6_16

Brawner, B. (2012). Teaching and learning with technology: Reforming the algebra classroom. *Southwest Teaching and Learning Conference* (pp. 1-8). San Antonio: Texas A&M Univeristy.

Capraro, M. M., & Joffrion, H. (2006). Algebraic equations: Can middle-school students meaningfully translate from words to mathematical symbols? *Reading Psychology, 27*, 147-164.

Carraher, D. W., Martinez, M. V., & Schliemann, A. D. (2008). Early algebra and mathematical generalization. *ZDM Mathematics Education, 40*, 3-22. doi:10.1007/s11858-007-0067-7

Dekker, T., & Dolk, M. (2011). From Arithmetic to Algebra. In P. Drijvers (Ed.), *Secondary algebra education: Revisiting topic and themes and exploring the unknowns* (pp. 69-87). Rotterdam: Sense Publishers.

Herbert, K., & Brown, R. H. (2000). Patterns as tools for algebraic reasoning. In B. Moses (Ed.), *Algebraic Thinking, Grade K-12: Readings from NCTM's School-Based Journals and Other Publications* (pp. 123-128). Reston VA: National Council of Teachers of Mathematics.

Jupri, A., Drijvers, P., & van den Heuvel-Panhuizen, M. (2014). Difficulties in initial algebra learning in Indonesia. *Mathematics Education Research Group of Australasia*, 1-28. doi:10.1007/s13394-013-0097-0

Lee, L., & Wheeler, D. (1987). *Algebraic thinking in high school students: Their conceptions of generalisation and justification.* Montreal: Concordia University.

Ma, H. L. (2007). The Potential of patterning activities to generalization. In J. In Woo, & e. al. (Ed.), *Proceedings of the 31st Conference of the International Group for the Psychology of Mathematics Education.3*, pp. 225-232. Seoul: PME.

National Council of Teachers of Mathematics. (1989). *Principles and standards for school mathematics.* Reston, VA: Author.

Treffers, A. (1987). *Three dimensions: A model of goal and theory description in mathematics instruction - the Wiskobas project.* Dordrecht: D. Reidel Publishing Company.

Vogel, R. (2005). Patterns- a fundamental idea of mathematical thinking and learning. *ZDM, 37*, 445-449.

Zazkis, R., & Liljedahl, P. (2002). Generalization of patterns: The tension between algebraic thinking and algebraic notation. *Educational Studies in Mathematics*, 379-402.

The Study of Potentials and Problems in Reading Faced By the Eighth Grade Students of Junior High School

Ida Ayu Made IstriUtami

English Education Department Ganesha University of Education

E-mail: saraswati.goddes@gmail.com

Abstract

Knowing students' problems, especially in reading, is very important to design an appropriate and meaningful learning. From the problem identification, teacher can find the potency of designing and developing material to meet students' need. Therefore, this study was aimed to identify the potentials and problems toward reading lesson faced by the eighth grade students of Junior High School. This study was based on the result of classroom observation, document study, and also checklists. The identification of potency and problems through classroom observation was done to obtain data on how existing reading material was used in teaching reading on the classroom. There was also document study to evaluate existing reading material and syllabus used for teaching reading. Then, the data from the teacher and students had been gathered by administering checklists. From the result of the study, it can be identified that the problems faced by the eighth grade students of Junior High School in reading dealt with topic selection, pictures or illustration, and reading activities, while the potency was to develop new reading material by using those problems as consideration.

Keywords: problem, potency, reading

1. Introduction

Reading involves both conscious and unconscious thinking process(Beatrice, 1990). The quality of a good reader has good linguistically and conceptually idea with modification of new information.They constructexpectationsandpredictions which will be reinforced, modified or challenged reading in the end of reading process.Bartlett (1932) called as *schema* theory as the world (knowledge and experience) is influenced by the information from the reading text.

Byrnes (1998) states that traditionally, the purpose of learning to read in a language has been to have access to the literature written in that language. In language instruction, reading materials have traditionally been chosen from literary texts that represent "higher" forms of culture.

He also says that this approach assumes that students learn to read a language by studying its vocabulary, grammar, and sentence structure, not by actually reading it. In this approach, lower level learners read only sentences and paragraphs generated by textbook writers and instructors. The reading of authentic materials is limited to the works of great authors and reserved for upper level students who have developed the language skills needed to read them.

Manzo, Manzo and Albee (2003) states that learning to read involves acquiring and applying strategies for phonetic decoding for building a growing store of sight words, and for reconstructive and constructive comprehension of text.

Furthermore, Byrnes (1998) claims that the communicative approach to language teaching has given instructors a different understanding of the role of reading in the language classroom and the types of texts that can be used in instruction. When the goal of instruction is communicative competence, everyday materials such as train schedules, newspaper articles, and travel and tourism Web sites become appropriate classroom materials, because reading them is one way communicative competence is developed. Instruction in reading and reading practice thus become essential parts of language teaching at every level.

Reading is an activity with a purpose. A person may read in order to gain information or verify existing knowledge, or in order to critique a writer's ideas or writing style. A person may also read for

enjoyment, or to enhance knowledge of the language being read. The purpose(s) for reading guide the reader's selection of texts.

The purpose for reading also determines the appropriate approach to reading comprehension. A person who needs to know whether she can afford to eat at a particular restaurant needs to comprehend the pricing information provided on the menu, but does not need to recognize the name of every appetizer listed. A person reading poetry for enjoyment needs to recognize the words the poet uses and the ways they are put together, but does not need to identify main idea and supporting details. However, a person using a scientific article to support an opinion needs to know the vocabulary that is used, understand the facts and cause-effect sequences that are presented, and recognize ideas that are presented as hypotheses and givens.

Reading research shows that good readers

- Read extensively
- Integrate information in the text with existing knowledge
- Have a flexible reading style, depending on what they are reading
- Are motivated
- Rely on different skills interacting: perceptual processing, phonemic processing, recall
- Read for a purpose; reading serves a function

Reading is also an interactive process that goes on between the reader and the text, resulting in comprehension. The text presents letters, words, sentences, and paragraphs that encode meaning. The reader uses knowledge, skills, and strategies to determine what that meaning is.

Reader knowledge, skills, and strategies include

- Linguistic competence: the ability to recognize the elements of the writing system; knowledge of vocabulary; knowledge of how words are structured into sentences
- Discourse competence: knowledge of discourse markers and how they connect parts of the text to one another
- Sociolinguistic competence: knowledge about different types of texts and their usual structure and content
- Strategic competence: the ability to use top-down strategies, as well as

knowledge of the language (a bottom-up strategy)

The purposes for reading and the type of text determine the specific knowledge, skills, and strategies that readers need to apply to achieve comprehension. Reading comprehension is thus much more than decoding. Reading comprehension results when the reader knows which skills and strategies are appropriate for the type of text, and understands how to apply them to accomplish the reading purpose.

In addition, Shriver (2007) claims that reading is actually a complex, multi-part process. Think about each part described below:

- The words we speak are actually made up of smaller pieces of sound, called **phonemes.** Understanding that words are made up of individual sounds is a key part of learning to read. This understanding is called phonemic awareness. Phonemes make up spoken words, and words only make sense when these phonemes are combined in a particular order. Phonemic awareness can be taught and learned using activities such as rhyming games.

- Another part of learning to read is understanding that letters of the alphabet, either by themselves or with other letters, stand for sounds or phonemes. This knowledge is called the alphabetic principle. Real words can be just as new to beginning readers as the made-up words are for those who can read proficiently. Phonemic awareness and phonics skills help readers sound out new words.

- Knowing that a word has meaning is also a very important part of learning to read. The words we know are called our vocabulary. Learning vocabulary starts very early in life, such as when toddlers look at what you are talking about, or say their first words to get what they need or want. As they grow, they learn more and more words. By the time they start to sound out words as part of learning to read, most children can recognize the words they are sounding out, recognizing that they have heard those words before and what the words mean. This is why having a good vocabulary is so important to reading.

- As a reader continues to develop phonics skills, he or she improves reading skills to become a more fluent reader. Fluency goes beyond just pronouncing or knowing words—it actually includes many parts, such as:

o Being able to read quickly
o Recognizing the words and their meanings
o Saying words and sentences with feeling and stressing the right word or phrase so that a sentence sounds natural
- Understanding the information that words and sentences are communicating—called comprehension—is another important part of reading. Comprehension is actually the main goal of learning to read. There are many ways to improve comprehension:
o Building vocabulary can help a reader recognize more words and better understand the overall meaning of the text.
o Understanding the structure of text—or how it is organized—helps readers know what to expect and where, so they can better comprehend what they are reading. Teachers show students different ways to understand the structure of the text to improve their comprehension.
o Teachers can give students strategies or guidelines for understanding different types of texts, such as a newspaper, a fiction book, or a menu.
o Such strategies teach students to ask and answer questions about what they are reading, summarize paragraphs and stories they read, and draw conclusions about the information.
Teaching students to think about what they are reading is an important way for them to use their skills to understand science, history, social studies, math, and many other subjects they will study throughout their education.

2. Research Methods
The subjects of this study were the eighth grade students of SMP LaboratoriumUndikshaSingaraja and the English teacher who teaches the eighth grade students of SMP LaboratoriumUndikshaSingaraja.The identification of potential problems in reading was done through conducting observations. The observation was conducted through classroom observation, document study, teacher's and students' checklist. The classroom observation was done to help the researcher to investigate students' behaviors when learning reading in English by using existing reading material. A study to analyze English teaching documents was also conducted during the document study. The last step

of potential and problem identification was giving checklist to the students about their problem toward the use of existing reading material.
Generally, there were some methods of data collection used in this study such as observation, administering checklist, and document study while the instruments used were observation sheet and checklist.In this study, the data obtained from observation, interview, document study, and checklist, had been analyzed descriptively. The first data was gained through observation. The data of observation had been described in order to know the potency and problem faced in real situation.
The second step was gathering data from document study. The document study contained syllabus analysis and library research. The data from syllabus analysis, then, had been described qualitatively in order to know the standard competency and basic competence of teaching reading for eighth grade of Junior High School. The result of students' and teacher's checklists were analyzed descriptively to identify the problems and potencies in reading faced by the eighth grade students of Junior High School.

3. Finding And Discussion
Classroom observation was conducted to help the researcher to investigate students' behaviors when learning reading in English by using existing reading material. The observations used observation's sheet as the instrument and it had been conducted to the eighth grader students of SMP LaboratoriumUndikshaSingaraja. Based on the observation, there were two reading materials which had been used in the classroom. They were Language in Focus textbook and workbook. Before the teaching and learning activity being started, the researcher randomly asked some students whether or not they were interested in the reading texts from the textbook and workbook. Most of them answered that they read the text just because they had to, not because they were interested in the text. They listened to the teacher's reading but most of them did not actually pay attention on the content.
The researcher also found that the texts of existing reading material already used some pictures, but they were not colorful. In relation with the appropriateness of the

reading material with the students' daily life, the researcher found that some texts on the reading materials were about western culture, and some were about culture from other places in Indonesia. Most students did not have prior knowledge about the text and could not relate the text into their daily life. Only few of the students tried to answer teacher's questions about the text, and most of their answers were incorrect. The researcher also found that the students were hesitating in asking question. Moreover, when the teacher encouraged the students to ask questions about the text, the students were busy understanding the concept of western and national culture given earlier by the teacher. It showed that a lot of time was used for culture understanding instead of reading English activities. In additional, students did not express their opinion toward the topics of the reading texts since the topics were not familiar for them.

A study to analyze English teaching documents was also conducted. In evaluating the existing reading material, some indicators were used as guidance of the implementation of the checklist. The indicators were adapted from the criteria of good materials by Thomlinson (1993) and they were divided into three categories. The categories were viewed from content, language used, activities and assessment. The instrument used in gathering the data was checklist. The English teaching document analyzed was the textbook contained reading material for eighth grade students of SMP LaboratoriumUndikshaSingaraja

Based on the implementation of the checklist in evaluating the content of the reading material from the textbook used by English teacher of eighth grade students of SMP LaboratoriumUndikshaSingaraja, the researcher found that the topics given in the reading text were related to daily activities for the eighth grade students. Some of the topics were related to national culture of Indonesia and other topics were related to western culture. It possibly made the students difficult to comprehend the text since they were not familiar with the topics given. Therefore, the contents of reading material were not appropriate with students' prior knowledge.

The researcher also found that the textbook was lack of grammar explanation of the reading text. In term of the illustration used in the current textbook, the researcher found that the text book provided sufficient illustrations or pictures. But unfortunately, the pictures were not colorful because they were printed in grayscale. Another point found during the document study was the textbook used formal English with understandable instruction of activities but the instruction did not invite students to actively communicate with each other and with teacher. It possibly made the students were not motivated to actively use English in real life interaction.

Beside observation and checklist toward the existing reading material of the textbook used and its implementation, the researcher also had been administered interview to the English teacher. The interview was conducted in order to triangulate some data and avoid the bias of them. Based on the interview, the English teacher of Class VIII A of SMP LaboratoriumUndikshaSingaraja stated that English was students' favorite subject. It could be seen from students' enthusiasm in teaching and learning activities in the classroom. But unfortunately, reading lesson was not students' favorite session of English subject. The students' lack of curiosity of the topic given in reading lesson made them hesitate to ask question about the topic or answer teacher's question. Talking about the presentation of the reading material in the textbook, the teacher admitted that the students never showed their excitement on the pictures given. It was due to the uncolored pictures and illustration used to support the reading text. The teacher also elaborated that the pictures and illustration in the textbook contained no uniqueness to motivated students to develop their curiosity.

In term of the students' attitude during the activities to check their understanding toward the reading text, the teacher said that there was no significant problem. The instruction given in the reading material was clear enough and avoided bias on students' understanding. But the only problem related to reading activities were that the students were not feeling motivated to present or perform their work to the class.

According to the teacher's confession, it was hard to motivate and encourage the students to give opinion toward the topic.

In this study, another data was collected by using checklist to the students about their problem toward the use of existing reading material. Those questions were derived from some dimensions such as effective domain, cognitive domain, and expectations.

From the result of the checklist, the researcher found that 71.42% of students stated that they like English. On the other hand, there were 35.71% of students stated that they did not like reading lesson. The high percentage of students who did not like reading lesson probably because they found that the topic given in the reading text were not interesting, as stated by the English teacher. That fact was supported by the data that showed 71.42% of the students stated that they did not like the topic given in the reading text. The researcher also found that almost all students stated that the reading texts were not supported with interesting pictures and illustration. Therefore, 100% students agreed that the reading text should provide colorful pictures and illustration to make them more interested in reading the text.

When the researcher asked about the relation between the topic given in the reading text and the students' daily life, 85.71% of the students stated that the topics given related to their daily life.

Moreover, the result also showed that 82.14% of students understand the language used in the reading material. Based on the observation, the students were not actively asked the teacher to explain more about the language used in the reading text. Further, 82.14% of students stated that they understand the instruction of the reading activities and 28.57% of students stated that they enjoyed doing the exercises given. That learning attitude probably derived from their lack of curiosity toward the topic given.

Because they were not motivated to participate in class discussion, only 21.42% of students stated that the reading text stimulated them to give opinion. Based on the observation, the students were not courage to give their opinion toward the topic given. Further, because the students were not stimulated to give opinion, only 32.14% students stated that they used English to discuss the topic with teacher and other students. Moreover, there were only 42.85% students stated that the reading material and its activities gave them opportunity to use English as a means of communication.

In term of language used in the reading material, 71.42% of the students stated that the language was difficult to understand. Furthermore, 14.28% of the students stated that some of the texts were not supported with related pictures. From this study, the researcher found some problems in reading faced by the eighth grade students of Junior High School. The problems dealt with:

- Topic selection: the students were not interested on the topics presented in the existing reading material. Even though the topics in the existing reading material related to their daily life, but the students admitted that some of the topics were about western culture and the students did not have prior knowledge about it.

- Pictures and illustration: based on the document study, the researcher found out that the existing reading material already contained a lot of pictures and illustrations. But unfortunately, the pictures and illustration were not colorful and the pictures failed in gaining students attention and interest.

- Activities in reading: in term of reading activities in the existing reading material, the researcher found that the students were not motivated to express their opinion. Moreover, the students hesitated to answer and ask questions to their teacher.

In addition, the result of the checklist and observation did not show significant problem on the language used in the existing reading material. The language used in the existing material was easy to understand by the students and the instruction of the activities was clear enough. From those problems faced by the students, the researcher identified potencies to develop new reading material by using the problems as consideration.

4. Conclusion And Suggestion

The general result of observation toward the implementation of existing reading material was that the topics given on the reading texts were not familiar for the students.

Moreover, considering the activities occurred in the classroom, it indicated that the activities did not help the students use the target language communicatively in the class. The students were not motivated to interact with friends by using English to discuss about the topic given

for reading. From those problems faced by the students, the researcher identified potencies to develop new reading material by using the problems as consideration. In relation to the results of this research, the researcher suggest for the English teachers could actively find reading texts which are closely related to students' daily lie and their culture. Through that strategy, the teacher can easily gain students interest and motivate their use of English in active communication

5. References

Beatrice, S. Mikulecky. 1990. *A Short Course in Teaching Reading Skills*. USA: Addison-Weasley Publishing Company

Berardo, SachaAnthony. 2006. *TheUseofAuthenticMaterialsintheTeachingofReading.* The Reading Matix

Goodman,K. 1988.*TheReadingProcess*inCarrell,P.L.,Devine,J.&Eskey,D.E.(Editors)(1988)*InteractiveApproachestoSecondLanguageReading*Cambridge,C.U.P.*pp11-21*

Manzo, A. V., Manzo, U. C., and Albee, J.J. 2004. *Reading Assessment for Diagnostic-Prescriptive Teaching*. Canada: Thomson Wadsworth

Nuttall, C. 1996. *Teaching reading Skills in a foreign language (New Edition)* Oxford Heinemann

THE INFLUENCE OF CLINIC SUPERVISION TOWARDS THE ABILITY IN HANDLING TEACHING AND LEARNING PROCESS AND WORK ETHIC OF THE TEACHERS OF JUNIOR HIGH SCHOOL IN ABANG SUB-DISTRICT

I Made Bawa Mulana

Pengawas Madya, Disdikpora Kabupaten Karangasem

e-mail : bawa30sksd@gmail.com

Abstract

This research aimed to know the influence of clinical supervision towards the ability in handling teaching and learning process and work ethic of the teachers of junior high schools in Abang sub-district. The research design was the Posttest Only Control Group. The number of the subjects was 149 teachers. And the number of the samples was 42 teachers. Two types of instruments used in collecting the data, namely: questionnaire and observation sheet. The samples were taken by using proportional random sampling technique in which 42 teachers were divided into 2 groups, namely: experiment group and control group. Every group consisted of 21 teachers. The data were analyzed by using MANOVA. The results of the study show that: 1) There was a significant difference of their work ethic between the teachers who were given Clinical Supervision and Non Clinical Supervision, 2) There was a significant difference of the ability in handling teaching and learning process between the teachers who were given clinical supervision and non clinical supervision, 3) There was a significant difference in their work ethic and the ability in handling teaching and learning process between the teachers who were given clinical supervision and non clinical supervision. The study concluded that clinical supervision could improve the ability of the teachers of SMP in Abang sub-district in handling teaching and learning process.

Keywords : clinical supervision, ability in handling teaching and learning process, work ethic

1. Introduction

The main job of teachers is designing lesson plan, conducting teaching and learning process, and assessing the result of the teaching and learning process conducted. To maximize the quality of education, the teachers' work should be supervised well both by schools' supervision and head masters. The supervision of the teaching and learning activities is done internally in order to be able to conduct the teaching and learning process effectively and efficiently. Head masters become the supervisors in supervising the teaching and learning activities. While, the teachers are responsible to evaluate and reflect the result of the teaching and learning activities conducted. The supervision of teaching and learning activities includes planning, implementation, and assessing the teaching and learning process from the beginning, in the middle and at the end of the semester.

The planning of teaching and learning activities is the preparation of meaningful learning experiences of the learners. As stated in PP No. 32 in the year 2013, the standard planning of teaching and learning activities includes syllabus and lesson plan. A lesson plan at least consists of the objective, learning materials, teaching method, sources of learning, and assessment used to assess the output of the teaching and learning process.

In Peraturan Pemerintah No. 32 in the year 2013 about standard of process, teachers are expected to be able to develop the planning of their teaching and learning activities. It is also supported by Peraturan Menteri Pendidikan Nasinal (Permendiknas) No. 65 in the year 2013 about standard of process; how to develop syllabus and lesson plan, especially in the level of basic and middle of formal education. Besides that, in the appendix of Permendiknas No. 16 in the year 2007 about standard of academic qualification, it is also stated about some competencies that must be mastered by the teachers, namely: main competencies and subject competencies.

One of the main competencies that must be mastered by the teachers is pedagogic competency that requires teachers to be able to develop curriculum of the subjects that they teach, understand the principal in planning teaching and teaching and learning activities, develop the components and design the complete planning of teaching and learning activities, either the activities in the classrooms, laboratories or in the real situation. Therefore, every teacher must be able to design his/ her syllabus and lesson plan completely and systematically to have interactive, enjoyable, challenging, encouraging learning activities for the learners. The ability in handling teaching and learning process can be defined as teachers' ability in exploring the classes' potentials by giving chances widely for everybody creatively, so that, time and fund available can be used efficiently to do activities in the classrooms.

The duties and functions of teachers are not only to share knowledge, but also to help students to be able to solve the problems that they face. Therefore, in handling teaching and learning process, teachers should have appropriate strategies to help their students to be able to study effectively and efficiently. Khabibah (2006: 1) said that good education does not only prepare the students for doing a particular job or position, but also to prepare the students to be able to solve the problems faced in their daily life. One effort should be done by the teachers to have learning activities runs effectively and efficiently is by understanding and mastering learning materials, strategies, and beside that, the teachers must also have knowledge how to work systematically to conduct teaching and learning activities easily, (Dimyatio and Moedjiono, 2009: 9).

The general problems faced in our education nowdays are also faced in the junior high schools in Abang sub-district, namely: the limitation of the number of the teachers which is not fix to the number of the teachers needed and also the ability of the teachers in conducting the teaching and learning activities which is still low. Learning activities are still teacher-centered and teachers do not apply inovative strategies. It effects the quality of the education. The result of an observation showed that the teachers of junior high schools in Abang sub-district had low work ethic and the ability in handling their teaching and learning process. It was found that the teachers still appllied conventional methods and they were not innovative in designing their teaching and learning activities. Therefore, an effort that could be done to cover and anticipate the low quality of our education was by developing the quality of education services. To enhance the quality of the education services in the level of instructional must be started from the improvement of the quality of education services done by the teachers.

The inability of teachers in conducting learning activities is caused by the limitation of the teachers in the system of choosing learning strategies and knowledge of the teachers about approaches, strategies, methods and teaching techniques to teach the learners. Actually, all the teachers have more ability than what they do if they are given opportunities and guidance to improve their ability. Therefore, teachers should be helped to cover their weaknesses and limitation in conducting learning activities to enhance their ability in teaching and their professional behaviors.

One of the efforts that can be done to enhance the teachers' work ethic and ability in handling teaching and learning process is by implementing clinical supervision. To enhance the quality of teachers can be done through seminar and schools' supervision. Schools' supervisors are responsible for supervising the academic and schools' management. They are also responsible to improve the quality of the students' output and education.

Three main functions of implementing supervision are the functions of administration, education, and support. Administration function is related to the policy accountability and rule standard. Education function is how to enhance the teachers' ability in doing their jobs. And support function is how to support the teachers to be able to work based on their jobs' context.

Basically, supervision is research activities to know the differences between what the teachers should do theoretically or based on the rule and the real condition what the teachers do in doing their jobs in the classrooms every day. The implementation is not only about the logic action, but, the supervisors need also to know what the teachers do based on their background education, rule, and culture that cause how the teachers do their jobs. Supervisors should understand what the teachers do, why they do, and how they should do in order to achieve their goals optimally.

The main job of supervisors is doing management and academic supervision. In

doing the academic supervision, the ability that should be mastered by supervisors is clinical supervision. Clinical supervision is the supervision that focuses in renewing learning activities through systematic cycles from the step of planning, observation, and analysis intensively. Clinical supervision can also be done to renew the administration standard or rule, the teachers' professional abilities in designing, implementing, assessing learning activities, and enhancing support function to encourage the learners. The main principal of implementing clinical supervision is to facilitate teachers and headmasters in solving the problems faced in conducting their jobs. The problems can be seen by the gap occurs between real fact and what are expected.

In having supervision, the teachers should declare their problems faced. They should not be responded directly by giving information, but the teachers' initiative should be encouraged in order to be able to solve their problems. The supervisors should be as the facilitators in exploring and implementing the teachers' knowledge and skills to be able to solve their problems by themselves. Therefore, supervisors should think logically and work hard to be able to cooperate and communicate well with the teachers to enhance the quality of learning process.

Clinical supervision is the process of supervision by supervisors to teachers collegially to help teachers to enhance their professional competencies, especially in teaching in the classrooms based on the result of the observation and accurate and objective data analysis. Work ethic is the total behavior of someone and the way in expressing, viewing, believing and giving meaning of something that encourages him/her to act and achieve high performance. By having work ethic, teachers will have high spirit to do their jobs seriously; therefore, they will believe that by working seriously they will get the best result.

Based on the background of the study stated above, the probems of this study could be formulated as follow. 1) Was there a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision? 2) Was there a significant difference on the ability in handling teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision

and the teachers who were not given clinical supervision? And 3) Was there a difference simultaneously of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision?

The research objectives of this study were to investigate: 1) The difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision, 2) The difference on the ability in handling teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision, 3) The simultaneous difference of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

2. Methods

This study was an experiment research. An experiment research is a research that is used to know either there is an effect or not to the subject given treatment observed (Arikunto, 2005: 207). Or in other words, an experiment research is to to know there is a cause and effect or not. It is done by comparing one or more experimental groups that are given a treatment with one or more control groups that are not given any treatment. Type of experiment in this study was quasi experiment. It could be seen from the subject of the study which were assigned without random sampling to determine the two groups; experiment and control groups. This study was a Post-Test-Only Control-Group Design. The population of this study was all the teachers of the junior high schools in Abang sub-district. The number of the population was 149 teachers. The samples in this study were determined without individual random. It was chosen since it was difficult to change the schools that had been existed. The samples were then devided into two groups, namely control groups and experimental groups through random sampling technique. Random sampling technique is the selection of samples randomly, in which the samples are taken from the schools not from individuals (Arikunto, 2005: 95).

The steps in determining the samples in this study were as follows: firstly, conducting normality test to all of the teachers. The

normality test was done by using SPSS 17.0 for windows with the significant value was 5 %. The schools were normally distributed if their significant value was higher than 0.05, meanwhile, the schools were not normally distributed if the significant value was lower than 0.05. The experimental groups of this study were the teachers of the junior high school of SMP Negeri 3 Abang. The total number of the experimental group was 21 teachers. While, the control groups were the teachers of the junior high school of SMP Negeri 4 Abang with the total number of the control groups were also 21 teachers. Therefore, the total number of the samples used in this study was 42 teachers, both for the experimental group and the control group.

The instruments used to obtain the data in this study were questionnaire and observation sheet. The questionnaire was used to obtain the data of the teachers' work ethic, and the observation sheet was used to obtain the data of the teachers' ability in handling teaching and learning process. Sukardi (2008: 78) said that observation method is a method often used in education researches; one of them is used in action research. In this study, the observation was conducted by observing the real situation without any effort to influence, arrange, or manipulate.

Conducting observation based on the reality, describing accurately what have been observed, then, the data are noted and analyzed (Nasution, 2008: 106). Therefore, observation is a method that is done directly on the objects or subjects of the study. In this study, the observation was done to obtain the data of the teachers' ability in handling teaching and learning process. Before conducting an observation, the observation sheets were prepared.

Furthermore, questionnaires by using Likert scale were used to obtain the data of the teachers' work ethic. Liker scale is a psychometric scale that is generally used in questionnaires scale. The name of this scale came from the name of Rensis Likert. Likert scale is used to measure attitude, opinion, and perception of someone or a group of people about social phenomenon. By using Likert scale, the variable measured is described to be variable indicators. Then, the indicators are used in formulating instrument items in the form of statements of questions. The answer of every instrument item has grade from very positive to very negative, that can be in the form of words, such as: very important (sangat penting =

SP), important (penting = P), doubtful (ragu-ragu = R), unimportant (tidak penting = TP), very unimportant (sangat tidak penting = STP).

The procedures in formulating Likert scale according to Nasir (2005) are: the researchers should collect enough relevant items from the problems being observed, consisting of the clear items that the respondents like to dislike. 2) Then, those items are tried out to representative respondents from the population observed. 3) The respondents are asked to check every item, either they like (+) or they dislike (-). Those responds are collected and the answers that like the item are given the highest scores. There is not any problem to give point 5 for the highest score and point 1 for the lowest one or oppositely. The important thing is the consistency of the direction. The same as, either the answer of "agree" or "disagree" is considered the respondents like or dislike, depending on the content of the questions or the statements formulated. 4) The total score of every respondent is the total score gained from all items used. And, 5) The responds obtained are then analyzed to know which items have very clear limit between high score and low score in total scale. For example, 25 % of upper respondents and 25 % of lower respondents are analyzed to see how far the difference of every item in these groups is. The items that are not able to show clear differences, either they are categorized in high score or low score are not used as the instruments for keeping the internal consistency of the statements or questions.

The ability in handling teaching and learning process is teachers' ability in creating and maintaining optimal learning condition and teachers' ability in bringing back the optimal learning condition if there are problems in the process of learning, either small and temporary problems or permanent problems. The ability in handling teaching and learning process can be defined as teachers' ability in exploring the classes' potentials by giving chances widely for everybody creatively, so that, time and fund available can be used efficiently to do activities in the classrooms related to the curriculum and the development of the learners. The instrument used to gain the data about the teachers' ability in handling teaching and learning process was by using observation sheets in the form of APKG.

The instruments formulated based on the blue print prepared. The instruments that had been formulated were then consulted to

the experts. The validation test done in this study was content validation or experts test. The mechanism in counting the instruments was: a) the experts checked the items one by one by using scale. b) the scale was then grouped, c) the result was tabulated in the form of metrics, d) then, cross tabulation was made, e) the content validation was then calculated. Product moment correlation was used to test the item validation of the work ethic; it was by finding the correlation of the items' score with the total score.

The data obtained were then analyzed by the following steps: 1) The descriptive data used for describing the teachers' ability in handling teaching and learning process were analyzed. The analysis was based on the ideal mean score (Mi) and the ideal standard deviation (SDi). 2) Testing the normal distribution of the data and the homogeneity of the variance. A) The normality test was done to know whether the data obtained were normally distributed or not, therefore, the hypothesis test could be done. The normality test was done to four groups' data. The first group was the teachers' work ethic from the teachers who were given clinical supervision, the second group was the teachers' work ethic from the teachers who were not given clinical supervision, the third group was the teachers' ability handling learning process who were given clinical supervision, and the fourth group was the teachers' ability from the teachers who were not given clinical supervision. The normality test from the four groups' data was done by using Kolmogorov-Smirnov statistic with the significant value was 5 %. This test was done on the data of the post-test of the experimental group and the control group. B). The homogeneity test was analyzed by using variance-covariance of Equality test with the help of SPSS17.00 for windows by using Box's M test to test the homogeneity of all the variances together and by using Levene's test to test the homogeneity of the separated variances. The criteria for testing the data were more than 0.05. The correlation between the variables observed was done to know the level of correlation between Y1 (work ethic) and Y2 (the ability in managing learning activities). The analysis was done by using Product Moment test with the significant value was 5 %. If the result of the correlation between Y1 and Y2 was not more than or equal to 0.800 (≤ 0.800), then the analysis could be continued to the hypothesis by using multivariate analysis. But, if the two variables Y1 and Y2

were correlated, then the analysis was continued by using other analysis.

The first hypothes was stated that there was a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision was tested by MANOVA of variance statistic. The testing criteria was if F with the significant less than 0.05, then Ho was rejected, it meant that there was a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision. The second hypothesis stated that there was a significant difference on the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision was tested by MANOVA of variance statistic. The testing criteria was if F with the significant less than 0.05, then Ho was rejected, it meant that there was a significant difference on the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision. The third hypothesis stated that there was a difference simultaneously of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision was tested by MANOVA of variance statistic. The testing criteria was if F with the significant less than 0.05, then Ho was rejected, it meant that there was a difference simultaneously of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

3. Discussion of Results

The findings showed that the minimum score of the variable of the teachers' work ethic was 99, the maximum score was 120, the range was 21, the mean was 109.05, the standard deviation was 6.80, the median was 108, and the mode was 116. The mean score of the teachers' work ethic given clinical supervision was 109.05 which was on the interval of > 96. Based on the table, it

could be concluded that the teachers' work ethic given clinical supervision was in the category of "**very high**".

The minimum score of the variable of the teachers' ability in handling the teaching and learning process was 180, the maximum score was 217, the range was 37, the main was 200.19, the standard deviation was 11.18, the median was 203, and the mode was 189. The mean score of the teachers' ability in handling the teaching and learning process given clinical supervision was 200.19 which was on the interval of > 176. Based on the table, it could be concluded that the teachers' ability in handling the teaching and learning process given clinical supervision was in the category of "**very high**".

The minimum score of the variable of the teachers' work ethic who were not given clinical supervision was 70, the maximum score was 90, the range was 20, the mean was 79.57, the standard deviation was 6.07, the median was 79, and the mode was 76. The mean score of the teachers' work ethic who were not given clinical supervision was 79.57 which was on the interval of $64 < X \leq 80$. Based on the table, it could be concluded that the teachers' work ethic that were not given clinical supervision was in the category of "**medium**".

The minimum score of the variable of the teachers' ability in handling the teaching and learning process who were not given clinical supervision was 140, the maximum score was 171, the range was 31, the main was 157.33, the standard deviation was 9.49, the median was 158, and the mode was 158. The mean score of the teachers' ability in handling the teaching and learning process who were not given clinical supervision was 157.33 which was on the interval of $146.67 < X \leq 176$. Based on the table, it could be concluded that the teachers' ability in handling the teaching and learning process that were not given clinical supervision was in the category of "**high**".

Normality test was done to ensure that the samples came from the normal distributed population; therefore, the hypothesis test could be done. The normality test was done to four groups' data. The first group was the teachers' work ethic from the teachers who were given clinical supervision, the second group was the teachers' work ethic who were not given clinical supervision, the third group was the teachers' ability in handling the teaching and learning process who were given clinical supervision, and the fourth group was the teachers' ability in handling

the teaching and learning process who were not given clinical supervision. The normality test to four groups' data was done analyzed by using Kolmogorov-Smirnov statistic with the help of SPSS-17.00 for windows with the significant value was 5 %. The result of the calculation showed that all the four variables had the value of Kolmogorov-Smirnov statistic more than 0.05. Therefore, it could be said that the data were normally distributed.

The homogeneity test was done to show that two or more samples group data came from the population that had the same variants. It was found that the significant value of the homogeneity of all the variances together and the homogeneity of the separated variances were more than 0.05. Therefore, the metrics variance-covariance of the variables the teachers' work ethic and ability in handling the teaching and learning process were homogeny.

The correlation test was done to know the level of correlation between Y1 (work ethic) and Y2 (the ability in handling the teaching and learning process). The result of the correlation test showed that the data of the teachers' work ethic and the ability in handling the teaching and learning process who were given clinical supervision got the value of $r_{y1y2} = 0.163$. Therefore, $r_{ob} < r_{table}$ (0.433) on the significant value of 5 %. It could be concluded that the teachers' work ethic and the ability in handling the teaching and learning process both the teachers who were given and not given clinical supervision were not correlated. Therefore, the hypothesis test could be continued by using Manova.

There were three hypothesis tested in this study. Multivariate analysis was used to test the three research hypothesis.

The first hypothesis

Ho : There was not a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

Ha : There was a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

The result of the analysis showed that the teachers' work ethic who were given and not given clinical supervision had the value of

$F= 219.551 > F_{table}$ (4.35) with the significant value which was less than 0.05. It meant that the nil hypothesis (Ho) was rejected and the alternative hypothesis (Ha) was accepted.

The second hypothesis

Ho : There was not a significant difference on the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

Ha : There was a significant difference on the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

The result of the analysis showed that the teachers' ability in handling the teaching and learning process who were given and not given clinical supervision had the value of $F= 179.323 > F_{table}$ (4.35) with the significant value which was less than 0.05. It meant that the nil hypothesis (Ho) was rejected and the alternative hypothesis (Ha) was accepted.

The second hypothesis

Ho : There was not a difference simultaneously of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

Ha : There was a difference simultaneously of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision.

To know the differences between the teachers' work ethic and the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision was analyzed by using Manova with the help of SPSS-17.00 for windows. The result of the analysis showed that the value of $F = 161.849 > F_{table}$ (4.35), and the significant value was less than 0.05. It meant, the nil hypothesis (Ho) was rejected and the alternative hypothesis (Ha) was accepted. Therefore, the teachers' work

ethic and the ability in handling the teaching and learning process that were given clinical supervision were better than the teachers who were not given clinical supervision.

The descriptive analysis about the teachers' work ethic and the ability in handling the teaching and learning process that were given clinical supervision showed that the mean score of the teachers' work ethic who were given clinical supervision was 109.5. This mean score was higher than the mean score of the teachers' work ethic who were not given clinical supervision (79.57). Meanwhile, the mean score of the teachers' ability in handling the teaching and learning process who were given clinical supervision (200.19) was higher than the mean score of the teachers' ability in handling the teaching and learning process that were not given clinical supervision (157.33). Therefore, it could be concluded that the teachers' work ethic and the ability in handling the teaching and learning process that were given clinical supervision were better than the teachers' work ethic and the ability in handling the teaching and learning process who were not given clinical supervision.

Richard Waller (in Muhammad, 1994: 19) defined clinical supervision as the supervision that is focused on renewing the learning activities by conducting systematic cycles from planning, observation, and intellectual analysis intensively from the real teaching activities in the purpose of modifying rationally. Keith Acheson and Moudith D. Call (in Muhammad, 1994: 19) said that clinical supervision is the process of helping teachers in minimizing the gap between the real teaching activities and the ideal teaching activities. He stated further that clinical supervision is a supervision model that consists of three phases, namely: planning the meeting, class observation and repeating the meeting.

Findings of this study were in line with the result of the research conducted by I Wayan Korma (2012) in his study entitled "Pengaruh Implementasi Pendekatan Supervisi Klinis Terhadap Wawasan Kompetensi Pedagogik dan Kualitas Pengelolaan Pembelajaran Para Guru di Gugus IV SD Kecamatan Denpasar Selatan". The result of his study showed that there was a significant difference simultaneously of the implementation of clinical supervision approach toward the pedagogic competency knowledge and the quality of learning management of the teachers of the 4th group (gugus IV) of the elementary schools in South Denpasar sub-

district, with the probability of Pillai's Trance, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root was 0.000. It was found that clinical supervision was better than conventional supervision in improving the teachers' pedagogic competency knowledge and the quality of learning management. The same as the research conducted by Made Purba Wirawan (2010) entitled "Peningkatan Kinerja Guru Kelas I Sekolah Dasar Melalui Supervisi Klinis Pada Gugus IV Kecamatan Kubutambahan". The purpose of this study was to know the effectiveness of clinical supervision that was given to the teachers of the first grade in the elementary schools of the 4th group (gugus IV Cempaka Putih) in the sub-distric of Kubutambahan. The findings of this study showed that the clinical supervision given by the supervisors of the elementary schools could improve the teachers' work. Before the supervision was given, the mean was 71.43 which was in the category of enough effective, then, after getting the supervision, the mean was 80.71 which was in the category of effective. The teachers were encouraged to renew the learning activities in their classes.

The second finding was the teachers' ability in handling the teaching and learning process that were given clinical supervision was better than the teachers' ability in handling the teaching and learning process who were not given clinical supervision. It was happened because through clinical supervision, the teachers were brave to declare their difficulties or problems that they faced in handling the teaching and learning process. Therefore, the supervisors would be able to give solution to solve the difficulties or problems that the teachers faced through discussion. The supervisors and the teachers worked and discussed together to find out the solution to solve the problems faced. The supervisors didn't try to find the teachers' mistakes that caused the teachers to be afraid when they were being supervised.

The third finding was simultaneously, the teachers' work ethic and the ability in handling the teaching and learning process who were given clinical supervision was higher than the teachers' work ethic and the ability in handling the teaching and learning process who were not given clinical supervision. Therefore, it could be said that clinical supervision effected toward the improvement of the teachers' work ethic and the ability in handling the teaching and learning process. Or the implementation of

clinical supervision could give significant effect toward the teachers' work ethic and the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district.

The implication of the findings of this study are: *first*, to improve the teachers' ethic and the ability in handling the teaching and learning process, the implementation of clinical supervision could be used as an alternative to improve the teachers' professionalism, *second*, in implementing clinical supervision, the supervisors are necessary to create good, warm, close and open relationship with the teachers. Therefore, the teachers would be able to accept supervision given to improve and create enjoyable learning activities.

4. Conclusion

The conclusions of this study are as follows: 1) There was a significant difference on the work ethic of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision. The score of the teachers' work ethic who were given clinical supervision was higher than the teachers who were not given clinical supervision. 2) There was a significant difference on the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision. The score of the teachers' ability in handling the teaching and learning process who were given clinical supervision was higher than the teachers who were not given clinical supervision. The teachers' ability in handling the teaching and learning process who were given clinical supervision was in the category of "very high", while the teachers' ability in handling the teaching and learning process who were not given clinical supervision was in the category of "high". And 3) There was a difference simultaneously of the teachers' work ethic and the ability in handling the teaching and learning process of the teachers of junior high schools in Abang sub-district between the teachers who were given clinical supervision and the teachers who were not given clinical supervision. The scores of the teachers' work ethic and the ability in handling the teaching and learning process who were given clinical supervision were higher than the teachers who were not given clinical supervision. Therefore, it could be

concluded that clinical supervision significantly could improve the teachers' work ethic and the ability in handling the teaching and learning process of the teachers of junior high school in Abang sub-district.

Based on the findings, the suggestions could be given as follows. The teachers are expected to be able to improve their work ethic and their ability in handling the teaching and learning process, therefore, the quality of learning activities can be improved optimally. The headmasters are expected to be able to supervise and encourage the teachers to improve their work ethic and ability in handling the teaching and learning process. The supervisors are expected to be able to give optimal supervision to all the teachers that they supervise. For the perfection of this study, it is suggested to other researchers to conduct further researches by implementing other supervisions available; therefore, it can provide various references for teachers in improving the quality of education.

5. References

Agung, A. A. Gede. 2005. *Konsep dan Teknik Analisis Data Hasil Penelitian Tindakan Kelas.* Singaraja: Fakultas Ilmu Pendidikan Undiksha Singaraja.

Arikunto, S. 2005. *Prosedur Penelitian Suatu Pendekatan Praktis*. Jakarta: Rineka Jaya.

Dantes, Nyoman. 2007. *Metodologi Penelitian Untuk Ilmu-ilmu Sosial dan Humaniora*. Singaraja: Undiksha.

Depdiknas. 2005. *Peraturan Pemerintah Nomor 32 tahun 2013 tentang Standar Nasional Pendidikan*. Jakarta: Depdiknas.

Depdiknas. 2007. *Peraturan Menteri Pendidikan Nasional No. 16 tahun 2007 tentang Kualifikasi Akademik dan Kompetensi Guru*. Jakarta: Depdiknas.

Dimyati dan Moedjiono. 2009. *Belajar dan Pembelajaran*, Jakarta : Rineka Cipta.

Korma, I Wayan. Pengaruh Implementasi Pendekatan Supervisi Klinis Terhadap Wawasan Kompetensi Pedagogik dan Kualitas Pengelolaan Pembelajaran Para Guru di Gugus IV SD Kecamatan Denpasar Selatan. *Jurnal Pascasarjana* Undiksha. Volume 2 Nomor 2.

Nasution, S. 2008. *Metode Research*. Jakarta: Bumi Aksara.

Nazir M.2005. *Metode Penelitian.* Bogor: Ghalia Indonesia.

Sukardi. 2008. Metodologi Penelitian Pendidikan. Yogyakarta: Bumi Aksara

Wirawan Purba, Made, Peningkatan Kinerja Guru Kelas I Sekolah Dasar Melalui Supervisi Klinis Pada Gugus IV Kecamatan Kubutambahan, *Jurnal Pendidikan Kerta Mandala Dinas Pendidikan Kabupaten Buleleng*, Volume 3, No. 003, Oktober 2010, hal 73.

The Effect Of Problem Based Learning Based on Performance Assessment on Physics Learning Result Viewed From Cognitive Styles

I Putu Eka Wilantara

Sekolah Menengah Atas Negeri (SMAN) 1 Singaraja

ewilantara@yahoo.com

Abstract

This research aims at discovering the effect of problem based learning based on performance assessment and cognitive styles on physics learning. This research used post test-only control group design. The learning result data were collected with essay test and cognitive style data were collected with GEFT test. The data acquired were analyzed with two way ANOVA and Tukey test. The results of this research were : (1) there is a significance difference in the physics learning result between students taught by using PBL model based on performance assessment and those taught by using conventional model, (2) there is an interactional effect between learning model with cognitive styles physics learning result, (3) there is a significant difference in the physics learning result between *field independent* students taught by using PBL model based on performance assessment and those taught by using conventional model, and (4) there is a significant difference in physics learning result between *field dependent* students taught by using PBL model based on performance assessment and those taught by using conventional model.

Key words : performance assessment, cognitive styles, physics learning result, problem based learning model.

1. Preface

Physics is the most fundamental science as it relates to the structure and behavior of objects. (Giancoli, 2001: 1). Physics was studied since high school education. However, many students have difficulties in learning and understanding the concepts of physics. These difficulties can be difficulties in problem solving. Most students erred in linking concepts in physics, causing errors in solving every problem. One model of learning that can help students overcome difficulties is PBL.

PBL model is a learning model that is focused on learning experience which set includes investigation and problem solving particular problems related to daily life. PBL models associated with the use of intelligence from within the individual to solve the problem of meaningful, relevant, and contextual.

Through the PBL approach students presented their ideas, students are trained reflecting perceptions, argue and communicate to any other party so that teachers understand the thinking of students, and the teacher can guide new ideas in the form of concepts and principles. Thus, learning takes place in accordance with the abilities of students, so that the interaction between teachers and students, and students with student be conditioned and controlled.

In addition to learning models, assessment of student performance also affects the quality of learning outcomes. Assessment is used to determine the success of student learning by assessing the performance of individual students or groups. Assessment is the application of a variety of ways and use a variety of tools. Assessment aims to obtain information about the extent to which the learning outcomes of students or information about the achievement of competence of learners. This assessment process aims to answer questions about how well the results or achievements of learners.

An examination of the philosophy of the functioning of the school as a place to prepare students to be able to live in the community, the model of Problem Based Learning (PBL) -based assessment of the performance of a learning strategy that is

essential to implement, because students do not just memorize the principles of science, but also can apply it in real life. Thus, learning will be more meaningful. Meaningfulness of the study will have an impact on memory and students' understanding of concepts more powerful so it will be stored in long-term memory, which would certainly have a positive impact on learning outcomes.

Cognitive styles of students in the learning process associated with several things, among others: 1) the ability to analyze and organize the information that is encapsulated in the field of cognitive style field independent and dependent; 2) divergence and convergence towards thinking formulated in divergent and convergent cognitive styles, and 3) the spontaneity of giving a response, formulated in the reflexive and impulsive cognitive style (Candiasa, 2002: 3). The main activity in the PBL learning-based assessment of the performance is to analyze and organize information to solve the problems of physics. Therefore, cognitive style, especially the classification of field independent and dependent fields need attention in the physics learning process.

Cognitive styles can be conceived as an attitude, a stable option or strategy to find ways students in receiving, remember, think, and solve problems. Cognitive style refers to individual characteristics in an effort to organize conceptually environment (Goldstein and Blackman, 1978: 2).

Cognitive styles associated with individual methods used to collect, analyze, evaluate, and interpret data. Cognitive styles divided into two cognitive styles Field Independent (FI) and Field Dependent (FD). Differences in cognitive style would cause information (evidence) obtained by the same individual will be interpreted differently. It is associated with characteristics different cognitive styles. Individuals who have FI cognitive styles are individuals who tend to view the objects consist of discrete parts and separated from its surroundings, able to analyze to separate the stimulus from the context, is able to restructure, impersonal oriented, and work with motivation and internal reinforcement. While individuals who have cognitive style FD are individuals who tend to think globally, looking at the object and its environment as a single entity, socially oriented, prefer a structured environment, following the existing goals, as well as prioritizing motivation and external reinforcement.

Student as unique individuals certainly has a different cognitive styles with other individuals in the class. Cognitive style which is owned by the students will have an impact or a positive impact if provided the right environment and conditions, so that students can learn optimally. Students who learn optimally will achieve good learning outcomes, but if the condition or the learning environment of students not in accordance with its cognitive style will make the students can not learn optimally. So in applying learning must pay attention to the type of cognitive style that is owned by the students. The aim of this research was to determine the effectiveness of Problem Based Learning model (PBL) based assessments in improving learning outcomes in terms of cognitive style.

2. Methods

This study was conducted at SMAN 1 Singaraja in the academic year 2013/2014 in the class X semester of 1. This study used a 2x2 factorial design. As for hypothesis testing using Variant Analysis of Two Paths (2x2 ANOVA) and Tukey test. In this study involves three variables consisting of independent variables, the dependent variable and variable moderator. The independent variable in this study is a model of Problem Based Learning (PBL) performance-based assessment. The dependent variable in this study is the result of studying physics. While the moderator variables are cognitive styles. Data were collected using a cognitive style GEFT test and study outcome data were collected using a test description.

3. Results and Discussion

Based on the results of data analysis, found the results of the study as follows.

First, there are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning (Fa_{count}= 24.96>F_{table}=4.00).

Secondly, there is an interaction effect between learning models with cognitive style on learning outcomes physics ($F_{AB(count)}$ = 92.55> F_{table} = 4.00).

Third, there are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning in

students who have the cognitive style field independent (Q_{count}=18.72>Q_{table} = 3.74).

Fourth, there are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning in students who have the cognitive style of field dependent (Q_{count} = 5.23 > Q_{table} = 3.74).

Results of the data analysis has shown that the assessment of the performance-based model of PBL significantly different effect on the physics learning outcomes between groups of students who take the PBL model of performance-based assessment and the group of students who take conventional learning models. Learning outcomes of students who take PBL learning model-based assessment of performance is higher than the learning outcomes of students who take the learning with conventional learning models. This is evidenced by the average of the learning outcomes of students who take the PBL learning model-based assessment of the performance of 33.68 is greater than the value of the group of students who take the conventional learning model that is equal to 31.53. These findings prove that the PBL model of performance-based assessments applied by physics teacher in the learning process, can improve student learning outcomes.

Based on the findings of the research note that the application of PBL model of performance-based assessment appears to have contributed positively to students' understanding in solving physics problems. This is in accordance with the opinion of Duch (1996: 327), which states that by applying the model of problem-based learning (PBL) in learning will encourage students to know how to learn and work together in groups to find a solution to the problems in the real world.

The findings in this study reinforce the notion Ibrahim and Nur (2007: 23) states that the model PBL is very effective for teaching processes higher-order thinking, help students process the information in its possession and to help students build their own knowledge about the social world and the physics around, Further Arends (2004: 392) states that PBL helps students build a model of the mind and skill in solving problems.

In addition to the model PBL, the use of assessment in learning performance also support improved learning outcomes physics. As we know modern learning theory has the concept that students should use their prior knowledge to build new knowledge, actively exploring knowledge related to everyday life. In general, the performance assessment will make students active in the task (performance) complex.

Very precise assessment of performance combined with PBL as a model in the classroom learning more done experiments that need to be carried out an assessment of the student's performance. Performance assessment allows teachers to assess the process and not just the results. When students are asked to do something, then the teacher can assess students 'work processes as well as assessing the students' work. This assessment can be used as illustration to obtain information about the extent to which students can achieve learning competencies. So if the student has not reached success, teachers can find the right solution to fix in the next lesson. This is supported by the opinion of Nitko (1996: 239) states that the assessment of the performance of a procedure that uses tasks or exercises to get information about how the students learn well.

PBL model of performance-based assessments applied in physics learning can make students better understand physics concepts being taught because these concepts are found by the students. In lessons, students are actively involved in problem solving and thinking skills students require higher. Conditioning of students who study in groups which interact to teachers and friends can increase the achievement of mastery learning can be expected.

Focused on the above findings and exposure, it can be said that the model PBL is more effective performance-based assessment used in teaching physics than conventional models. With the use of PBL model of performance-based assessment will make learning more meaningful so that it will affect the outcome of learning physics.

The results also showed that there are significant interaction between learning models with cognitive style on learning outcomes physics. The students who have the cognitive style of field independence, students who take the PBL learning model has a performance-based assessment of learning outcomes physics higher than students who take conventional learning. In contrast to the students who have the cognitive style of field-dependent, physics learning outcomes of students who take the learning to be higher than conventional

models of physics learning outcomes of students who take the PBL model of performance-based assessment. This causes the opposite effect, which means there are simple interaction (Ferguson, 1982: 256-257).

Related to the research findings in the form of an interaction between cognitive learning models and styles in physics effects on learning outcomes, learning model in this study is limited to two models, namely the model-based performance assessment PBL and conventional learning models. Besides, cognitive styles are also divided into two cognitive styles Field Independent (FI) and Field Dependent (FD). Application of appropriate learning models with a cognitive style that is owned by the student learning outcomes is higher than the application of learning models that are less suited to the student's cognitive style.

Cognitive style is personal and each has a dominant cognitive style both FD and FI. Cognitive style differences will lead to differences in the perspective of students in conducting a learning process in the classroom and outside the classroom. This is supported by the opinion of Wapner and Demick (in Arends, 2004: 50) who explains that each person is different in perceiving and processing information. There are more harmonious studying alone, there were more than happy to listen to the explanation and information from teachers through lecture method.

While the characteristics of individuals who have cognitive style FD according to Witkin, et al (1977: 8), among others: (1) tend to think globally; (2) tend to accept existing structures; (3) has a social orientation; (4) are likely to choose a profession that emphasizes social skills, (5) tend to follow existing destination; and (6) tend to work with external motivation and is more interested in the external reinforcement.

It also expressed by Lamba (2006) which states there is a difference between the cognitive styles FI (articulated) and FD (global). Based on the difference in perspective, a way of thinking and ability to analyze to solving the problem, then the physics learning outcomes of each individual will be different. The higher the level of ability to analyze the problem-solving abilities will be trained. It will be able to improve learning outcomes.

Based on the findings in this study, the model PBL is more effective to improve learning outcomes for students of physics

who have FI cognitive styles. This happens because the PBL model of performance-based assessment of independence put learners in constructing knowledge and learning model requires high level thinking skills in analyzing and solving the problems that form the basis for learning. Students who have FI cognitive styles are better able to organize information independently and continuously conducting an analysis of independently obtained information than students who have cognitive style FD. While the conventional learning model would be more effective to improve learning outcomes for students who have cognitive style FD because in this learning, students will be more guided by the teacher in analyzing various information.

Cognitive styles according to Goldstein and Blackman (1978: 2) refers to the individual characteristics of the environment in an effort to organize conceptually. In physics lesson, students who have cognitive style independent field has a greater ability than students who have dependent cognitive style field in the study of physics. Students who have the cognitive styles FI has the capability of analyzing and solving problems, so that perception was not affected when the environment changes. Thus FI cognitive style will contribute to the learning outcomes.

Students who have the cognitive style FD requires a well-established learning objectives. In addition, the structure of learning materials also tend to be followed in accordance with what was presented, so that they are more interested in learning materials are more structured and systematic. PBL models that are less structured and systematic less attractive for individuals FD having to organize themselves. In the conventional learning model, students who have cognitive styles tend to be favored FD, because the role of the teacher is still prominent.

4. Closing

Based on the results of hypothesis testing and discussion in this study can be summarized as follows.

1. There are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning. Students who follow the model PBL has a performance-based assessment of learning outcomes physics higher

than students who take conventional learning

2. There is an interaction effect between learning models with cognitive style on learning outcomes physics.

3. There are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning in students who have the cognitive style of field independence. Physics learning outcomes of students who take the model-based assessments PBL higher performance than students who take conventional learning in students who have the cognitive style of field independence.

4. There are significant differences between the physics learning outcomes of students who take the model PBL-based assessment of performance and students who take conventional learning in students who have the cognitive style of field dependent. Physics learning outcomes of students who followed the conventional higher learning than students who take the PBL learning model-based assessment of the performance of the students who have the cognitive style of field dependent.

5. References

Arends, R. I. 2004. *Learning to Teach.* Sixth Edition. New York: The McGraw-Hill Companies.

Candiasa, Made. 2002. Pengaruh Strategi Pembelajaran Dan Gaya Kognitif Terhadap Kemampuan Memprogram Komputer". *Jurnal Teknologi Pendidikan Universitas Negeri Jakarta Vol. 4, No.3.*

Duch, Barbara J. 1996. Problem-Based Learning in Physics : The Power of Students Teaching Students. *Journal of College Science Teacher.* 25 (5): 326-329.

Ferguson, George A. 1982. *Statistical Analysis in Psychology and Education.* Auckland: McGraw-Hill Book Company.

Giancoli, Douglas C. (2001). *Fisika Jilid I.* (Edisi ke-5). (Penterjemah: Yuhilza Hanun). Jakarta: Erlangga.

Goldstein, Kenneth M. and Sheldon Blackman, *Cognitive Style: Five Approachs and Relevant Research.* New York: John Wiley & Sons, 1978.

Ibrahim, M dan Nur, M. 2007. *Pengajaran Berdasarkan Masalah.* Surabaya: Unesa University Press.

Lamba, H.A. 2006. Pengaruh Pembelajaran Kooperatif Model STAD dan Gaya Kognitif terhadap Hasil Belajar Fisika Siswa SMA. *Jurnal Ilmu Pendidikan 13(2), 122-128.*

Nitko A.J. (1996). *Educational Assessment of Students*, 2nd Ed. Columbus Ohio : Prentice Hall.

Witkin, H.A., et.al., A.Field-Dependent and Field-Independent Cognitive Style and Their Educational Implications, *Review of Educational Research*, Vol. 47, 1977.

IMPROVING THE EFFECTIVENESS OF LEARNING MATHEMATICS THROUGH SCIENTIFIC APPROACH

I Ketut Bawa

SMP Negeri 1 Singaraja

E-mail: ktbawa4@yahoo.co.id

Abstract

This research was conducted in order to obtain empirical data on the impact of the application of scientific approach in teaching mathematics, particularly to increase the effectiveness of learning mathematics. This study was carried out following the procedure of action research designed by Kemmis & Taggart. The subjects were 28 students of class VIII-A2 SMP in Negeri 1 Singaraja in the second semester of academic year 2014/2015. A number of the data were collected with the technique to test students' mathematics learning outcomes. The data were analyzed with descriptive statistics.The results showed that the scientific approach in mathematics learning in class VIII-A2 SMP Negeri 1 Singaraja in the second semester of academic year 2014/2015 increased the effectiveness of learning mathematics. It can be seen from the increase in mastery learning achieved by VIII-A2 from 81.84% in the first cycle to 89.29% in the second cycle and increased to 92.86% in the third cycle as well as increased to 96.43% in IV cycle. Based on the success indicators defined achievement of 100% completeness study, it can be said that the action of the application of scientific approaches in the study of mathematics has not been successful, but the statistical achievement of mastery learning is sufficient to indicate that the scientific approach gives positive expectations in order to increase the effectiveness of learning the tips edges improve student learning outcomes overall. Based on these results, researchers advice to teachers is that the scientific approach applied in the math class trying to continue to make improvements so as to achieve the expected goals. This is very positive approach in the scientific characteristics such as: 1) a student-centered, 2) involves the science process skills in constructing concepts, laws or principles, 3) involves the cognitive processes of potential in stimulating the development of intellect, especially thinking skills high level students, and 4) to develop the student's character.

Keywords: Effectiveness, Scientific

1. Introduction

One of the factors which determine the success of students in participating in the learning process in the classroom, which is marked by the results of student learning is the learning approach used by teachers. This is quite reasonable because the approach used by teachers will further define the interaction that will occur in the process of learning. Interaction in learning related to what strategies used by teachers and also how teachers approach the students so as to increase the motivation to learn from the students. In a good learning, teachers should act as mentors and facilitators. In its role as counselors, teachers must strive to turn on and provide motivation for a process that is conducive to interaction. In its role as facilitator, the teacher should try to provide good facilities through approaches undertaken. Thus, to make learning approach give good results, then selecting learning approaches should be tailored to the character of learning and the learner's own characters.

At the beginning of the second semester of the school year 2014/2015, researchers got an additional teaching at class IX-A7. The class VIII-A2 is one of the parallel classes in class VIII SMP Negeri 1 Singaraja. For the information, the class VIII and VIII-A1-A10 are superior classes which were established by the dominant abilities of students in Mathematics, Bahasa Indonesia, science and English. Thus, the class VIII-A2 contains a group of students with mathematical skills which are not as good as the excellent class. However, it should not also be said that the class VIII-A2 has low math ability, because of student input SMP Negeri 1 Singaraja generally have an average ability in mathematics.

Based on the observation at the beginning of the meeting until the 6th meeting and the evaluation done in the first semester, it appeared that the class VIII-A2 deserves

additional attention in learning mathematics. In addition to the fact that the results of the evaluation did not meet the predetermined or target standard, the students' interaction with the teaching material and teaching resources was not optimal. During the first five meeting, there was a tendency that students were too passive eventhough they were given challenging questions. In addition, the students tended to keep silent and smiled and pretended involving in the learning process. This was likely to be one cause of not achieving the learning objectives that had been set previously.

Judging from the learning method applied during the first five sessions, expository method combined with discussion method also showed that students tended to wait for an explanation and instruction from the teacher to grind. When the concept had been explained by teachers, students tended to be a listener even if teachers had to pose questions that intrigued the students. Similarly, when conducting the discussion, the students tended to perform his duties without enthusiasm. Only one of two children asked for an explanation to the teacher when being approached by the teacher. Students who posed question were just the same students in every meeting. Thus, based on that experience, it can be said that the learning process of mathematics in the classroom had lost the spirit of learning, lost the excitement in learning, and ultimately learning objectives were not achieved.

Further searches carried out by discussing with the teachers of the current semester. The results of the discussions indicated that during the first semester, the teachers tended to apply the assignment method. Judging from the results of the evaluation study at the end of the semester also showed that there were more than 50% of students in class VIII-A2 did not meet the target standard. This shows that the learning method that had been applied so far was not effective in the sense of not been able to be a bridge for the achievement of learning objectives that had been set in mathematics. Therefore, it is necessary to change the method or approach to learning that has been applied in classes VIII-A2 in learning mathematics.

One approach to learning that could give meaning to the learning of mathematics, both in terms of knowledge, skills and attitudes of students, and could get closer to the students' learning outcomes with the goal of learning mathematics itself is a scientific approach. This approach was selected because, in addition to being the main approach in the implementation of the curriculum in 2013, the researcher has confidence while applying scientific approach to learning mathematics. The researcher also believes that scientific approach is an effective approach to achieve the goal of learning mathematics. This belief is based on the basic concept of scientific approach itself which is student centered with a pattern that is very scientific which involves the process of observation, the activity to ask or submit temporary answer (hypothesis), the exploration process, the processing results of exploration, the communication activities or the delivery of the data processing, and also the self-evaluation process. The reserahcer belives that these steps will be more meaningful in students because students do not only involve their mind but also involve other senses in learning mathematics as in the hearing, talking (communication/debate) and evaluating the results of his own.

Based on the description of the background above, the problem which was formulated was "Could the scientific approach increase the effectiveness of learning mathematics?"

To answer this problem, the researcher began to implement the scientific approach from the beginning of the academic year 2014/2015. This approach was chosen because, in addition to trying to apply an appropriate learning approach in curriculum 2013, the scientific approach has several advantages for application in the learning process in accordance with the purpose of scientific approach itself. There are some purposes of the scientific approach namely 1) to improve the ability of the intellect, especially the advanced thinking abilities of students, 2) to form the students' ability to solve a problem systematically, 3) to create the conditions of learning in which students feel that learning is a necessity, 4) to obtain high learning outcomes, 5) to train students in communicating ideas, especially in writing a scientific article, and 6) to develop students' characters.

Based on the formulation of the problems mentioned above, the purpose of research in the form of implementation of the scientific approach in teaching mathematics in general were described in the scientific approach to learning mathematics. In particular, this action aims to determine the impact of the scientific approach to improving the effectiveness of learning

mathematics learners, in terms of achievement of learning goals.

The resultof the research related to the application of scientific approach in learning mathematics were expected to have benefits for:

1. Students, as a way of learning mathematics that the knowledge will be meaningful if the students explore their own abilities with the help of an adult through the process of observation, questioning activities, exploring, communicating the results of data processing activities, and doing self reflection.

2. Teachers, as a reference in conducting instructional innovations that give positive benefits to increase the effectiveness of learning which is marked by the achievement of learners who meet the specified criteria.

3. School, as a subject of study in determining the policies that support effective mathematics learning feasibility and ultimately improve student learning achievement.

A Review of the scientific approach was taken from a paper prepared by Prof. Dr. Putu Nitiasih, MA, entitled "Models of Scientific Learning Based in the implementation of Curriculum 2013", which was delivered in the Professional Development Workshops for Teachers in SMP Negeri 1 Singaraja on January 10, 2014. In addition, an explanation of the scientific approach was also cited from many of teaching materials Training of Trainer (ToT) Implementation of Curriculum 2013, issued by the Human Resources Development Agency of Education and Quality Assurance of Education Ministry of Education and Culture, in 2013.

Learning according to scientific approach is a learning process that is designed to make learners actively construct the concept, law or principle through the stages of observing (to identify or find the problem), formulating the problem, proposing or formulating hypotheses, collecting data with a variety of techniques, analyzing the data, drawing conclusions and communicating the concept, law or principle discovered. The scientific approach is intended to provide insight to learners in recognizing, understanding the various materials using a scientific approach, that information could have come from anywhere, at any time, do not rely on the information in the direction of the teacher. Therefore the learning conditions are expected to be created and

aimed at encouraging students to find out from various sources through observation, and not just be told.

The application of scientific approaches in the learning process involves skills such as observing, classifying, measuring, predicting, explaining, and concluding. In carrying out these processes, assistance from teacher is needed. However, the teacher must help diminishing with increasing adult student or the higher class of students.

Learning in the scientific method has the following characteristics: 1) a student-centered, 2) involving the science process skills in constructing concepts, laws or principles, 3) involving the cognitive processes of potential in stimulating the development of intellect, especially high-level thinking skills of students, and 4) deeveloping the student's characters.

Along with these characteristics, the purposes of learning in scientific approach are: 1) to improve the intellectual ability, especially the advanced thinking abilities of students, 2) to form the students' ability to solve a problem systematically, 3) to create conditions of learning in which students feel that learning is a necessity, 4) to obtaining results of high learning, 5) to train students in communicating ideas, especially in writing a scientific article, and 6) to develop students' character.

Step-by-step implementation of the scientific approach in the learning process include digging through observation, questioning, trying, and then processing the data or information, presenting data or information, followed by analyzing, reasoning, then concluding, and creating. The meaningfulness of observing method prioritizes the learning process (meaningfull learning). This method has certain advantages, such as the media presents a real object, happy and challenged learners, and easy implementation. The method is very beneficial to observe the fulfillment of curious learners. Thereore, the learning process has a high significance. The "asking step" in learning activities as presented in Permendikbud No. 81A in 2013, is asking questions about information that is not understood from what is observed or questions to get additional information about what is observed (starting from the factual questions to questions that are hypothetical). The next activity is the "gathering information". Activities of collecting information are the follow up of asking. This activity is done by digging and

collecting information from various sources through a variety of ways. For that learners can read more books, pay attention to the phenomenon or object closer, or even conduct experiments.

The "associating / processing information / reasoning" in learning activities as presented in Permendikbud No. 81A in 2013, is processing the information that has been collected either limited from the collecting activities / experiments and the results of activities to observe and collect information activities. Processing information gathered from nature to add breadth and depth to the information processing that are looking for solutions from a variety of sources that have a different opinion to the contrary. This activity is conducted to find the relationship of the information with other information, find the pattern of linkages such information.

Concluding step in learning activities with a scientific approach is a continuation of the activity of processing data or information. Having found a link between the information and finding different patterns of these linkages, then students make conclusion together in a single group, or individually.

In the scientific approach the teacher is expected to provide an opportunity for learners to communicate what they have learned. This can be done through writing or telling what is found in the activities of finding information, associating and finding patterns. The results is delivered in class and assessed by the teacher as learning outcomes of students or groups of such learners. The communicating activity in learning activities as presented in Permendikbud No. 81A in 2013 is to convey the observations, conclusions based on the analysis of oral, written, or other media.

The application of scientific approach to learning includes three main activities, namely the preliminary activities, core activities, and closing activities. Preliminary activities aimed at creating an atmosphere of effective early learning which allows students to follow the learning process well. The main objective is to establish the preliminary activities of students' understanding of the concepts that have been controlled with regard to the new subject matter to be learned by the students. Core activity is the main activity in the learning process or in the process of mastering the learning experience (learning experience) students. Core activities in learning are a process of forming the experience and abilities of students programmed implemented within certain time duration. Core activities in the scientific method aim at constructing the concept, law or principle by students with the help of teacher through given activities. Closing activities aim at two main things – first, the validation of the concept, law or principle which has been constructed by students; second, the enrichment of the subject matter which is controlled by students

Effectiveness is the achievement of precise objectives or selecting the appropriate objectives of a series of alternative or choice of ways and the choice of several other options. Effectiveness can also be interpreted as a measure of success in achieving the goals that have been determined. For example, if a task can be completed with the election of the ways that have been determined, it is an effective way. According Sedarmayanti (2001), in general, effectiveness is often associated with efficiency in achieving organizational goals. Further said that if the goal or objective has been achieved as planned before, it can be said to be effective. Effectiveness also means successful or appropriate. The effectiveness of the communication process with regard to achieving the goal that has been planned in accordance with budgeted costs, set time and specified number of personnel. Effectiveness is also a measurement in terms of the achievement of goals or objectives that have been defined previously. This implies that the effectiveness can be interpreted as a measurement that the goals have been achieved as planned carefully.

Based on these opinions, it can be said that the effectiveness of a communication through a certain process could measurably describe the achievement of goals or objectives determined in advance.

Furthermore, according Sutikno (2005), understanding the effectiveness of learning can be expressed as the rate of success in achieving the learning objectives. Further explained that effective learning is a learning that allows students to learn easy, fun, and can achieve the learnig goal as expected.

As we know that 10% of the learning experience is taken from what we hear, 20% of what we read, 30% of what we see, 50% of what we see and hear, 70% of what we say, and 90% of the we say and do. The Law 19 of 2005 on the SNP mention that the learning atmosphere in the classroom should be interactive, inspiring, fun, challenging, innovative and active. So it has the characteristics of effective learning in which students see, hear, demonstrate,

collaborate, discover, and build their own concept.

The effectiveness of learning depends a lot on the readiness and learning is done by the students themselves, whether conducted independently or in groups. With regard to effectiveness, it is important to pursue the development of the activity, creativity and motivation of students in learning so that learning becomes effective. Thus it can be said that the learning effectiveness can be evaluated on the achievement of learning objectives optimally in accordance with the specified time.

2. Methods

This research is a classroom action research with qualitative approach. This approach was chosen in view of the object that is the target of research emphasizes the natural aspect rather than the provision of a rigid treatment.

This research was conducted in SMP Negeri 1 Singaraja in the academic year 2014/2015 semester. The study involved 28 students of class VIII-A2, which consists of 8 boys and 20 girls. The material as the object of research includes the tangent to the circle, a triangle and a circle in a circle outside the triangle.

The procedures of this classroom action research were designed according to the model of action research developed by Kemmis & Taggart (1998). In general, the research procedures are: 1) planning action, 2) the implementation of measures, and 3) reflection on actions taken. The procedure was designed in this classroom action research consisted of four cycles.

The instrument used in this study included instruments to collect data about students' learning achievement, such as achievement test, which was then used to look at the effectiveness of learning. The instruments were compiled based on the validity of the content, ie, the preparation was adjusted to the competence that was being taught.

For describing the issue, the obtained necessary data would be analyzed latter. The data required includes mathematics learning achievement which was collected by the testing techniques. All the data was obtained from the source in this case the students of VIII A2 in SMP Negeri 1 Singaraja.

After the data had been collected, in this case the students' mathematics learning achievement data in the form of quantitative analysis with qualitative analyzes that are comparative to later described qualitatively based on the average value.

The effectiveness of learning was aalyzed in terms of the achievement of the minimum passing grade or in terms of the achievement of learning objectives. Overall results of further data analysis were used to assess the success of the actions that had been implemented. The success of the action based on the indicator was that all students (100%) had reached or exceeded the minimum completeness criteria specified namely 75.00.

3. Discussion of Results

This research was conducted in SMP Negeri 1 Singaraja, involving 28 students of class VIII-A2, which consists of 8 boys and 20 girls. The study was conducted in the second semester of academic year 2014/2015 for 3 (three) months, from January to March 2015. Class VIII-A2 in SMP Negeri 1 Singaraja is a parallel class, which their students are not chosen specifically as the excellent class. As a parallel class, in terms of how to set up, therefore it can be assumed that the class VIII-A2 does not have the math skills as well as excellent class. But it can not still be said to lack the math skills, because the students input in SMP Negeri 1 Singaraja are the choosen students in Buleleng regency.

The class of VIII-A2 was chosen as the target of the research because the researcher immediately became the teacher of mathematics in this class in the second semester of academic year 2014/2015. This was in line with the objective of the action research to improve the learning process in a sustainable manner.

The class action of the study consisted of 2 hours of lesson for each cycle and held for 4 cycles outside the evaluation study. In the implementation process, in general, lesson plans were designed to be implemented according to plan. There were no significant obstacles in the process of implementation. In every meeting, all the students seemed very enthusiastic in studying the specified topics. Group discussion taken place as being expected. There were a great number of questions posed by students. The process of the presentation to the class continued after the discussion among students was also very interesting. However, there was also a small record that needed to be conveyed. At the beginning of the learning process in the cycle, there were members of the group who had hesitation in doing worksheets that were distributed.

They worked too careful so that the working group was running a bit slow. But this was only a short walk because after being given the motivation to do whatever came to his mind most of the students worked on worksheets with enthusiasm and there was even a group requesting to replace the LKS because of lack of space to write answers to questions in LKS.

The data collected by the instrument used to collect data further student achievement were analyzed as needed. The process of data analysis was carried out on the results of the evaluation of each end of the cycle. The analysis were performed to obtain an average value of learning achievement, the highest score achieved by students, students achieved the lowest value, median, mode and percentage of students in the classical learning completeness. The results of data analysis using some statistical formula results are as follows.

Table 4.1 Results of Research (Learning Achievement)

Statistic	Activity (cycle)			
	1	2	3	4
Average	85,85	84,21	94,82	97,86
Median	85	80	100	100
Modus	85	80	100	100
Highest Score	100	100	100	100
Lowest Value	70	75	75	60
Target Standard	81,84%	89,29%	92,86%	96,43%

Based on the data analysis above and on the basis of success indicators which specified that the action was considered sucessful if all students had been able to achieve the minimal learning completeness criteria, it can be said that the application of the scientific approach so far has not reached the set target. Moreover, if seeing the results obtained, the scientific approach can not also be said to be effective in learning mathematics. However, the study also showed the improvement of the average learning outcomes from the first cycle of 85.85 into 84.21 in the second cycle, then became 94.82 in the third cycle, and eventually became 97.86 in the fourth cycle. This indicated that the scientific approach had a positive impact on the improvement of student achievement.

Judging from the median and mode, it can also be said that the tendency of students to obtain a good value is getting higher. It can be seen from the value modes for the first cycle of 85, the second cycle 80, the third, and fourth cycles are 100. It also indicated that the impact on the scientific approach to the increasing number of students who scored satisfactory or in terms of positive impact on the scientific approach the acquisition value of student learning outcomes.

If viewing from the acquisition of minimum and maximum values achieved by learners, it can be said that scientific approach has less significant influence. It can be seen from the acquisition of the same maximum value for each cycle of 100 and acquisition of minimum values fluctuate or if averaged to 70. Thus the maximum value and the minimum value obtained by the students were not affected by the approach used.

Judging from the classical mastery learning, it can be said that the scientific approach has a positive effect in improving students' mastery learning. It can be seen from the achievements obtained from cycle to the next cycle has increased. In the first cycle obtained completeness study by 81.84% increased to 89.29% in the second cycle and became 92.86% in the third cycle and increased to 96.43% in the fourth cycle. This indicates that the level of effectiveness of the better scientific approach along with improvements made during the administration of the action.

With these results it can be said that the scientific approach gives hope to be continued to be developed in order to improve student learning outcomes and

improve the effectiveness of classroom learning. It is good to implement the scientific approach closer to the students with their daily activities, ranging from observing, trying, communicate and then using their results in learning. This is in line with the advantages of the approach scientifically the learning is designed so that learners are actively constructing concept, law or principle through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect data with a variety of techniques, analyze the data, draw conclusions and communicate the concept, law or principle "discovered".

The characteristic of students in VIII-A2 also supports the adoption of a scientific approach where this approach requires creativity of the students themselves because they seemed to find themselves, not just be told. It can be seen when the students of VIII-A2 doing a group discussion in accordance with the student worksheet provided by the teacher. This is important because the characteristics of the scientific approach itself namely: 1) a student-centered, 2) involving the science process skills in constructing concepts, laws or principles, 3) involving the cognitive processes of potential in stimulating the development of intellect, especially the level thinking skills high students, and 4) developing the student's characters.

So it can be concluded that the scientific approach in mathematics learning in class VIII-A2 SMP Negeri 1 Singaraja was not optimal but was able to show an increase in the effectiveness of learning seen from mastery learning obtained.

4. Conclusion

In accordance to the results of research and discussion as described above, the action research which measures the implementation of scientific approach in mathematics learning in class VIII-A2 SMP Negeri 1 Singaraja in the second semester of academic year 2014/2015 can be concluded to be able to improve the effectiveness of learning math for VIII-A2 students in SMP Negeri 1 Singaraja in the second semester of academic year 2014/2015.

This study examined the impact of the application of scientific approaches in teaching mathematics to increase the effectiveness of mathematics. The results of the study showed an increase in the effectiveness of learning mathematics. The

researchers' suggestions, especially to teachers of mathematics are:

1. The scientific approach should be continued to be developed by other teachers to different subjects and issues as one approaches the study of mathematics.
2. In the implementation, the scientific approach can be implemented with a variety of learning methods such as discovery learning, inquiry learning, project based learning and others which expect creative teachers to select them according to the needs of teaching materials and learners.
3. Teachers are expected to always be open to innovation on learning approach to teaching mathematics. Thus, the learning will not be monotonous that will ultimately affect the quality of service of teachers towards their students.

5. References

Blom B.S, etc. 1971. *Handbook on Formative dan Sumative Evaluation of Student Learning.* New York : McGraw-Hill Book Co.

Kemmis, W.C & Taggart, R.M. 1988. *The Action Research Planner.* Geelong Victoria : Deakin University Press.

Kemendikbud. 2013. *Bahan Ajar Training Of Trainer (Tot) Implementasi Kurikulum 2013 (Pendampingan In Service Learning 2), Pendekatan dan Strategi Pembelajaran SD/SMP/SMA/SMK*

Nitiasih, Kerti Putu. 2014. *Model-Model Pembelajaran Berlandaskan Scientific Learning Dalam Implementasi Kurikulum 2013.* Makalah. Disajikan dalam Lokakarya Pengembangan Profesionalisme Guru-Guru SMPN 1 Singaraja, 10-01-2014

Permendikbud 81a Tahun 2013 Tentang Implementasi Kurikulum 2013

PP 19/2005 Tentang Standar Nasional Pendidikan

Padmadewi, Ni Nyoman. 2007. *Konsep Dasar Penelitian Tindakan.* Jakarta : Depdiknas.

Sugiyono. 2000. *Statistik Untuk Penelitian.* Bandung : Alfabeta.

STUDENTS' REPORT CARD A CROSS SCHOOL LEVEL OF INDONESIA: PRIMARY AND SECONDARY SCHOOLS

I Wayan Subagia
Chemistry Education Department,Universitas Pendidikan Ganesha
Singaraja Bali Indonesia

e-mail: aigabus @yahoo.co.id

ABSTRACT

This paper examined the existence of students' report cardof primary and secondary schools of Indonesia based on the implementation of 2013 Curriculum. The examination was done by reviewing and comparing students' report card from three different schools, namely the primary school of SD Negeri 3 Banjar Jawa, the secondary school of SMP Negeri 1 Singaraja and SMA Negeri 1 Singaraja. The research results revealed that the content of students' report card differ from one to another a cross school level. The students' report card of primary school consists of the description of students' competencies including affective, cognitive, psychomotor, extracurricular, suggestion, absence note, physical development, health condition, and the note of students' specific achievement. All competencies are described in the form of words only, except the physical development of students. The students' report card of secondary school is relatively similar, but it is described in the form of numbers, predicates, categories, as well as in words for each subject matter. The description of students' report card given in words is difficult to understand by students' parents. Therefore, it is suggested to the school or government to formulate more understandable students' report card.

Key words: students' report card, primary school, and secondary school.

1. Introduction

Students' report card is a final report of semesterly evaluation results of students' achievement reported by the school to students and students' parents. This includes the description of learning outcome achieved by students for all subject matters learnt at school. This report is used by students' parent to reflex on his or her child strength or weaknesses in learning. In addition, semesterly students' report card is also used to support students' application for further study enrolementin college or university. Therefore, it can be said that students' report cardis an important report of students' learning achievement.

Students' parents need to understand clearly the meaning of each description in students' report card in order to be able to participate in guiding his or her child learning outside of the school. The facts showed that many students' parents did not understand clearly the description of learning outcome achieved by his or her child at school written in students' report card. Therefore, they cannot help or suggest his or her child to put priority on his or her learning activities at home, such as spending more time in learning or inviting private teachers for specific subject matter to help him or her learn at home.

Based on the evaluation standardset up by the government of Indonesia, evaluation aims to ensure that students' evaluation is planned in accordance with competency required by curriculum following evaluation principles; students' evaluation is conducted professionally, openly, educative, effective, and matchs with social cultural context; and students' evaluation is reported objectively, accountable, and informative (Permendibud R.I. No. 66/2013). This indicates that students' report card as a result of semesterly evaluation of students' learning outcome should be written clearly and can be understood easily bystakeholder including students' parents.

Evaluation of students' learning outcome as a process of collecting and analysing information to measure students' learning achievment consists of authentic assessment, self assessment, portfolio assessment, quis/test, daily test, middle semester test, final semester test, competency level examination, quality of competency levelexamination, national examination, and school examination (Permendibud R.I. No. 66/2013). The description of students' competencies in students' report cards are formulated based on the results of self assessment, portfolio assessment, quis/test, daily test, middle and final semester test.This includes the description of students' competencies in affecive, cognitive, and psychomotor domains.

Students' evaluation follows principles, namely objective, integrated, economic, transparent, accountable, and educative (Permenibud R.I. No. 66/2013). Objective means that evaluation is done based on standard andit is not influenced by the subjectivity of evaluators. Integrated means that evaluation conducted by educators is done base on planning, in accordance with learning activities, and conducted continuously. Economic means that evaluation is done effectively and efficiently incluidng planning, implementation, and reporting. Accountable means that evaluation is informed widely, both to internal and external schools, in terms of technique, procedure, and product. Educative means that evaluation should educate and motivate students and teachers to prepare better teaching learning process. In addition, evaluation results in the form of students' report card should be meaningful and easy to understand by students' parents.

Base on preliminary studies done at schools, it was found that many teachers had difficulties in describing students' competencies achievement for each subject matters. This was due to the number of topics of learning materials that should be described. As a result, teachers only describe students' competencies achievement based on a particular topic and the descriptions were slightly similar. Therefore, it is difficult to understand by students and students' parents. If the students' report card is not meaningful for students and students parents, it will not give motivation to students to revice their ways of learning and to students' parents to encourage his or her child to do addition learning to solve problem on his or her weaknesses.

Based on the finding of preliminary studies done at school, this study aimedatexamining intensively the existence of students' report card a croos school level including primary and secondary schools. This study is done by reviewing and comparing intensively three students' report cards from different schools, namely: the primary school of SD Negeri 3 Banjar Jawa, the secondary school of SMP Negeri 1 Singaraja and SMA Negeri 1 Singaraja. These three schools are located at Buleleng Regency the Province of Bali.

2. Results and Discussion

Students' report card consists of the description of semesterly students' competencies achievement including affetive, cognitive, and psychomotor domains of each subject matter. In addition, students' report card also describes students' achievement in terms of extracurricular activities, suggestion for students, students' health condition, students' physical development, and students' absence. This is described based on the guideline of writing students' report card given by government (Kemendikbud, 2014a; 2014b).

Base on the guideline of students' report cardwriting of primary and secondary schools is written differently. Therefore, students' report card of primary school is presented slightly different from students report card of secondary school. The diffrences between students' report card of primary and secondary schools are occurred on the forms of the description. The students' report card of primary school is only described in the form of words, whereas the students' report card of seconddary school is described in the form of numbers, predicates, and categories.

The students' report card of primary school consists of the description of students' competencies including affective, cognitive, psychomotor, extracurricular, suggestion, absence note, physical development, health condition, and the note of students' specific achievement. All competencies are described in the form of words only, except the physical development of students. In general, the description of students' report card of primary school can be describeb as follows. First, the description of competencies of affective domain. This description consists of elements, namely aspect and description.

Aspek	Deskripsi
Menerima, menjalankan, dan menghargai ajaran agama yang dianutnya	*Sangat terbiasa dalam melaksanakan Tri Sandya dan beribadah tepat waktu, khusuk dalam bedoa serta berperilaku bersyukur*
Menunjukkan perilaku jujur, disiplin, tanggung jawab, santun, peduli, percaya diri, dan cinta tanah air	*Sangat baik dalam perilaku santun, jujur, disiplin, tanggung jawab, percaya diri, dan cinta tanah air*

(Source: Laporan Hasil Belajar Siswa Kelas IVCSD Negeri 3 Banjar Jawa, 2014/2015)

This affective domain description shows that student has very good behaviour in spiritual and social competencies. It means that there is no weaknessesof behaviour of student for this competencies. This description does not give information about further spiritual and social attitudes that should be maintained or improved as mentioned in the guideline of students' report card writing (Kemendikbud, 2014a).

Second, the description of competencies of cognitive domain. This consists of the description of aspect and competencies for each subject matter.The description of this aspect includes the description of general behaviour of students intended by curriculum. The content of the description of competencies includes the description of students` competencies for each subject matter.

The following is an example of the description of competencies in cognitive domain including aspect and description of three subject matters, namely: Indonesian Language, Science, and Mathematics

Aspek	Deskripsi
Mengingat dan memahami pengetahuan faktual dan conceptual berdasarkan rasa ingintahu tentang dirinya, makhluk ciptaan Tuhan dan kegiatannya, dan benda-benda lain di sekitarnya	*Bahasa Indonesia: Sangat baik dalam hal menggali informasi dari teks wawancara tentang jenis-jenis usaha dan perkerjaan serta kegiatan ekonomi dan koperasi. Masih perlu ditingkatkan dalam hal menggali informasi dari teks laporan hasil pengamatan tentang gaya, gerak, energi panas, bunyi dan cahaya* *IPA: Sangat baik dalam memahami sifat-sifat bunyi melalui pengamatan dan keterkaitannya dengan indera pendengaran juga dalam hal mendeskripsikan hubungan antara sumber daya alam dengan lingkungan, tekonologi, dan masyarakat* *Matematika: Sagat baik dalam menentukan nilai terkecil dan terbesar dari hasil pengukuran panjang atau berat berdasarkan pembulatan yang dijadikan dalam bentuk tabel sederhana juga dalam hal memahami aturan pembulatan dalam membaca hasil pengukuran dengan alat ukur*

(Source: Lapran Hasil Belajar SiswaKelas IVC SD Negeri 3 Banjar Jawa, 2014/2015)

This psychomotor domain description shows the strength and weaknesses of students' skill for each subject matter. The description only contains the description of some topics of semesterly learning materials. For example, on students` report card, it is mentioned that the student has very good skill in developing and making numerical and geometrical trends, but his or her skill in synthsizing and reconstructingthe net of simple three dimension form need to be improved. From this description, it is hard to understand students' competencies in psychomotor domain for all semesterly learning materilas for mathematics. Therefore, it is difficult to conclude whether or not the student has good skill in mathematics.

Forth, the description of extracurricular. This part of students' report card is consisted of extracurricular activities and the note of activities followed by students. The following is an example of the description of students' extracurricular

No.	Kegiatan Ekstrakurikuler	Kegiatan yang pernah diikuti
1	Pramuka	*Tingkatkan kembali rasa kebersamaan antar anggota*

(Source: Laporan Hasil Belajar Siswa Kelas IVC SD Negeri 3 Banjar Jawa, 2014/2015)

This description is clearly showed that teacher fails to understand the form. So, the description made by the teacher is wrong. Based on this form, teacher should describe activities followed by the students in an extracurricular called "Pramuka" (Kemendikbud, 2014a).

Fifth, the description of suggestion for students. An example of the description of suggestion for students is as follow.

Sudah menunjukkan sikap santun, jujur, peduli, cinta tanah air, percaya diri dan bertanggung jawab. Masih tetap perlu dilatih untuk lebih optimal serta tingkatkan keaktifan dalam kegiatan ekstra Pramuka.

(Source: Laporan Hasil Belajar Siswa Kelas IVC SD Negeri 3 Banjar Jawa, 2014/2015)

This description shows a repetition of the description of students' competencies in affective domains. It seems that this description is not containing suggestion for students' further learning.

The last three elements of primary school students' report card, namely: students' absence, students' physical development, students' health condition, and specific note of students' achievement, are already clearly described.

The students' report card of secondary school is relatively similar. It consists of the description of students' competencies including cognitive, affective, psychomotor, extracurricular, and absence note. The description of students' competencies are given in the form of numbers, predicates or categories, as well as the description in the form of words for each subject matter.

The following is an example of the description of students' report card of the secondary school of SMP Negeri 1 Singaraja presented in the form of number, and predicates or categories.

MATA PELAJARAN		Pengetahuan (KI 3)		Keterampilan (KI 4)		Sikap Spiritual dan Sosial (Ki 1 & KI 2)	
Kelompok A		Angka (1 – 4)	Huruf (A – D)	Angka (1 – 4)	Huruf (A – D)	Dalam Mapel SB/B/C/K	Antar Mapel Deskripsi
1	Pendidikan Agama & Budi Pekerti	3.64	A⁻	3.64	A⁻	SB	*Kesimpulan dari sikap secara keseluruhan dalam Mapel diputuskan melalui rapat koordinasi bersama dengan guru Mapel dan wali kelas secara umum siswa ini sudah baik dan perlu dipertahankan*
2	Pendidikan Pancasila dan Kewarganegaraan	3.65	A⁻	3.48	A⁻	SB	
3	Bahasa Indonesia	3.40	A⁻	3.44	A⁻	SB	
4	Matematika	3.56	A⁻	3.60	A⁻	SB	
5	Ilmu Pengetahuan Alam	3.12	B⁻	3.36	A⁻	SB	
6	Ilmu Pengetahuan Sosial	3.48	A⁻	3.40	A⁻	SB	
7	Bahasa Inggris	3.48	A⁻	3.40	A⁻	SB	
Kelompok B							
1	Seni Budaya	3.28	B⁻	3.44	A⁻	SB	
2	Pendidikan Jasmani, Olahraga dan Kesehatan	3.40	A⁻	3.28	B⁺	B	
3	Prakarya	3.40	A⁻	3.6	A⁻	SB	
4	Bahasa Bali	3.24	B⁺	3.6	A⁻	SB	

(Source: Laporan Hasil Belajar Siswa Kelas VIIIA5 SMP Negeri 1 Singaraja, 2015)

Based on the examples above, it can be seen that the students' achievement in the form of number is presented in four scaleranging from 1 to 4 and predicates ranging from A to D for knowledge and skill competencies. For competencies in affective domain, both spiritual and social domains, are presented in terms of categories, namely: SB for Very Good, B for Good, C for enough, and K for insufficient, and in the form of description for the achievement among subject matters. The description of achievement in affective domain includes

method and result. The method should not be described andthe description should only consists of the result as described in senior high school level (SMA) (Kemendikbud, 2014b).Since the students' parents do not know the range of four scale division, the students' achievement presented in number, both for knowledge and skill, is difficult to understand. This number is an everage results of students achievement calculated mathematically. In other words, this description can be seen as mathematical results and does not present as a symbol of

competencies. Besides, students' parent used to think of his or her students' achievement in learning in a 100 sclale. It is easier to understand the description of students' achievement presented in terms of categories because it shows clear grade.

The description of students' competencies in the form of words of secondary school students for three subject matters is described as follow.

Mata Pelajaran		Kompetensi	Catatan
Kelompok A (Wajib)			
1	Bahasa Indonesia	Pengetahuan	Kompetensi mengulas karya dalam teks ulasan dan menjelaskan peristiwa alam dalam teks eksplanasi amat baik
		Keterampilan	Keterampilan mengulas karya dan menjelaskan peristiwa alam melalui teks amat baik
		Sikap Spiritual dan Sosial	Konsisten menunjukkan sikap taqwa, disiplin, sopan santun, dan jujur
2	Matematika	Pengetahuan	Menguasai kompetensi dengan baik
		Keterampilan	Menguasai kompetensi dengan baik
		Sikap Spiritual dan Sosial	Menunjukkan sikap disiplin, sopan santun dan jujur
3	Sejarah Indonesia	Pengetahuan	Sudah memehami proses perjuangan bangsa Indonesia dalam upaya mempertahankan kemerdekaan dari ancaman Sekutu dan Belanda
		Keterampilan	Menguasai kompetensi dengan baik
		Sikap Spiritual dan Sosial	Memiliki sikap disiplin, sopan santun dan jujur

(Source: Laporan Hasil Belajar Siswa Kelas XI-MIPA-3 SMA Negeri 1 Singaraja, 2014/2015)

Based on the description of students' report card presented above, it can be seen that the description of students' competencies in the form of words only contains the competencies' achievement of students whithout presenting future suggestion for students. This makes difficulties for students' parent to understand his or her child achievement in learning the subject matter.

The way of teachers to describe students' competencies in the form of words is different from one teacher to another. For example, in describing affective domain for the subject of Indonesian language, mathematics, and Indonesian history of senior high school students, each teacher formulates students' competency differently. The Indonesia language teacher mentions that student consistently demonstrates dicipline, polite, and honest attitudes, the mathematic teacher just mentions that student demonstrates dicipline, polite, and honest attitudes, and the Indonesian history teacher mentions that student has dicipline, polite, and honest attitudes. These three different descriptions of attitudes have slightly different meaning. May be all teachers mean the same thing, but since he or she uses different words the meaning is different. These facts show that teachers need to improve his or her language skill in writing students' competencies.

3. Conclusion

Students' report card is an important report of students achievement in learning at school. This report consist of the description of students' competencies including affective, cognititive, and psychomotor domains. Theoretically, students' parents use this report to know the development of students learning and to contribute in helping students to learn optimally outside the school. Since the description of students' report is unclear, students' parents cannot use this reportto take participation in developing students' education.

The description of students' competencies on students' report card is not easy to understand by students' parents. This due to several factors, namely: the form of the description, the content of the description, and the way to describe students' competencies. The form of the description of students' report is given in terms numbers, predicates, categories, and words. The description in the form of numbers provides in four scale ranging from 1 to 4 with two decimals. Students' parents have diffculties to understand it, since they used to think of students' achievement in learning in a 100 scale. The description in the form of predicates provide in four categories ranging from A to D for cognitive and psychomotor omains and four categories ranging including very good (SB), good (B), enough (C), and insufficient (K) for affetive domains. This description is easier to unerstand by

students' parents because it shows clear grades. The description in the form of wordsis highly difficult to understand. This description does not clearly describe the topics or the competencies that must be achieved by students in semesterly learning materials. The description is only consisted of the strength or weaknesses of students in a particular topic of semesterly learning materials. In addition, the description of students' competencies is hard to be differentiated from one to another. The use of languade to describe students' competencies is also unclear.

Based on this finding, it is suggested to the school or government to reformulate students' report card in order to be easier to understand and can be used to know students' achievement in learning clearly. It is better to use number in a 100 scale. This will pacilitate students' parent to contribute to his or her chid education at large.

4. References

Laporan Hasil Belajar Siswa Kelas IVC SD Negeri 3 Banjar Jawa 2014/2015.

Laporan Hasil Belajar Siswa Kelas VIIIA5 SMP Negeri 1 Singaraja 2014/2014.

Laporan Hasil Belajar Siswa Kelas XI-MIPA-3 SMA Negeri 1 Singaraja 2014/2015.

Kemendikbud. (2014a). Panduan Teknis Penilaian dan Pengisian Rapor di SD. (*https:// ayomendidik.files.wordpress.com/2014/09/ panduan-teknis-penilaian-pengisian-rapor-di-sd.pdf*)

Kemendikbud. (2014b). Panduan e-rapor SMA. (http://dapo.dikmen. kemdikbud.go.id/ portal.web/docs/PANUAN%20E-RAPOR.pdf)

Permendikbud R.I. No. 66 Tahun 2013 tentang Standar Penilaian Pendidikan

Development of Social Skill Scale

Sri Budyartati

Postgraduate Yogyakarta State University
IKIP PGRI MADIUN INDONESIA

budyartatisri@gmail.com

Abstract

Many social skills may be learned implicitly, all children can benefit from being taught social skills explicitly, not only children who are developmentally lagging behind their peers. Social skills are not always learned easily. Some children may require repeated instruction and reinforcement of learning. It is also possible for children to have well-developed social skills in one area but not in another.

The primary objective of the Social Skill Scale (SSS) is to describe the child's behavior for purposes of socialization and education, rather than diagnosis. It focuses on the child's adaptation to and functioning within his or her environment which is particularly relevant to teachers. The SSS helps teachers design classroom interventions that address both the child's strengths and weaknesses.

It includes 115 items that can be completed in just 15 minutes by Early Childhood, a preschool, or Kindergarten teacher. These items cover Three basic scales and ten components or summary scales

Key words: *Development,Social Skill Scale*

1. Introduction

Social success is critical for broader success, and resilience research shows that children who are popular, likeable and able to resolve conflicts with others are also more likely to succeed at school, and are generally more resilient than children with less developed social skills. Social skills are complex and multi-faceted. They are also closely linked to development. The social skills which serve a five year old child will clearly not be adequate for negotiating the more complex social world of a twelve year old. In assessing social skills, it is important to bear in mind the milestones of normal social development according to the child's age.

It is often assumed that social skills will be 'picked up' by osmosis. However, while many social skills may be learned implicitly, all children can benefit from being taught social skills explicitly, not only children who are developmentally lagging behind their peers. Social skills are not always learned easily. Some children may require repeated instruction and reinforcement of learning. It is also possible for children to have well-developed social skills in one area but not in another. For example, they may be able to work cooperatively on a group project, but lack the self-confidence to approach a group of children in the playground. Social competence has many domains.

Development Background

The social life skill aspects from UNESCO, Indonesia have engaged with UNESCO to develop Social Skill in:
a. Interpersonal communication skills
b. Verbal/Nonverbal communication, Active listening, Expressing feelings; giving feedback (without blaming) and receiving feedback,
c. Negotiation/refusal skills, Negotiation and conflict management, Assertiveness skills, refusal skill
d. Empathy: Ability to listen and understand another's needs and circumstances and express that understanding
e. Cooperation and Teamwork Expressing respect for others' contributions and different style, Assessing one's own abilities and contributing to the group, Advocacy Skill, Influencing skills & persuasion, Networking and motivation skills

Recently Indonesia minister education have a new policy to develop character education. In Indonesia, developing character is become hot issue. In their education they adopted social skill from UNESCO programs.

The first step to training social skills is assessing them. Social skills assessment methods can be defined as having a direct or indirect focus (Gresham, 2002). Direct

assessment includes observation and self monitoring strategies. Indirect assessment includes analog role-play measures, interviews, and teacher and parent ratings

1. **Gap or Problem Identification**
   a. It has a specific focus on social skills as opposed to protocols that address social functioning secondarily. For example, some behavior rating scales such as the *Behavior Assessment System for Children* (Reynolds & Kamphaus, 1992) include a small subset of items which assess social indices in the context of behavioral or emotional pathology. Similarly, some cognitive measures describe aptitude for social interaction (e.g., *Wechsler Intelligence Scale for Children-Third Edition* [Wechsler, 1993]) and some personality measures describe "openness" to social exchanges (e.g., the Rorschach system [Exner,1993]). Unfortunately, such assessment is so broad that it may yield vague findings, and implications that can frustrate educators and seldom lead to effective intervention. 2

   b. Indonesia will increase character education, social life skill but they still debating about learning and teaching about character. One side said think it as hidden curriculum but another side says it is a special education.
   c. There is nothing standardized instruments to assess Social Skill as a character,
   d. In Indonesia, some research about social skill not comprehensives. They have not make relationship between character and brain development in Social Skill in Social Skill assessment

2. **Research Question(s)**
   a. How development Instrument to Assessing Social Skill in Elementary School Education which is social skill concepts around public, educators, and parents will be measure in this research?
   b. What kinds of methods will use to measure Assessment Social Skill?
   c. How about validity and reliability in its measure?

d. How to use the psychometric properties reported from this research?

3. **Purpose**
   a. This research will define social skill concepts around public, educators, and parents development instrument to assessing Social Skill in Early School Education.
   b. This research methods will take Item Response Theory to analysis measurement of Assessment Social Skill
   c. This research will be produce an instrument to measure social skill which valid and reliable
   d. The research will reported psychometric properties and the using its

4. **Value or Need for the study**
   a. The research will give information from student result test, and than the information can use to be diagnosis Social Skill Deficits (SSD) each student.
   b. Teacher able to use test information function for help their Student with SSD
   c. Test information function to make learning strategic for each subject matter
   d. Stake holder (learning community, like parents, etc) and the headmaster can use the test result to make decision for school programs

5. **Ages and stages of social development**
The following guide shows social skills development appropriate to various ages. However, it should be borne in mind that there is no universal developmental timetable. Also, many of the skills listed below are more like works in progress than milestones of achievement; they develop slowly over years, gradually becoming more sophisticated and well-established.

Age	Social behaviours
2	• Social awareness is very limited. Play tends to be solitary, although toddlers will closely observe and copy adults and other children. Direct interaction is minimal, apart from squabbles over toys!
3	• Parallel play develops: children play alongside one another, with some interaction.

	• Beginning to learn to share and take turns. • Beginning to learn to manage physical aggression.
4-5	• Co-operative play develops. Children start to play group games. Games become more complex and organised. • 'Special' friendships begin to form. • Learning how to play fairly and abide by rules. • Can approach others and ask to join in with groups. • Begins to learn to be assertive and to ask others to stop if they are being annoying.
6-8	• Learning to be a 'good winner' and a 'good loser'. • Can empathise with others in distress and offer appropriate support. • Learning to give and receive compliments from others. • Conversation skills developing: how to listen to others and take turns talking etc. • Can ask an adult for support when needed. • Negotiation skills: including others in decision-making, learning to decide together and make suggestions rather than boss others around. • Able to say 'no' to peers when appropriate.

6.   Method

Role-play assessments were one of the first techniques to assess social skills in many populations, including shy men, individuals with severe psycho pathology, and unassertive children. Since the introduction of the role-play, direct behavioral observation, informant-based rating scales, self-report rating scales, and sociometrics have been introduced to assess this construct. Each of these methods has strengths and weaknesses that should be considered in the context of the assessment. Rating-scales are an efficient method to gain information on the presence or absence of essential skills to social functioning, while direct behavioral observation provides information on environmental variables that affect behavior. The child's developmental level, culture, and setting should also be considered when selecting appropriate assessment methods. Just as with any assessment in the education or psychology fields, the assessment of social skills should be conducted through the use of multiple assessment methods and from a variety of sources (Merrell, 1999). The assessment of social skills of children is, undoubtedly, of great importance. Accurate assessment leads to effective intervention, as well as knowledge on the implications of poor social functioning, group differences, and, hopefully one day, information on common pathways to psychopathology (Matson & Wilkins, 2009). Researchers are encouraged to continue the study of social skills in children to aid in the better understanding of social dysfunction and its implications within groups, particularly those with special needs, and across cultures, and internationally.

Apropos to social skills assessment, Sattler (1993) proposed criteria when selecting an adaptive behavior scale or checklist. Initially, one should judge the *scope* of the assessment instrument, in this case, whether it highlights social competencies. With regard to the *structure* of the instrument, it should cover the areas of behavioral functioning that are of interest for a given student in a manner that is easily understood by raters.

The *reliability* and *validity* of the instrument also should be examined, including statistics about the interrelationships among items (internal consistency reliability) and whether multiple raters obtain

the same results when assessing the same student (inter-rater reliability). Studies reporting these statistics are available in test manuals and journal publications. One should be certain that the group from which an instrument was developed and standardized matches the student being assessed. Finally, the *utility* should be weighed, meaning the instrument should require a reasonable amount of time for administration and scoring.

As discussed previously, the best assessment instruments are *standardized*, that is, they are developed and refined based on the responses of hundreds to thousands of student ratings. This process improves the likelihood that assessment outcomes are meaningful. Furthermore, one can rank the scores of a target student within a pool of many age-level and grade-level peers who participated in test development. The ranking can be produced automatically by a computerized scoring program, or located in a table included with the manual. This comparison helps describe

how a student's social skills deficits compare to a norm-referenced group.

a model for instructional development, in recent years, a number of model for instructional development have employed the common steps of analysis, design, and evaluation (TwelkerUrback& Buck, 1972). The system approach model around which this source book is organized is based upon these earlier models and upon actual field experience in designing, developing, evaluating, and disseminating teacher training materials in special education Cennamo, Katherine, 2005. *Real World Instructional Design*. Thomson Learning. Inc. Canada.. we have called our system approach the four D model because it divides the instructional development process into the four stage of Define, Design, Develop, and Disseminate   A brief description of each stage follows:

Define : instructional requirements.

Design : prototypical instructional material.

Develop : Trainee, tested and reliable instructional material.

Disseminate : instructional material among special educational teacher training programs.

DEFINE the purpose of this stage is to stipulate and define instructional requirements. the initial phase is mainly analytical. through analysis, we prescribe objectives and constraints for the instructional materials.

4. Discussion of Results

The manuscript that will be presented in the 1st ICIRAD 2015 should be uploaded in the system provided by the Research Institute of Ganesha University of Education (http://lemlit.undiksha.ac.id/icirad2015).
Make sure that your full paper has met the formats required in this guideline.

5. Conclusion

Development of Social Skill Scale in Early Childhood Education

Here is an alternative for clinicians and educators who evaluate young children. This exciting scale measures social competence, affective expression, and adjustment in children 4+ to 6 years of age. The primary objective of the Social Skill Scale (SSS) is to describe the child's behavior for purposes of socialization and education, rather than diagnosis. It focuses on the child's adaptation to and functioning within his or her environment which is particularly relevant to teachers. The SSS helps teachers design classroom interventions that address both the child's strengths and weaknesses.

It includes 115 items that can be completed in just 15 minutes by Early Childhood, a preschool, or Kindergarten teacher. These items cover Three basic scales and ten components or summary scales:

6. Acknowledgement
Thanks to:

1. Professor Djemari Mardapi as my Promotor,
2. Nonny Swediaty, Ed.D as co Promotor
3. DR. Samsul Hadi
4. Lucilla Rudge
5. Muhammad; Adhimas Ragil & Anugerah Perdana,
6. Yogyakarta State University, Ohio State University and IKIP PGRI Madiun
7. Everybody who give their contribution

7. References

APEID(1993) *New Directions in Technical and Vocational Education*, Bangkok : Unesco Regional Office for Asia and Pasific

Allen, Mary. Yen & Yen, Wendy. M(1979). Introduction measurement theory, Berkeley, California: Brooks/ Cole Publishing Company

Amaury Samalot – Rivera M.A. 2007, *The Effect Of Social Skill Instruction On Sport And Game Related Behaviors Of Children And Adolescents With Emotional Or Behavioral Disorders* Dissertation Presented In Partial Fulfillment Of The Requirements For The Degree Doctor Of Philosophy In The Graduate School Of The Ohio State University , The Ohio State University

Andersen, Lorin. W. (1981). *Assessing Affective Characteristic In The Schools*.Boston: Allyn and Bacon.

Ayriza, Y., Izzaty, R. E. & Setiawati, F., A., (2004-2006). Pengembangan modul *social skill*untuk anak-anak prasekolah dan model sosialisasinya. Yogyakarta :Pusdi PAUD.

Bandura, A. (1986). *Social foundations of thought and action: A social cognition theory.* New Jersey : Prentice Hall, Inc.

Brennan, R. L. (Ed.). (2006). *Educational Measurement.* 4th Edition. Wesport, CT: American Council in Education & Praeger Publishers

Cavell, T. A. *(1990). Social adjustment, social performance, and social skill: A tri-component model of social competence.* Journal of Clinical Child Psychology, 19, 111-122. (20)

Curtis, A. (1998). *A curriculum for the pre-school child.* New York: Routledge.

Cohen, R. J., & Swerdlik, M. E. (2005). *Psychological testing and assessment.* 6th Edition. New York, NY: McGraw-Hill Companies, Inc.

Crocker, L, & Algina, J. (1986). *Introduction to classical and modern test theory.* Madison Avenue, New York, NY: Holt, Rinehart & Winston.

Djohan, *Jurnal Penelitian dan Evaluasi Pendidikan* Vol. 13, No. 1, Thn. 2009 (12)

Eisenberg, N., Cameron, E., Tryon, F,, & Dodez, R (1 98 1). Socialization of prosocial behavior in the preschool classroom. *Developmental Psychology*, 17, 773-782. .(43)

Emmer, E.T. (1986*). Effects of teacher training in disciplinary approaches.* Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 316 927)(44)

Franz, C. E., Mc. Clelland, D. C., Weinberger, J. (1991). Childhood antecedents of convetional school accomplishment in midlife adults. *Journal of Personality and Social Psychology,* Vol. 60, page 586-595.

Furr, R. M., & Bacharach, V. R. (2008). *Psychometrics*: *An introduction.* Thousand Oaks, California: Sage Publications, Inc

Gettinger, M. (2001). Development and implementation of a Performance-Monitoring System for Early Childhood Education. *Early Childhood Education Journal,* Vol 29, No. 1.

Gymboree: A Solution for Socialization, Parental Support Gymboree: _National Survey of 350 Preschool Teachers Finds Social Skills Trump Academic Abilities." PR Newswire_. *PR Newswire Association LLC. 2006. HighBeam Research. 26 Apr. 2010 <_http://www.highbeam.com_* >(51)

Goldstein (1981), Goldstein, A. P., 1981, Psychological Skill Training, The Structured Learning Technique. New York   38

Goleman,Daniel 2007 *Social Intelligence New Science Of Human Relationships,*Bantam Dell,NY,USA (11)

Gregory, R. J. (2007). *Psychological testing*: *History, principles, and applications.* 5th Edition. Boston, MA: Allyn & Bacon

Halpern, D. F. (n.d.) Creating cooperative learning environments. *American Psychological Society.* Retrieved December 5, 2005 from http://www.psychologicalscience.org/teachingtips/tips/tops_0300.html

Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of item response theory.* Newbury Park, California: Sage Publications, Inc.

Hannaford, Carla 2005,Smart Moves : Why Learning Is Not All In Your Head ,Great River Books (Formerly Graat Ocean Publishers). Great River Books I6i M Street Salt Lake City, Utah 84103 www greatriverbooks.com Page 173(28)

Kerjasama Antara Kemdiknas Dirjrn Dikti Diktendik,(2007), *Konsep Dasar Pendidikan Kecakapan Hidup, Buku 2 seri Pendidikan Kecakapan Hidup* Unesco Jakarta Office

KR, Rabu Wage (25 April 2012), *PAUD Kulonprogo Peringkat IV Indonesia.* YOGYA

KR,Senin (23/4 2012) Rama Yusufa Juara Lomba Mewarnai. YOGYA

Ladd, G. W. (1990). *Having friends, keeping friends, making friends, and being liked by peers in the classroom: Predictors of children's early school adjustment*? *Child Development*, 6 1, 312-331.(44)

Ladd, G. W., & Golter, B. (1988). *Parents' management of preschoolers' peer relations: Is it related to children's social competence? Developmental Psychology,* 24, 109-117.

Ladd, G. W., & Price, J. M. (1987). *Predicting children's social and school adjustment following the transition from preschool to kindergarten.* .(44)

Linn, R. L. (1989). *Educational measurement.* 3rd Edition. New York, NY: Macmillan Publishing Company

Lawhon, T., Lawhon, D. C. (2000).Promoting social skill in young children. *Early Childhood Education Journal,* Vol. 28, No. 2.

Mardapi, Djemari.2007.Teknik Penyusunan Instrumen Tes dan Nontes.Yogyakarta : Mitra Cendekia

Mardapi Djemari (2008) *Teknik Penyusunan Instrumen Tes Dan Nontes* Mitra, Jogjakarta Mitra Cendikia Offset

Mayeux, L., Cillessen, A. H. N. (2003).Development of social problem solving in early childhood. *The Journal of Genetic Psychology, 162 (2), 153-173.*

Monks, F.J., Knoers, A. M. P., & Haditono, S.R. (1998). *Psikologi Perkembangan.* Yogyakarta : Gadjah Mada University Press.

Mize, J. (1995). Coaching preschool children in social skills: A cognitive-social learning curriculum. In G. Carteledge, & J. F. Milbum (Eds.). *Teaching social skills to children and youth: Innovative approaches.* 237-261. Third edition. Boston, MS: Allyn and Bacon

Nonny Swediati, 2007, *Optimalisasi Multiple Intelligences Dengan Brain Gym*

Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 16 Tahun 2007

Peraturan Menteri Pendidikan Nasional Republik Indonesia:Nomor 58 Tahun 2009 Tentang Standar Pendidikan Anak Usia Dini.(42)

PRNewswire/ _January 10, 2006_. /-- *Character Development - Not Reciting ABCs - is Key to Toddlers' Success in Preschool(tsp)National Survey of 350 Preschool Teachers Finds Social Skills Trump Academic Abilities. Article from:PR Newswire. Article date: More results for:social ability Character Development - Not Reciting ABCs - is Key to Toddlers' Success in Preschool SAN FRANCISCO,* (45)\

Purwanto.2006.Instrumen Penelitian Sosial dan Pendidikan. Yogyakarta : Pustaka PelajarPeterson, Brooks, 2004 Cultural

Intelligence : A Guide To Working With People From Other Cultures(18)

*Published by HT Syndication with permission from Asian News International"How childhood experiences may influence social skills, ability to handle stress." The Hindustan Times. HT Media Ltd. 2008. HighBeam Research. 26 Apr. 2010 <http://www.highbeam.com>.*How childhood experiences may influence social skills, ability to handle stress Article from: The Hindustan Times Article date:July 30, 2008 More results for: social ability Report from Asian News International brought to you by HT Syndication. (47)

"RESEARCH LINKS CHILDHOOD SOCIAL SKILLS, LEARNING ABILITIES." US Fed News Service, Including US State News. HT Media Ltd. 2007. *HighBeam Research.* 26 Apr. 2010 <http://www.highbeam.com>. Research Links Childhood Social Skills, Learning Abilities Article from:US Fed News Service, Including US State News Article date:June 19, 2007More results for:social ability (48)

Ramdhani, N. (1991). Standarisasi skala tingkah laku sosial. *Laporan Penelitian.* Yogyakarta : Fakultas Psikologi UGM.

Ringwalt, S. (2008). *Developmental screening and assessment instruments with an emphasis on social and emotional development for young children ages birth through five.* Chapel Hill: The University of North Carolina, FPG Child Development Institute, National Early Childhood Technical Assistance Center. *http://www.nectac.org/~pdfs/pubs/screening.pdf*

Rick Lavoie (2005) *Social Skill Autopsies: A Strategy to Promote and Develop Social Competencies.* http://www.ldonline.org/article/Social_Skill_Autopsies%3A_A_Strategy_to_Promote_and_Develop_Social_Competencies

Roid, Gale H and Thomas M. Haladyna. (1982). A Thechnology for Test-Item Writing. London: Academic Press, Inc

Robin Stern, Ph.D *What is it? How can we use it to help our children?* by Robin Stern, Ph.D. *Social and Emotional Learning: Robin Stern, Ph.D.(22)*

Roeser, R. W., Wolf, K. V. D., Strobel, K. R. (2001). On the relation between social-emotional and school functioning. *Journal of School Psychology,* Vol. 39, No. 2, pp 111-139.

Seto Mulyadi, 2007, Tak Mempan Digertak Anjuran, Pena Pendiddikn

Sidiarto Lily Djokosetio, 2007,Perkembangan Otak Dan Kesulitan Belajar Pada Anak Jakarta: Penerbit Universitas Indonesia (UI-Press)

Shultz, K. S., & Whitney, D. J. (2005). *Measurement theory in action*: *Case studies and exercises.* Thousand Oaks, California: Sage Publications, Inc.

*(Social Skills:Promoting Positive Behavior, Academic Success, and School Safety*http://www.nasponline.org/resources/factsheets/socialskills_fs.aspx) 33

Stormshak, E. A., welsh, J. A. (2005). Social competence : A developmental framework. In Teti, D. M. I. *Handbook of Research Methods in Developmental Science.* Australia : Blackwell Publishing.

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional development for training teachers of exceptional children*: *A sourcebook.* Mineapolis, Minesota: CITH Indiana University dan CEC

THE EFFECTIVENESS OF LOCAL CULTURE-BASED PHYSICS MODEL OF TEACHING IN DEVELOPING THE SIX DIMENTIONS OF SCIENCE IN SMA

I WayanSuastra, Putu Ristiati

FMIPA UniversitasPendidikanGanesha

i_wayansuastra@yahoo.com

ABSTRACT

Education has a twin function, on the one hand aims at developing the potential of self-learners and on the other hand act to preserve their cultural values. To achieve these objectives, the role of education and learning are very important. The purpose of this study was to develop a six-dimensional model of learning science through the application of physics-based culture. Quasi-experimental study design with posttest only control group design was conducted 54 students in class X MIA.1 and X MIA.2 SMA Negeri 3 Singaraja. Data on the understanding and application of concepts measured by the test, the student process skills measured through observation assisted assessment rubric science process skills, creative thinking of students is measured by free content of creativity test, as well as the attitude and the nature of science (Nature of Science / NOS) students were measured by questionnaire. Data were analyzed descriptively and testing using MANOVA analysis at significance level of 5%. Based on the results of data analysis, it can be concluded that the physics-based model of learning the local culture more effectively in developing the six dimensions, namely understanding concepts, application of concepts, science process skills, attitudes, creative thinking, and the nature of science students.

Keywords: physics learning model based on local culture, the six dimensions of science

1. Introduction

The low quality of education in Indonesia remains an object of public critizism.It is natural since to the present date various problems have inflicted this nation that make us rather worried, such as lack of creativity in thinking and low level of ability of the students in applying the knowledge learned in everyday life, as well as their poor national character.The result of the study entitled Program for International Student Assessment (PISA)in 2009shows that the reading literacy achievement of the students in Indonesia ranks 57, mathematics literacy 61, and science literacy 60 out of i 65 countries (OECD in Elianur, 2012). Indonesia is in the ten lowest rank among PISA participating countries. Besides, the result of the survey entitled Trend International Mathematics Science (TIMSS)in 2007 reports about the mean score for the cognitive domain in science, which is an important aspect in the problem solving ability. Indonesia ranks 36 out of 49 counties in the world (Gonzales *et al.*, 2008). Indonesia gets knowingscore of 425, applying score of 426, danreasoning score of 438, all of which are under the TIMSS, i.e., 500.

Another problem in the educational sector, especially in science education, is the failure in teaching and developing value education at school.This is evidenced in various problems such as the high level of drug use among students/the public, fights between students / between villages, damages of the natural environment leading to various natural disasters such as long draughts, forest fires, air pollution, land/ water pollution, and surges of mud in Sidoarjo (Lapindo) that cannot be solved up to the present, and forest fires occur in almost 2/3 parts of Indonesia that have degraded the environment and put people into trouble.All of the problems ony result in and leave Indonesian people miserable. Adimassana (2000) adds that one of the causes is the failure of the educational sector in implementing value education at school. Zamroni (2000:1) states that education tends to become the means for "social stratifiction" and the school system only "transfers" to the students what is called dead knowledge, that is the knowledge that is too book-centered (textbookish), as if it has been separated from the root of its source and application.

Furthermore, Suastra (2005) states that the values that the natives had are full of local genius which are ignored in education, especially in science education at school. As a result, science educationbecomes "dry" and less meaningful for the students. It is this that needs a serious attention among the local decision makers and educational practitioners.

The future science education needs to strike a balance / harmony between the knowlege of science itself and the development of scientific attitude and local wisdom (the character of the nation) that are existing and developing in the community.Thus, the students' sociocultural environment needs a serious attention in developing science education at school since it is in this environment that we find native science. In this way science education will be really meaningful for the students themselves and the society at large.This is in keeping with the perspective of today's science education reform that stresses the importance of science education for improving social responsibility. In the lightof this effort at reforming science education, the objective of science education is not only to improve understanding of science itself, but more importantly to understand untuk meningkatkan pemahaman terhadap sains itu sendiri, human life itself. How they interact with all macrocosmic systems which is much dependent on universal values (Baker, 1995).Local culture-based physics model of teaching model is a teaching model that starts with an exploration of the students' initial knowledge/ ideas and beliefs followed by relating them to physics learned at school.The teacher plays wisely as "broker" who helps the students to go across the two cultures, i.e., the students' local culture and the scientific culture (Western Culture). The steps in the local culture-based physics model of teaching are (1) exploration of the students' local culture (knowledge andbelief) that are relevant to the physics

class at the time, (2) focusing (focusing on the inquiry), (3)inquiry form various perspectives (science, history), (4) elaboration, and (5) evaluation(Suastra, 2014).

Based on the background above, the problem to be investigated in this article is the study is whether the local culture-based physics model of teaching can develop the six science?

The benefits that can be contributed through this article is that it gives empirical and scientific justifications for the effectiveness of the local culture-based physics model of teachingin developing the six dimensions of science: concepts understanding ,concepts application, science process skill, Creative thinking, attitude, and nature of science. This writing can also be used as a reference for physics (science) education experts as the stepping stone to improve the quality of teaching in the classroom in an effort to improve the quality of the graduates.

2. Methods

This quasi- experimental research was done at the eleventh grade of SMA Negeri 3 in Singaraja involving 54 students who were distributed into 2 parallel classes (Class X MIA.1 and Class X MIA.2). Through a random sampling Class X MIA.1 was selected as the experimental group and Class X MIA.2 as the control group, thus the study used Post-testOnly Control Group Disign. The data on concepts understanding and concepts application were collected using physics learning achievement test, the students' creativity in thinking using creativity in thinking test, process skill using an observation, and attitude and the nature of science using a questionnaire. The data were analyzed using one-way MANOVA at sig. 0.05.

3. Result and Discussion

Based on the analysis of data, the result of the descriptive analysis of the data is shown in Tables 1, 2, 3, and 4.

Table1. Concepts Understanding and Application

Statistic	Concepts Understanding		Concepts Application	
	LCBPMT	CTM	LCBPMT	CTM
Mean	78. 35	67.34	74.22	68.96
Median	76. 47	64.71	72.22	66.67

Statistic	Concepts Understanding		Concepts Application	
	LCBPMT	CTM	LCBPMT	CTM
Standard Deviation	7. 34	7.47	7.32	7.19
Variance	53. 97	55.82	53.70	51.83

Table2. Science Process Skill and Scientific Attitude

Statistic	Science Process Skill		Scientific Attitude	
	LCBPMT	CTM	LCBPMT	CTM
Mean	73.40	66.30	78.61	66.89
Median	71.32	63.22	77.33	69.33
Standard Deviation	6.35	6.57	7.33	7.19
Variance	50.25	54.62	51.87	8.31

Table1 shows that the mean score for concepts understanding for the students who learned through LCBPMT in physics class   is 78. 35 (good qualification), which is higher than that for those who learned through CTM (68.96 or falling into sufficient qualification). Similarly, the mean score for concepts application of the students who learned through LCBPMTis 74.22 (good qualification) or higher than that of those who learned through CTM (68. 96 or falling into sufficient qualification).

Table2 shows   that the mean score for science process skill of the students who learned through LCBPMT is 73. 40 (good qualification), which is higher than that of those who learned through CTM(66. 30or falling into sufficient qualification). Similarly, the mean score for scientific attitude of the students who learned through LCBPMTis 78. 61 (good qualification) which is higher than that of those who learned through CTM(66. 89 or falling into sufficient qualification).

Table3.Creative thinking and Nature of Science (NOS)

Statistic	Creative thinking		NOS	
	LCBPMT	CTM	LCBPMT	CTM
Mean	64.36	60.10	82.04	73.14
Median	63.64	59.09	81.00	75.00
Standard Deviation	2.84	8.33	5.54	76.27
Variance	8.06	8.33	81.00	39.33

Table 4. Recap of the result of one-way MANOVA
RESULT OF THE TESTING OF HYPOTHESIS 1
Multivariate Tests[b]

	Effect	Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.998	5578.315[a]	5.000	48.000	.000
	Wilks' Lambda	.002	5578.315[a]	5.000	48.000	.000
	Hotelling's Trace	581.074	5578.315[a]	5.000	48.000	.000

	Roy's Largest Root	581.074	5578.315[a]	5.000	48.000	.000
MP	Pillai's Trace	.594	14.043[a]	5.000	48.000	.000
	Wilks' Lambda	.406	14.043[a]	5.000	48.000	.000
	Hotelling's Trace	1.463	14.043[a]	5.000	48.000	.000
	Roy's Largest Root	1.463	14.043[a]	5.000	48.000	.000

a. Exact statistic

b. Design: Intercept + MP

Table3 shows that the mean score for creativity in thinking for the students who learned through LCBPMT is 64.36 (sufficient qualification),which is higher than that of those who learned through CTM(60.10 or falling into sufficient qualification). Similarly, the mean score for the Nature of Science of the students who learned through LCBPMTis 82. 04 (good qualification), which is higher than that of those who learned through CTM (73.16 or falling into sufficient qualification).

After testing all the statistical requirements such as normality, homogeneity, and multicolinearity and after all the requirements were met then hypothesis testing was conducted.The result of hypothesis testing shows that there is a difference in concepts understanding, concepts application, science process skill scientific attitude and nature of science (NOS) between the group of students who learned through LCBPMT and those the one who learned through CTM as shown in Table 4.

In the light of the summary of the result of one-way MANOVA shown in Table 4 it can be interpreted that all of the levels of significance for Pillai's Trace, Wilks' Lambda, Hotelling's Trace, andRoy's Largest Root is less than 0.05that**H_0 is rejected.**Thus, it can said that simultaneously there is a significant difference in concepts understanding, concepts application, science process skill, scientific attitude, creativity in thinking, and NOS between the group of students who learned through LCBPMTand those who learned through CTM (F = 14. 04; p< 0. 05). When the mean scores of all dependent variables are examined closely it is seen the mean score for the six dimensions of science of those who learned through LCBPMT is 75. 16 or higher than that of those who learned through CTM(67. 12). A further testing using LSD shows that there is a difference in the mean score of the six science dimensions between the students who learned through LCBPMT and that of

those who learned through CTM, Δμ =[μ(MPBKL)- μ(CTM)]8. 20at Sig. less than 0. 05. Thus, the mean score for the six science dimensions of the students who learned through the local culture-based physics model of teachingand that of the group who learned through the conventional model is significantly different at Sig. 0.05. This result shows that the local culture-based physics model of teaching is better than the conventional teaching model (CTM) in developing the six dimensions of science. LCBPMT has a better effect than CTM in developing the six dimensions.

First, theoretically the local culture-based physics model of teachingmodel that starts the teaching activity by probing initial ideas and beliefs of the students about the material to be learned is based on constructionism that stresses that student prior knowledge needs to be probedand then is used as reference in teaching. This is in keeping with Ausubel's opinion (in Suastra, 2013) that "the most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly."Furhermore, the teacher concentrates on the students to prepare an inquiry into their prior ideas.This activity of concentrating is meant to direct students to the understanding of the means and steps that must be taken to test the prior ideas so the inquiry is more focused and does not need a long time. The next step from LCBPMT is inquiry from various perspectives.In this step the students do the inquiry, both from the scientific and the historical/ sociocultural perspectives. If the concepts are related to the scientific ones the activity will be a scientific inquiry. However, if the inquiry is related to the socio-cultural aspects then it can be studied from those perspectivesand these can also be in the historical perspective. This is in line with Liston's (2009) opinion that states that an inquiry based learning will give a better effect in developing knowledge of science and mathematics aand critical thinking skill. Inquiry is the form of teaching that demands from the students to ask questions, to

acquire knowledge and to find a phenomenon. Minner (2009) also states in addition to being capable of improving the students' understanding of concepts, inquiry-based learning can also develop their Creative thinking and their responsibility for their learning. In other words, inquiry activitydone by the students gives them the opportunity to develop the way how to learn. Wegerif (2010) states that learning how to learn helps the students very much in developing their Creative thinking Furthermore, Meador (1997) states that Creative thinking is not only needed in art, music, or drama, it is also needed in real life, especially in solving problems at work such as to think fluently, flexibly, originally and elaboratively. Munandar (1999) emphasizes that the four aspects of Creative thinking are very important and can continually be developed in teaching.Therefore, the findings of this study are very positive and further studies in the same line should be done in the future. The nurturant effects of the inquiry activity is the ability to develop scientific attitude in the students such as being objective (being honest), critical,curious, diligent/disciplined, and creative.Suastra (2011) calls scientific attitude scientific character.This is also supported by Minner (2009) who states that in addition to being capable of improving the students' understanding of concepts, inquiry-based science teaching can also develop higher levels of thinking (Creative thinking) and sense of responsibility of the students.

Integrating local wisdom, in this case, Balinese local wisdom in physics teaching offers a different nuances of teaching. The integration of the local wisdom in physics teaching makes physics teaching less "frightening" unlike the students' reaction to physics when they start to learnit for the first time, in which they tend to see it as a difficult subject. The integration would make the student closer to their natural and socio-cultural environments.Suastra (2014) states that the local culture-based physics model of teaching is effective enough to be applied to develop the students' science competences, creativity, and the nation's character based on local culture, such as being responsible to the socio-cultural environment, deligent and honest. Thus, as explained in Suastra (2010) to learn science is not only to understand the contents of the subject, which are only understood by a group of people (exclusive in nature), but to make

science for daily living, science for the future,and science for all.To help the students to cross the bridge from their native science (Eastern Culture) to scientific science (Western Culture), George (2001) suggests to the teachers of science to use collateral theory. If the students' ideas/beliefs fit in the physics concepts then secured collateral learning. However, if the physics concepts learned is different form the native beliefs, do not contradict them, but let them go together (parallel collateral learning).

4. Conclusion

On the basis of problems and the results of this study it can be concluded that local culture-based physics model of teaching is effective enough for developing the six dimensions of science (concepts understanding,conceptsapplication,science process skill, Creative thinking, and the nature of science (NOS). In the teaching in the classroom, the things that need to be focused on are as follows. (1) the teachers need to analyze ideas, beliefs that are contained in the local culture, both in their manifestation as local culture in the form of values, beliefs and local science that correspond to basic competences and write them explicitly and provide as much time as possible to express the ideas and beliefs that are related to physics lesson, although they do not correspond to the scientific concepts. The teachers are not justified to say the the students' ideas and beliefs are right or wrong (3) the teachers play the role as the facilitators and wise cultural brokers in teaching to help the students to cross from their culture (local culture) to science (Western Culture). They can use collateral learning theory in guiding the students'learning process (4) In discussion activity, start with factual things and move on to open ended questions such as "why", "how", and " what … if". (5) To assess science process skill and NOS the teachers can make observations periodically for certain aspects only aided with assessment rubrics. (6) The government/schools need to provide physics laboratory facilities and natural environment to help the students in doing scientific inquiries continuously.

5. References

Adimassana,Y.B.(2000). *Revitalisasi Pendidikan Nilai dalam Sektor PendidikanFormal.* Atmadi & Setiyaningsih (eds). Transformasi

pendidikan memasukmilenium ketiga. Yogyakarta: Penerbit Kanisius.

Baker *et al* (1995). The Effect of Culture on the Learning of Science in non-WesternCountries: The Results of a Integrated Research Review. *International Journal Science Education.* Vol.17.

Ellianur.R,. Indonesia Peringkat 10 Besar Terbawa dari 65 Negara Peserta PISA. http://www.kompasiana.com/chanel/humaniora. Diunduh tanggal 7 Mei 2012.

George.J. 2001. *Culture and Science Education: Developing World.* http://www.id21.org/education/e3jg1g2.html.

Gufron, A. 2010. Integrasi Nilai-nilai Karakter Bangsa pada Kegiatan Pembelajaran. Cakrawala Pendidikan. Th.XXIX Edisi Khusus Dies Natalis, Mei 2010.

Gonzales,P.Williams,T,Jocelyn,L.Roey,S,Kastberg,D&Brenwald,S. *Higlights from TIMSS 2007: Mathematics and Science Achievement of U.S.Fourth and Eighth Grade Students in an International Context.* Washington DC:Institute of Education Sciences (2008).

Liston, M. 2009. Promoting Inquiry Through Science Reflective Journal Writing. *Resource&*
Guides Vol.1#6 2009.

Meador, K.S. 1997. *Creative Thinking and Problem Solving for Young Learners.* Colorado: Teacher Ideas Press.

Montgomery,D.C. 1996. *Design and Analysis of Experiment.* Fith Edition. New York: John Willey&Sons.

Munandar, S.C.U. 1999. *Kreativitas dan Keberbakatan: Strategi Mewujudkan Potensi Kreatif dan Bakat.* Jakarta: PT. GramediaPustaka.

Suastra,I.W.2005. Merekonstruksi Sains Asli (*Indigenous Science*) dalam Rangka Mengembangkan Pendidikan Sains Berbasis Budaya Lokal di Sekolah (Studi Etnosains pada Masyarakat Penglipuran Bali). Unpublished Disertasion.

Suastra, I.W. 2013. *Pembelajaran Sains Terkini.* Singaraja: Penerbit Undiksha.

Suastra, I.W. 2010. Model Pembelajaran Sains Berbasis Budaya Lokal untuk Mengembangkan Kompetensi Dasar Sains dan Nilai Kearifan Lokal di SMP.

Jurnal Pendidikan dan Pengajaran Jilid 43, No.1, April 2010

Suastra,I.W.2011. PengembanganKarakterBangsaMelalui PendidikanSainsBerbasisBudayaLokal. Paper presented in a seminar entitled "MengembangkanPendidikanKarakter di SekolahMelaluiBudayaLokal,"Undiksha on 14th September, 2011.

Suastra,I.W (2012). *Model Pembelajaran Fisika untuk Mengembangkan Kreativitas Berpikir dan Karakter Bangsa Berbasis Kearifan Lokal Bali.* Presented in Konvensi Nasional Pendidikan Indonesia VII di Universitas Negeri Yogyakarta from 31st October to 4th November, 2012.

Suastra,I.W (2014). The Effectiveness Local Culture-Based Physics Model of Teaching in
Developing Competence and National Character. *Article* Presented in International Conference entitled Implementation and Education of Mathematics and Science (ICRIEMS).Universitas Negeri Yogyakarta, Yogyakarta on 18th to 19th May, 2015.

Wegerif, R. 2010. *Mind Expanding: Teaching for Thinking and Creativity in Primary Education.* Glasgow: Mc Graw Hill.

Zamroni. (2000). *Paradigma Pendidikan Masa Depan.* Yogyakarta: Bigraf Publishing.

THE EFFECT OF GROUP INVESTIGATION LEARNING ON UNDERSTANDING CONCEPTS AND CRITICAL THINKING ABILITY STUDENTS IN GRADES XI IA SMAN 4 SINGARAJA.

Putu Gede Wartawan[1], Putu Prima Juniartina[2]

SMA NEGERI 4 SINGARAJA

ABSTRACT

This research is aimed to analyze (1)) the difference of critical thinking skills and physics understanding between students who studied through group investigation model and their counterparts who studied through direct instruction learning model, (2) conceptual understanding skills between students who studied through group investigation model and their counterparts who studied through direct instruction learning model, and (3) critical thinking skills between students who studied through group investigation model and their counterparts who studied through direct instruction learning model

This study was an experimental study using the posttest-only control group design. The subjects were all students in grade XI IA SMA Negeri 4 Singaraja academic year 2012/2013. The selection of the class for this study was based on simple random sampling technique. The data were analyzed by descriptive statistics and MANOVA. Following MANOVA, Least Significant Difference used (LSD) to test the comparative pair average scores of each treatment group.

The result found that (1) there is significant influence learning model of concept comprehension variables and critical thinking together (F = 32,56; p<0,05), (2) there are significant differences between groups PK model of group investigations and direct instruction learning model (F = 43.019, p <0.05). (3) there are significant differences between groups KBK model of group investigations and direct instruction learning model (F = 37,14; p<0,05). Based on the LSD test and KBK obtained PK is achieved by students who learned using a Learning cooperative model of type GI better than students who learn using conventional teaching.

Keywords : group investigation, concept comprehension, and critical thinking ability.

I. Preliminary

Education is a measure of the progress of a nation. Indonesia is a country that adheres to the national education system. National education goals, according to Law number 20 of the National Education System in 2003 is to develop students' potentials to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible , If the educational goals can be achieved, it is expected that Indonesia's human resources into quality resources, able to face global competition, mastering science and technology, and has the skills in his life.

Answering these demands the government sees the need for repair and improvement of science education curriculum, because the curriculum is the heart of education (Rosyada, 2004). Latest imposed curriculum at all levels of schooling in Indonesia is the Education Unit Level Curriculum (KTSP). Implementation of KTSP integrated with life skills (life skills), the students have to learn about self-knowledge skills, social skills, academic skills, and vocational skills (Arnyana, 2007). Entry KTSP schools provide broad autonomy for schools or teachers to develop learning, according to the characteristics of students and learning resources that exist in the environment (Suastra et al., 2007).

Associated with the implementation of education reform, Gardner (1999) stated that the general purpose of education should be directed at achieving an understanding for mastering various fields of discipline. Understanding is a mental process of the adaptation and transformation of science (Gardner, 1999). Based on these descriptions, then understanding the physics lesson is intended as the ability to: (1) explain the concepts, principles and procedures, (2) identify and select the concepts, principles, and procedures, (3) applying the concepts, principles and procedures. The third dimension of understanding in this study is the basic thinking skills (basic thinking skills) in a ladder ability to think (Krulik & Rudnick, 1995). The understanding is the basic thinking skills that are fundamental to the achievement of critical thinking skills. Critical

thinking is an organized process that involves a mental process involving in them an understanding of concepts, problem solving, decision making, analysis, and scientific inquiry activity (Ennis, 1985).

According to the Human Development Report 2007-2008, Human Development Index (HDI) Indonesia amounted to 0.728 (HDI> 0.9 = high, and HDI <0.9 = low), which ranks 107 out of 177 countries surveyed by the UNDP (Kuncoro, 2009). Education index reached 0.83 because the literacy rate of 90.4% and the average ratio school attendant from elementary through high school reached 68.2%. In other words, not all Indonesian people free from ignorance. Based on data from TIMMS (Trends International Mathematics and Science Study) Indonesian student performance is still very low when compared to countries in Southeast Asia (Yuwono, 2009). It can be seen from the position of Indonesia on average 411 (400, Low), Malaysia rat average 508 (475, intermediate), Singapore average of 605 (625, advanced). These data show that the output of education in Indonesia has not yet reached the maximum results, where data also reflects that not maximal students' understanding of the concepts being taught.

Poor understanding of the concepts and physics student mastery of the material can be due to lack of critical thinking skills of students. This is supported by the discovery Rofi'uddin (2000) that there is a complaint about the lack of critical thinking skills possessed by graduates of basic education to higher education, since education thinking has not been handled properly. Similarly, research conducted Sadia (2008) in several districts in Bali showed that the critical thinking skills of high school students of class X with a qualified low mean score (mean) and standard deviation 49.38 16.92 (standard score of 100); and critical thinking skills of students of class IX SMPN low qualified with a score average (mean) and standard deviation 42.15 14.34 (standard score of 100).

Besides the lack of opportunities for students to hone their thinking skills, understanding the physics concept has not received serious attention from education. Poor understanding of this concept due to the many misconceptions students. This statement is supported by Sadia, et al., (2004) which revealed that one of the causes of universal lack of understanding of physics concepts that achieved by students are the misconceptions (misconceptions) in

students. The importance of understanding the concept of science and creativity in accordance with the mandate of the curriculum can be used as a reference in the learning process to achieve that value. To that end, it should be in a process of education in schools, education should provide an environment that allows students to develop creativity and abilities optimally, so that education can manifest itself and function fully in accordance with the needs of the community (Forster, 2009).

Learning science (physics) requires a learning strategy that is unique, authentic and holistic (Santyasa, 2004). Yasa (2007) explained that, until now still a lot of learning physics is done only emphasis on academic achievement. For students, studying physics seems only to face a replay or test purposes, and regardless of the extent to which they are able to apply concepts they learn to solve problems in their daily lives (Sadia, 1997). Sudarman (2007) revealed that a similar thing, the learning process is only directed at the child's ability to memorize information. One learning model that can overcome these problems is a cooperative learning model. Cooperative learning is developed based on constructivism view (Slavin, 1995) states in cooperative learning constructivism approach proceed from the assumption that students will more easily construct knowledge, easier to find and understand difficult concept when discussing a problem that is faced with his friends.

Some experts argue that the cooperative model is superior in helping students understand difficult concepts (Ibrahim, et al, 2000). In cooperative learning there are many variations that can be used by teachers in the learning process (Johnson, Johnson, & Stanne, 2000). One is the group learning model investigation (GI). Santyasa (2004) revealed GI cooperative learning based on the ideas of John Dewey about education, that the class is a mirror of society and serve as a laboratory to learn about life in the real world that aims to study the problems of social and interpersonal.

GI models have been used in various situations and in various fields of study and the various age levels. Basically this model is designed to guide students define the problem, explore the various horizons on the issue, submit relevant data, develop and test hypotheses. Research by Wijaya (2005), shows the application of GI models can improve the competence of

cognitive, affective and psychomotor student significantly.

Based on the above investigation group cooperative learning model provides an opportunity for students to get more involved in the learning process and provide opportunities for students to work as a scientist. This makes it possible to improve understanding concepts and critical thinking skills of students. Departing from the above description, the researchers want to examine further the effect of group learning model investigation towards understanding the concepts and critical thinking skills of students.

The purpose of this study was to analyze differences in understanding of concepts and critical thinking skills of students between groups of students who studied with Group Investigation model of cooperative learning and group of students who study learning model concept understanding conventional. Analyze difference between groups of students who studied with cooperative learning Group Investigation and conventional. Critical thinking skills to analyze the differences between groups of students learning with cooperative learning Group Investigation and conventional.

Ii. Methods

The design of this study follows the design of the non-equivalent experiment posttest only control group design (Tuckman, 1999). The design of the experiment is presented as Figure 2.1

$$\frac{X_1 \qquad\qquad O_1}{X_2 \qquad\qquad O_2}$$

Figure 2.1 Study Design

The population of this study were all students of class XI IPA SMAN 4 Singaraja academic year 2012/2013, amounting to 4 classes. The total population is 120 students with classroom composition is presented in Table 2.1.

Tabel 2.2 Draft study on each Learning Model

Table 2.1 Students in class XI SMAN 4 Singaraja

No	Class	Number of student
1	XI IA$_1$	30
2	XI IA$_2$	30
3	XI IA$_3$	30
4	XI IA$_4$	30
Number		120

The samples of this research using random sampling techniques gradually. In this study, random sampling is taken at random class. To determine the equivalent or not between classes within the population was measured to obtain the value of general tests of physics. Furthermore, these values were analyzed using t-test. Of the four populations are all used as a sample in the study, where two classes are treated cooperative application of learning models GI and the other two classes are treated the application of conventional learning models. Where the experimental class is a class XI and XI IA IA1 2, while the control class is the class XI and XI IA4 IA3.

This study investigated the influence of the independent variable on the two dependent variables. The dependent variable in question here is the treatment variable, the model of learning. Variables learning model consists of two dimensions: (1) learning model Group Investigation (MPGI) and (2) the conventional learning model (MPK).

The difference in treatment between learning model design group investigation with conventional learning models are presented in Table 2.2

Table 2.2 Draft Study on Each Learning Model

Learning Model GI	Learning Model Conventional
1. Grouping	1. Submission of the learning objectives
2. Planning	2. Explanation of material by teachers
3. Investigation	3. The division LKS
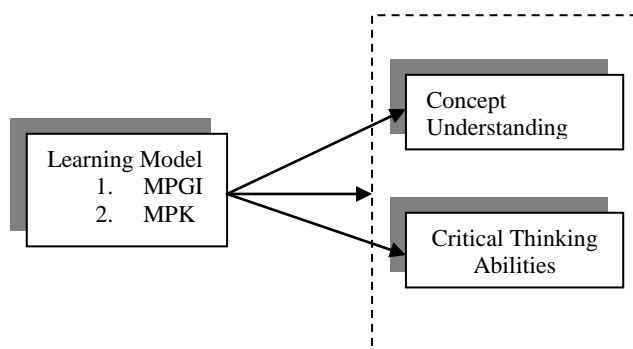
4. *Organizing*	4. Completion of LKS
5. *Presenting*	5. Presenting a topic to students
6. *Evaluating*	6. Exercise to students' abilities

Learning device used in this study; there are two pieces that lesson plan (RPP) and student worksheet (LKS). RPP and LKS used customized learning model that will be given in class. This study used two instruments, namely (1) the test conceptual understanding of physics, and (2) test critical thinking skills.

Before being used in research, learning devices and instruments tested prior research. The purpose of the test is to validate the instrument to instrument and describe degree of estimation can be displayed by each instrument.

In this study, the analysis technique used two techniques descriptive statistical analysis of data and MANOVA. To analyze the students' understanding of physics concepts used Manava analysis. Classifications described above percentage range by using 5 levels of classification. MANOVA test is then performed to test the hypothesis that the first decision to be taken by the third hypothesis Pillace analysis Wilks'Lambda Trace, Hotelling's Trace, and Roy's Largest Root. If the price F for analysis Pillace Wilks'Lambda Trace, Hotelling's Trace, and Roy's Largest Root significance is less than 0.05, then the conclusion is that there are differences in understanding of the concept and students' critical thinking among students who studied with GI models with students learning model conventional learning. Follow-up tests significance MANOVA is an average value between groups by using a Least Significant difference (LSD) or the difference between the smallest significance. Therefore the result of observation of each cell is the same, then used a formula Montgomery.

The results presented in this section is the description of the average value () and standard deviations (SD) an understanding of concepts and critical thinking skills obtained from the post-test. Data student learning with group learning model investigation (MPGI) and conventional learning models (MPK) each unit of analysis 60.

Based on the results of data analysis, found the results of the study as follows. First, there are differences in understanding of concepts and critical thinking skills among students taught by cooperative learning with students taught by conventional learning model (F = 32.56; p <0.05). Secondly, there are significant differences between the groups understanding of the concept of model group investigation and conventional learning model group (F = 43.019, p <0.05). The average value of understanding the concept of group investigation model group was higher than the group of conventional learning model (= 5.4; p <0.05). Third, there are significant differences between the groups ability to think critically investigative model group and the conventional learning model group (F = 37.14; p <0.05). The average value of critical thinking skills group investigation model group is higher than the conventional learning model group (= 7.00; p <0.05). Based on the obtained LSD test understanding of concepts and critical thinking skills achieved by students who learn by using a Learning model of cooperative GI better than students who learn by using conventional learning.

Based on the results of multivariate analysis as presented in Table 2.4, can be drawn interpretations as follows.

III. Results And Discussion

Tabel 2.3 Description of Critical Thinking Value and Concept Understanding.

Statistik	Critical Thinking Skills		Concept Understanding	
	A1	A2	A1	A2
Mean	72,33	65,33	74,08	68,68
Median	73,00	65,00	75,00	69,00
SD	6,089	6,443	4,999	3,960
Varians	37,073	41,514	24,99	15,67
Maksimum	85	80	83	76

Minimum	60	50	61	59	

Description :
A1   = Learning cooperative GI.
A2   = Learning model conventional

Tabel 2.4 Summary result of multivariate test.

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	*Pillai's Trace*	0,997	18352,002	2,000	117,000	0,000
	Wilks' Lambda	0,003	18352,002	2,000	117,000	0,000
	Hotelling's Trace	313,709	18352,002	2,000	117,000	0,000
	Roy's Largest Root	313,709	18352,002	2,000	117,000	0,000
MP MP	*Pillai's Trace*	0,358	32,564	2,000	117,000	0,000
	Wilks' Lambda	0,642	32,564	2,000	117,000	0,000
	Hotelling's Trace	0,557	32,564	2,000	117,000	0,000
	Roy's Largest Root	0,557	32,564	2,000	117,000	0,000

The results showed that there were significant differences in understanding of the concept among the group of students who study learning model group investigation and a group of students who studied with conventional learning models. This review is based on an average score of understanding the concept of cooperative learning model GI compared with conventional models, where the average students' understanding of concepts MPKGI group had an average of 74.08 and MPK group had an average of 68.68. On average greater in the group MPKGI show that MPKGI better than conventional learning model, with a value of F = 43.019 with a significance of less than 0.05. Thus the GI cooperative model has an influence on students' understanding of the concept.

If seen from the syntax or the steps of learning, learning model emphasizes group investigation on the student activity and is student-centered. Students are fully responsible for learning activities and students are given the opportunity to develop the activity and patterns of thought optimally through the main steps include: (1) grouping, (2) planning, (3) investigation, (4) organizing, (5) presenting, and (6) evaluating.

In contrast, conventional learning model emphasizes the activity of the teacher (teacher-centered) with the main learning step is conventional activities. Conventional activities include: the presentation of the subject matter by the teacher clearly and in detail, the students conduct experiments based LKS instructions and guidance of a teacher, and continued with conventional activities by students. Based on this, the process of learning the majority is still the responsibility of the teacher. Teachers are responsible for presenting a new academic information to students every week through verbal or text information. Students are just waiting for an explanation from the teacher and are only responsible for everything in the group. In the conventional learning methods can be used in addition to lectures such as lab and equipped or supported with the use of the media, the emphasis remains on the admissions process knowledge (subject matter) rather than on the search process and construction knowledge. Critical thinking skills cannot be improved through learning that emphasizes the acceptance of knowledge.

The findings in this study indicates that learning model group investigation has a comparative advantage compared to conventional learning models in terms of improving critical thinking skills. Under these conditions, the implications that can be given is the students' critical thinking skills can be improved by applying the learning model group investigation. In the study group investigation, the students actively engaged in learning activities, constantly trained to analyze and solve problems in context. The subject matter of the investigation group learning model is packaged in the form of environmental problems associated with students. This can lead to intrinsic motivation of students to be more responsible in the learning activities. In the study group investigation, the teacher acts as a facilitator and mediator. This implies that teachers should have good skills in presenting the subject matter in the form of the problems of ill-structured or ill-defined

with regard to the surrounding environment of students.

IV. Closing

Based on the results of the above discussion, the researchers can conclude the following:

1. There are differences in understanding of concepts and critical thinking skills among students who learned using cooperative learning model GI with students who studied with conventional learning models. Understanding of concepts and critical thinking skills of students who studied with GI cooperative learning model is better than a group of students who studied with conventional models.

2. There is a significant difference between the understandings of the concept of a group of students who are learning to use the GI cooperative learning with students who studied with conventional learning models. Understanding of concepts students learn the GI cooperative learning model is better than a group of students who studied with conventional models.

3. There are differences in critical thinking skills significantly between groups of students who are learning to use the GI cooperative learning with students who studied with conventional learning models. Critical thinking skills students learn the GI cooperative learning model is better than a group of students who studied with conventional models.

BIBLIOGRAPHY

Arnyana, I BP, Setiawan, I GAN, Neat, NK, 2007. The floating device-based learning biology teaching models kontruktivistik to improve the competence and creative critical thinking skills of high school students. Research report (not published). University Education Ganesha Singaraja.

Arnyana, I BP 2004. The development of devices based on problem-guided learning model cooperative strategy and the impact of implementation of the critical thinking skills and learning outcomes of high school students in the subject of ecosystems. Dissertation (unpublished). Malang State University Graduate Program in Education Technology Studies.

Ennis, RH 1985. Goal critical thinking curriculum. In Costa, AL (Ed): Developing minds: a resourse book for teaching thinking. Alexandria, Virginia: Association for

Supervision and Curriculum Developing (ASCD). Pages 54-57.

Forster, F. 2009. Improving creative thinking abilities using a generic collaborative creativity support system. Reflections Journal of Research and Innovation in Integrating ICT in Education.

Ibrahim, M., & Nur, M. 2000. Teaching based problems. Surabaya: Unesa University Press.

Johnson, R.T and Johnson, DW 1994. An overview of cooperative learning. Available on http://www.learnline.nrw.de/angebote/greenl ine/ lernen / downloads / overview.pdf. Accessed on September 25, 2011.

Kuncoro, M. 2009. Meaning 64 years of independence. Artiket. Available on http://mudrajad.com/upload/makna%2064% 20Tahun%20%merdeka.pdf.

Krulik, S. & Rudnick, J.A. 1995. The new sourcebook for teaching reasoning and problem solving in elementary school. Massachusetts: Allyn & Bacon.

Rosyada, D. 2004. The paradigm of democratic education. Jakarta: Prenada Media

Sadia, I W., Suastra, I W., and Tika, K. 2004. Development of a model and learning strategies physics in high school to improve student miskonseppsi. Research Report. Institute of Teacher Training and Educational Affairs Singaraja

Sadia, I W., Subagia, W., & Natajaya, I N. 2007. Development of a model and a learning tool to improve critical thinking skills (critical thinking skills) student junior high school (SMP) and senior high school (SMA). Research Report (Unpublished). Ganesha University of Education.

Sadia, I W. 2008. The model for effective learning to improve critical thinking skills. Education and Teaching Undiksha Journal, 41 (2), 219-237, April 2008.

Santyasa, I W. 2004. Learning physics-based thinking skills as an alternative to the implementation of the CBC. Technology Learning: Improving the Quality of Learning Learning through technology. Jakarta: Information and Communication Technology Centre of Education.

Slavin, R. E. 1995. Cooperative learning. Second Edition. Boston: Allyn and Bacon.

Suastra, I W., Tika, I K., & Kariasa, N. 2007. Development of Instructional Model For Developing Creative Thinking Ability

Elementary School Students. Research Report (unpublished). Ganesha University of Education Singaraja.

Sudarman. 2007. Problem-based learning: a learning model to develop and improve problem-solving skills. Journal of Innovative Education. 2 (2). 68-73. Available on http://www.jurnaljpi.files.wordpress.com/2007/09/04-sudarman.pdf. Accessed on 9 May 2011

Wijaya, I K. 2005. Application of portfolio assessment in this physics-based learning Group Investigation (GI) to improve basic competence graders X3 second half of SMA Laboratorium State Teacher Training Institute Singaraja 2005/2006 academic year. Thesis (unpublished). Department of Physics Education, Faculty of Mathematics and Science Education, State Teacher Training Institute Singaraja.

Yasa, P. 2007. Innovation model of learning science as demanded by the standard process unit level curriculum (SBC). Papers. Presented at the seminar with the theme "Development and Assessment of innovative learning models in anticipation of the implementation of the curriculum in junior high / high" on 24 s / d 25 September 2007.

Yuwono, I. 2009. Bringing the learning of mathematics in schools. Article. Available at http: //www.um.ac.id.pdf

KNITTING VALUE OF CHARACTER WITH PRIMARY SCHOOL STUDENTS GLOCALIZATION BASED SOCIAL RECONSTRUCTION OF THEORY PARADIGM VYGOTSKY

Wayan Lasmawan

Basic Education Studies Program, Post Graduate Program
Ganesha University of Education

e- mail : wayan.lasmawan@pasca.undiksha.ac.id

Abstract

Advances in science and technology are not always directly proportional to the level of social welfare. This is caused by "not inability" man managing technology to become the main instrument in managing society. There are a set of global values that should be used as basic instrument development community governance model, just ignored. The purpose of study was to develop a model-based character education glocalization in paradigm Vygotsky's theory of social reconstruction. Design research using the research and development put forward by the Borg and Gail (1981) combined with qualitative research design of Miles and Huberman (1994), which is done within 3 years. Samples were students and primary schools spread across eight districts in the province of Bali. The present study is the second year, with the main focus of research is a comparative test of character-based education model glocalization (MPKBG) with a model of character education in general (MPKU). The research instrument consists of guidelines for observation, interview, test learning outcomes, and performance assessment. The results showed that: (1) MPKBG have comparative advantages that are significant compared with MPKU, in terms of the improvement of students' understanding of the importance of defending the country and love of ideology, (2) MPKBG give the experience more real for students to actualize the values of nationality during learning, (3) MPKGB overall make learning civic more attractive and meaningful for students, (4) learning outcomes civic students that learned with MPKGB much better than those that learned with MPKU, and (5) in the implementation of MPKGB, learning methods including social reconstruction in a clump of Vygotsky is much better than with conventional methods and / or methods that based on mere thinking skills. Based on the above results, it can be concluded based character education model of glocalization in the paradigm of Vygotsky's theory of social reconstruction has visibelitas level and significant effectiveness in teaching civics at primary school students in province Bali.

Keywords: character education, theory of social reconstruction, civic education, elementary school.

I. Introduction

Indonesian nation is currently faced with fundamental problems related to identity and survival of morality nation" in the middle of the bustle of globalization increases. This issue is triggered by the swift moral abrasion nationality among the public, one of which is indicated by the rise of violent behaviors, immorality, and the abandonment of religion, to the erosion of identity nationalism. This condition is increasingly widespread and pervasive pulse into egocentric and sectarian nature which originally was the capital of the nation in establishing identity, with the great slogan "Unity in Diversity". On the other hand, it appears that there are efforts "omission" and "apathy" structured government, especially the executive governance, ranging from the local to the central level, against abrasion symptoms.

Affirmation and preservation of identity and national morality is an essential requirement of a nation. But this time the Indonesian people are facing very serious problems associated with it. So that various

circles today, ranging from ordinary citizens, officials, politicians, school principals and education experts "talk Langtang" about the importance of character education and affirmation of local genius. This thought pattern, seems to be very dangerous for the survival of identity and diversity in unity (Vygotsky, 1978: 117) Indonesia, because when we think affirm local genius that we have, other people or other nations also think and do the same thing. Certainly this paradigm instead of thinking makes us as a nation, the better, it will open up new fronts against other nations in the constellation of global society. Furthermore Vygotsky (in Lasmawan, 2012), states that the reconstruction of local values and local community (global) ethics are at the core of social development of children, so that the learning should be packaged in a way confirming selfhood these values in all its dimensions.

Along with construction in mind, Barkowits (Pieterse, 2004), stated that the strengthening of the unilateral nature depends undertaken by developing countries, instead of making them exist in the construction of a global society, on the contrary more and made them stunted and marginalized. That is, that must be done is how do glocalization (make global values as part of a system of local value through adaptation structured)) for global values, so that the retention of local value will still be done, and instead the values of our global transformation and integrated into the local value itself, which in turn will enrich and strengthen the repertoire of local genius of our own nationality (Dantes, 2010). In line with this conception, apparently thinking and abstract sociological like this that should be developed by experts and practitioners in education, especially curriculum developers, instead of struggling to identify and map the values of character education is "gramyang" (scattered formless), so that instead of solving the problems of development national character that is needed by this nation, but rather give birth to new problems are much more complex and fundamental.

Relying on the analysis of the conceptual and empirical, and supported by several theories as has been presented above, this research will be geared towards the analysis, mapping, development, integration, and the justification of the global values are visible to serve as a local value or local genius in order to develop the material and the model character education in civics learning materials in primary schools. This

seems to be something that is "very new", so it has academic and practical urgency is very high in relation to the development of character education in the formal educational curriculum construction in Indonesia. Selection of subjects Civics as a medium of integration and pemodelam glocalization based on the rational that, here's subjects are "closest" when we talk about character education, all the basic values that are intended character is Pancasila in his capacity as the way of life of the Indonesian nation.

Through this research will be firormulasikan models, materials, and devices that character education is relevant and visible for elementary school students, as potential generation in the construction of citizens. Glocalization is a "break-way berikir of basic societal values" (Pieterse, 2004), which is a strategy to strengthen selfhood and meaningful local genius in the global construction, through a process of assimilation, integration, association, and dissemination of structured and aims. Relying on this constructive logic, this research will be focused on how to give birth to a model, the material and learning tools are integrated character education in civics learning that meet the elements of a valid, practical, effective, and in accordance with the characteristics of elementary school students.

II. Research methods

The main focus of research is to design a model and educational materials based character glocalization in the paradigm of Vygotsky's theory of social reconstruction in teaching elementary school civics. Based on the focus of the problem, this study used research design development type "Prototipycal Studies" as put forward by Akker (1999) and Plomp (2001). It is important to consider in research development is the quality of the learning device (product) produced. Plomp (2001), providing product quality criteria are: valid (reflecting knowledge of state-of-the-art technology and internal consistency), has added value (added value), practical, and effective. In general, Plomp (2001), states that the implementation of the research includes the development of three phases: the analysis phase of the upstream-downstream (front-end analysis), prototype development phase (prototyping phase), and the phase of assessment (assessment phase) or summative evaluation. Related to the focus of this research is to do the design

(development) models and educational material based character glocalization in the paradigm of the theory of social reconstruction Vygotsky in teaching civics primary school, until it produces candraan material, learning model, learning devices, thesis students, and the teacher manual with all devices. Schematically roadmap in this study can be described as follows:

III. Results and Discussion

Based on the results obtained illustrate that there are a number of character values globally visible and relevant to be integrated in the education of the character based on the spectrum of the theory of social reconstruction Vygotsky in teaching Civics for elementary school students, namely: democracy, objectivity, multicultural, open-minded, social care, opened culture , sex education, anti-racism, anti-harassment, gender equality, leadership, self-respect, the honor of the nation, care for the environment, human rights, morality dignity, and respect for minorities.

The results showed that: (1) MPKBG have comparative advantages that are significant compared with MPKU, in terms of the improvement of students' understanding of the importance of defending the country and love of ideology, (2) MPKBG give the experience more real for students to actualize the values of nationality during learning, (3) MPKGB overall make learning civic more attractive and meaningful for students, (4) learning outcomes civic students that learned with MPKGB much better than those that learned with MPKU, and (5) in the implementation of MPKGB, learning methods including social reconstruction in a clump of Vygotsky is much better than with conventional methods and / or methods that based on mere thinking skills.

The results of field studies show a phenomenon that really stands out with regard to the arrangement of psychological atmosphere classroom teaching civics in elementary school, which was captured by the activity of observation and hearings with teachers and students, is the emergence of the tendency of teachers to implement the patterns structuring classes that "disciplinary" such as: giving reproof, warning, screaming, angry, views menggerahkan, or other forms of punishment to students, which of course is less reassuring and fun. From the views of students, classroom atmosphere that is calm, orderly, or non-violent, remains a student expectations; although to achieve this, teachers must be firm and hard to the students. Thus, the real reward and punishment as the two forms of reinforcement (reinforcement) in the context of the arrangement of the classroom environment learning civics-SD and for elementary students, as far as having a reason and a cause that is clear and can be understood by students, can still be tolerated, and not too raises classroom atmosphere that is unpleasant or stressful psychologically. From the results of the study and understanding of the research context, the problem of structuring the classroom psychological environment is very complex, and indicates a phenomenon that is still quite problematic for teachers. Therefore, he is not only concerned with, or limited to the issue of the order of interpersonal relations between teacher - student; it covers all the components involved in the learning process; both in terms of students, teachers, classes, and system administration that apply learning in school, all of which are mutually test the knot meaning.

Based on the above results, it appears that not all global value is not relevant to character education in the national or local scale. This fact proves that globalization is a great opportunity for each culture to introduce in the international arena. Hence the need for the spirit of glocalization to stem the increasingly homogeneous culture that does not make widely in each country. A country must indeed have the right strategy for the existence of the country especially in terms of popular culture through the media. It is important to understand, because globalization can realize homogenization business ideology will then use the information to back-to promote democracy, serving the public services, to respect differences, as well as play a role in human rights in the democratization and promoting

public services. Based on the internal contradictions of the concept, Roland Robertson (Lasmawan, 2011), offers the concept of glocalization as a bridge contradiction of the concept. Globalization and localization are ideal values in understanding the process of globalization as well as the value of cultural sovereignty (Scholte, 2010). Globalization itself is a trigger that comes up and the formation of values diversifikatif and heterogeneity as well as the sovereignty of the nation.

The above findings, in line with the development of the concept of glocalization, which was popularized by Roland Robertson in 1977 in a conference on "Globalization and Indigenous Culture" (Scholte, 2010). In general notion of glocalization is the adjustment of global products with local character, through adaptation, acculturation, integration, and transformation aims. There is also a saying think globally and act actually (think globally but act locally). According Lasmawan (2010) glocalization is globalization with a local flavor. Thus glocalization into a strategy that appears as a critique of the concept of free trade are not menspesialkan a state in accordance with its potential. Glocalization means the process of reconstruction and integration, global elements and interactions authenticity elements that gave birth to a new cultural environment. Thus, globalization can change the local cultural ecosystem, including the reconstruction of the mindset of the local communities, shows how swift and sharp globalization for the establishment of global integration.

Glocalization is one result of globalization is homogenization and diversity, globalization and localization. So, glocalization is a strategy that appears to be criticism of the neoclassical concept of free trade, and the western culture "relative arrogant" which is no longer a country specializes in one culture according to their potential. In the realm of cultural studies, glocalization means the emergence of a global interpretation of the values in the local context by the community in different areas of culture. Glocalization facilitate the empowerment of local communities to be able to steer the impact of globalization on their profits at the same time connecting it with resource-global resources. To operationalize the idea of glocalization, the main principles to be considered is the full recognition of the existence and potential of actors at the local level, without having to be limited to the locality. In the framework of

this, political decentralization and regional autonomy as a means to provide opportunities for greater participation for local actors to determine the direction of regional development because they are the most know the condition and needs of the region, as well as the best solution that can be applied to solve problems facing society at the lowest level.

In line with the above findings, when linked with the idea of social reconstruction, then academically, by Vygotsky on construction instructional rests on three main ideas, namely: (1) that the intellectual evolve when individuals face new ideas and difficult to associate ideas with what they already know; (2) that the interaction with others enriches intellectual development; and (3) that the main role of the teacher is to act as a servant and mediator of learning. In line with the basic idea, it is an important contribution Vygotsky at the level of instructional revolution is when he explains how the brain works and how individuals acquire and process information. The views offered Vygotsky is important to choose and understand the application of learning strategies, for three main reasons, namely: (1) he underlined the important role of knowledge early in the learning process, (2) he helped us understand the knowledge and the differences between various types of knowledge, and (3) he helps to explain how human knowledge is obtained and processed in the memory system of the brain of a student. It is urgent to understand remember information and experiences stored in long term memory as the beginning of knowledge. Knowledge early (prior knowledge) is a collection of knowledge and experience of individuals who acquired throughout the course of their lives, and what he brought to a new experience, so that the use of organizing early (advance organizer) is a teaching tool that is recommended by Ausubel in Lasmawan (2010) to link the learning materials with prior knowledge, because learning involves the acquisition of cues through teaching and information of others within a building of self-regulation (self-regulation) were established.

One of the medium used in the process of glocalization is the language and culture. This is consistent with Vygotsky thought about how dependent students with environment and aspects sosiokulturnya in learning. Language is able to bring emotion to global product feels local. Glocalization is global and local interpretation which gives a unique hybridization results in a

geographical region different cultures (Ritzer, 2004: xii). While globalization is a process that creates homogeneity through the global expansion of the common format and specific practices (Ritzer, 2004: xiii). In other words, glocalization refers to the process that leads to cultural heterogeneity while grobalisasi bother going to the convergence trend toward homogeneity. The meeting, which cuts across the state can create fusion and hybridization of culture through a process of social and cultural integration into an order that is mondial. But on the other hand, the condition may also raise issues or threats to national and sub-national identity that tends to lead to the homogenization of the world or a particular community. Homogenization is getting stronger with the growth of commodity culture as a key strength of the region of the world change towards globalization (Ritzer, 2004: 70).

When homogeneity increasingly thick felt to dominate the world of motion, emerging forms of cultural or other civilizations that tried to free from the confines of homogenization. If some non-Western civilization followed the trail left by the West in order to achieve the level of civilized, other civilizations recognize the global flow of consumerist message as a new form of cultural imperialism or commonly called the Americanization (Scholte, 2010). Ritzer (2004: 74) recognize the concept of Americanization as the third process after capitalism and McDonald are becoming a major force in the global deployment of emptiness scope of homogeneity. Instead of following the homogenization, civilizations or cultures are increasingly showing their identity through glocalization, through the social process-related and interdependent to constantly adapt in a global world (Ritzer, 2004: xii). Commodities culture and local values exposed as a provider of materials to be used in the creation of individual and groups in all regions of the world that terglokalisasi. Global practices that facilitate cultural hybridization, these include the colonization, migration, cross-border employment, and intermarriage.

Hybridization goes under names such as syncretism, creolization, tnetissage, mettisage, and crossover. Accordingly, when associated with the basic concepts of Vygotsky about the importance of social and cultural aspects, it specifically Vygotsky argued that in addition to teachers, peers also affect the child's cognitive development.

Contrary to learning through discovery individual (individual discovery learning) cooperative group work seemed to accelerate the development of children. The idea of a creative working group expanded into personal teaching by peers, the child is taught other children were somewhat left behind in lessons. A child can be more effectively guide the other child passes Proxima Zone Development (ZPD), because they themselves had just passed that stage so they can easily see the difficulties faced by other children and provide appropriate scaffolding. To that end, it is the application requires cooperative classroom setting, so that students can interact with each other and bring each other problem-solving strategies that efekif in masng each of their zone of proximal development. Modern cultural globalization has brought changes to the meaning of a value system that has been embraced by people in developing countries, thus leading to the development of a new social system which can be very different to the local culture in a country. In this context, globalization will question the autonomy and sovereignty of the state, so that the fate of a country will be determined by the forces of global and local in interacting with each other. Therefore, in the era of globalization, countries often face the problem of the loyalty of the people who spread towards globalization and subnational, so that a failure in the separation of the two loyalty will trigger conflicts between communities, inter-ethnic or inter-cultural. In this regard, the Indonesian community meeting was held between globalization (universalism) and localization (particularism). The meeting between the two poles are very different even at the end of the most extreme trigger cultural contradiction, which can be seen from the two (2) sides, namely: first, before going to Indonesia, the culture of capitalism modernity has a principle of the culture of modern capitalism that upholds the principle of rationality, efficiency, productivity, and egalitarian culture expression system with a very hedonistic, materialistic, and individual gratification. Secondly, contrary before meeting with the culture of modern capitalism, agrarian culture Indonesia has its own very different principles with the principles of modern culture. In the culture of Indonesia, there is a system of feudalism and communalism which still upholds the principle of a mystical, magical, ritual that does not exempt and do not encourage the emancipation of citizens.

Related to instructional revolution (application of the concept of glocalization in teaching elementary school Civics), contribute more to the Vigotsky theory emphasizes the importance of socio-cultural talent in learning, so learning occurs when students work in the zone of proximal development. ZPD is slightly above the level of development of a person's level of development when they are engaged in learning through proper assimilation and mediation. Applicative, ZPD is the distance between the actual level of per-development with the level of potential development. The level of real development is the ability of solving problems independently while the level of per-potential development is the ability of problem solving under adult guidance through collaboration with a more capable peer friend. The aid is in the form of instructions, warnings, encouragement, describe the problem in solving steps, giving an example or other things that allow students to grow their own. In this context, the management and administration of learning should be able to elaborate on direct linkages between the socio-cultural cognitive domain. That is how the quality of students' thinking and social activity in the cubicle instructional fostered such a way that wakes cooperation between students and other students are more capable in mediation and facilitation adults and teachers.

IV. Conclusion

Based on the exposure results and discussion above, it can be formulated conclusions of research as follows: (1) MPKBG have comparative advantages that are significant compared with MPKU, in terms of the improvement of students' understanding of the importance of defending the country and love of ideology, (2) MPKBG provide experience more real for students to actualize the values of nationality during learning, (3) MPKGB overall make learning civic more attractive and meaningful for students, (4) learning outcomes civic students that learned with MPKGB much more both of those that learned with MPKU, and (5) in the implementation of MPKGB, learning methods including social reconstruction in a clump of Vygotsky is much better than with conventional methods and / or methods that based on mere thinking skills. Classes should be arranged in such a way that the implementation of the principle of scaffolding and ZPD can function properly and optimally, where it will be menterjadikan learning meaningful for students.

References

Dantes, N. (2010). Pendidikan Teknohumanistik (Suatu Rangkaian Perspektif Dan Kebijakan Pendidikan Menghadapi Tantangan Global) (*Makalah*). Universitas Pendidikan Ganesha: Panitia Konaspi

DepartemenPendidikanNasionalRepublik Indonesia. *Undang-undangRepublik Indonesia Nomor 20 Tahun 2003 TentangSistemPendidikanNasional*. Jakarta. 2003.

Lasmawan, Wayan (2010). Membangun Karakter Kebangsaan dalam Perspektif Budaya Lokal (*Makalah*). Disampaikan dalam Seminar Peringatan Hari Guru di Yayasan TP 45 Bali. Singaraja: Program Pascasarjana Undiksha.

Lasmawan, Wayan (2011). Pengembangan model buku ajar berwawasan social-budayadalampembelajaran IPS sekolahdasar (*LaporanPenelitian*). Singaraja: LembagaPenelitianUndiksha.

Pieterse, Jan Nederveen. (2004). *Global and Culture, GlobalMelange*. Lanham: Rowman& Littlefield Publishers, Inc.

Plomp. (2001). *Development Research in/on Education Development.* Makalah disajikan pada Seminar Nasional Pendidikan Matematika Realistik Indonesia. di USD. Yogyakarta: 14-15 November.

Ritzer, George. (2004). *The Globalization of Nothing*. California: Pine forge Press.

Scholte, Jan Aart. (2010). *Globalization : A Critical Introduction.* New York : Palgrave.

EFFECT OF BRAIN BASED LEARNING MODEL TO ABILITY OF CONCEPTS AND CREATIVE THINKING SKILLS FOR STUDENTS BASE ON ABILITY OF SCIENCE FOR STUDENT OF DEPARTMENT ELEMENTARY SCHOOL OF EDUCATION

I Gusti Ayu Tri Agustiana[1], Rudiana Agustini[2], Muslimin Ibrahim[3]

[1] *Elementary School Education of Department Universitas Pendidikan Ganesha Bali Indonesia*
[2] Chemistry Education of Department, State University of Surabaya
[3] Biology Education of Department, State University of Surabaya
Jl. Udayana No.12 Singaraja Bali

Email : igustiayutriagustiana@yahoo.co.id

Abstract

This research aimed to examine (1) the difference mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning, (2) the effect of the interaction between learning model with the ability science (field of study chosen in high school (SMA / SMK) toward mastery of concepts and creative thinking skills of students, (3) the difference mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning, the student has the ability science, (4) the difference mastery of concepts and creative thinking skills among students who follow the model of the brain based learning with students following the model of cooperative This research is a quasi-experimental research (Quasi Experimental) using The Posttest Only Control Group Design. The population is all semester students III PGSD Ganesha University of Education in the 2015/2016 year course Basic Concepts of science concept parth 2.. Determination of the sample with simple random sampling tehcnic. Data mastery of concepts and creative thinking skills of students measured by the instrument mastery of concepts and creative thinking skills, collected data on the ability of science to distinguish input from students and non IPA IPA (the chosen field of study in SMA / SMK). Data were analyzed by Multivariate Analyze of Variance (MANOVA).

The results showed that: (1) There are differences in the mastery of concepts students creative thinking skills among students who follow the model of the brain based learning with students who attend cooperative learning model ($F = 45.279$, $p = 0.001 < 0.05$), (2) there are significant interaction between learning model with the ability IPA (the chosen field of study in SMA / SMK) toward mastery of concepts and creative thinking skills of students ($F = 14.428$, $p = 0.001 < 0.05$), (3) There are differences in the mastery of concepts and creative thinking skills Among the students who follow the model of the brain based learning with students following the model of cooperative learning, the student has the ability IPA ($F = 24.186$, $p = 0.001 < 0.05$), (4) there are differences in the mastery of concepts and creative thinking skills among students following the model of the brain based learning with students following the model of cooperative learning, the student has the ability to non IPA ($F = 29.57$, $p = 0.001 > 0.05$)

Keywords : Brain-Based learning model, mastery of concepts, creative thinking skills, ability science

1. Introduction

Recently, information of technology is growing very fast. The rate of development of the then influential to various fields. One of the co-evolve and change is education (Caine & Caine, 2013).

The rapid pace of information causes a variety of problems emerged in the world of education.

Now, the main problem of education today is to build rationality, and aspects of it, is far more important than learning

achievement (achievement) as measured by achievement test scores are just more emphasis on memorization of knowledge (Brooks & Brooks, 1993). Think rationality is increasingly urgent conducted on students in Indonesia. It is based on be some data on education in Indonesia is still relatively low compared with the ASEAN countries. According to the Education For All (EFA) Global Monitoring Report (2011): The Hidden Crisis, Armed Conflict and Education issued by UNESCO shows that Indonesia Education Development Index is 0.934 which rank 69 of 127 countries. The position is far behind from Brunei Darussalam who is ranked 34 and Japan ranks first in the world.

That is, education in Indonesia in the category of crisis. This condition indicates weakness in many aspects, especially in science literacy. International PISA study results show that the average score of students' scientific literacy Indonesia is at position 60 of 65 countries with a score of 383 for the achievement of the 2009 study (OECD, 2013: 217). These results illustrate that Indonesia is still in the category of students have limited scientific knowledge. This limitation handcuff way of thinking students so that they do not have the scientific reasoning ability (OECD, 2013: 231). Low scientific reasoning could bear on creative thinking skills that are not, and do not provide adequate social status in building social networks in the community (Ospanova et al., 2014: 1545). Therefore, science education from the basic level to the college level needs to be addressed, namely through improvements in the aspect of pedagogy for teacher of science

The role of science teachers at both the elementary and secondary school level is essential for building the scientific reasoning. Talking about the teacher, then inevitably have to involve the role of universities that produce teachers. It is therefore very interesting study orientation point known at the provider level teachers, in particular providers of elementary school science teacher. The study on the ability to equip student teachers to think creatively in constructing science learning is crucial. For the student teachers, creative thinking must be built carefully for an educational institution at the university. Various attempts have been made by the government to improve the quality of science education, namely: (1) the development of learning models the ability of science, (2) development of instructional media capabilities of science, (3) upgrading for the

educators, (4) the provision of infrastructure that support learning the ability of science, and (5) training (Ida, 2008). Consortium International (2010), reported that in the field of science abilities, Indonesia was ranked 32 out of 36 countries. These facts, show that the quality of the learning ability of science needs to be improved, because the learning ability of science plays an important role in improving the quality of human resources (Sismanto, 2007). Learning ability of science concerned with how to find out about a systematic nature, so that the ability of science not only mastery of knowledge in the form of a collection of facts, concepts, or principles alone but is a process of discovery. Educational purposes ability of science in education at primary school level is to develop basic knowledge and skills that are useful to themselves and learners in everyday life, as well as the provision of continuing education to a higher level. In addition, through the ability of science education are expected to develop the attitudes, moral values, and a set of life skills in order to prepare good citizens and capable society.Based on the description, the mastery of concepts in the learning ability of science intended as the ability to (1) explain the concepts, principles and procedures, (2) identify and select the concepts, principles, and procedures, (3) applying the concepts, principles and procedures. The third dimension of mastery of the concepts in this study is the basic thinking skills (basic thinking skills) in a ladder ability to think (Krulik & Rudnick, 1995). Mastery of concepts is the basic thinking skills that are fundamental to the achievement of critical thinking skills.

Critical thinking skills, is one of the creative thinking ability in developing the capacity of reason argument and decision making (Thomas, 1993). Creative thinking skills, as well as influential model of teaching and learning science abilities of learners. Therefore in it concerns the analysis in making a good decision in light duty and heavy duty (Suzan et al, 2013). Developing creativity students prospective teachers, the professors considered problematic if they can not teach them to make the process of creativity and creative thinking, as well as professors can not develop their own creative thinking skills (Normn, 2013). Therefore, future teachers' professional problems, which is the result of a college education does not become a serious obstacle in the development of creative thinking skills (Roza Iztileuovna et al., 2013).

Education student teachers Primary School Preferred is the content pedagogical objective, as well as the role and function of culture colleges that educate on aspects of humanist become professional specialists that are important in the future, which have appeared since the crisis whether caused by man, as well as by natural disasters (Ospanova BA et al., 2013). Therefore, planting the concept that students have the skills to think Kratif in the face of crisis, particularly in the field of science is very important, because learning never contextual and meaningful, because the ability of science concepts imported from foreign cultures. These corridors develop creative thinking skills become very important. In addition, the recruitment of students of Elementary School Teacher In Ganesha University of Education a come from various departments in secondary schools (SMA) and vocational schools (SMK), language, science Social (IPS) and Science, this condition is very difficult learning process capability science. These conditions once does not make creative and innovative learning. Student background affect student creative thinking (Suzan et. Al., 2013). In regard this function of brain learning model base learning (BBL) pull is applied, because the BBL models provide a holistic approach and meaningful learning process for students and lecturers (Caine and G.Caine, 1995). With BBL, in addition to meaningful learning, also build science process skills become more urgent, so it can simultaneously between student background science and non-science. It is based on using the BBL is a learning system of education that promotes the advancement of the brain and to follow the mechanisms of the human brain works, such as when the retrieve, process, and interpret the information that has been absorbed, as well as how the brain works in retaining the message or information obtained.

Therefore, it is necessary to study deeper to influence learning model Brain Base Learning to mastery of concepts and skills to think creatively in terms of the background of the ability of science students Teacher Education school (PGSD) Ganesha University of education Ganesha, particularly in the field of science is very important. The objectives are (1) to analyze the differences between groups of student mastery of concepts which use a model brain based learning and student groups using cooperative learning model. (2) Analyzing the difference mastery of concepts among the group of students who have the ability (background ability of science and non ability of science). (3) To analyze the interactive effects between learning model (brain-based learning and cooperative) and ability (background ability of science and non capabilities science) on student mastery of concepts. (4) Analyzing creative thinking skills difference between the groups of students who use the model brain based learning and student groups using cooperative learning model. (5) creative thinking skills to analyze the differences between groups of students who have the ability (background ability of science and non-science). (6) To analyze the interactive effects between learning model (brain-based learning and cooperative) and ability (background ability of science and non-science) to the creative thinking skills of students. This paper can provide positive benefits in the development of science for students learning abilities of school Teacher Education (PGSD) Ganesha Education University ,. In particular the benefits that can be gained from this study are as follows: Model BBL learning in science learning can familiarize students Elementary School Teacher Education (PGSD) University education Ganesha, to learn to be independent and have creative thinking skills.

2.Methods
Research design
This study considered quasi experimental. This study used a non-equivalent design post only control group design and measurement techniques using two factors in the 2x2 versions (Campbell & Stanley, 1996). non-equivalent post test only control group design which is a quasi experimental design (quasi). The study design is presented in Figure 1.

Class	Treatment	Post
Experiment	X_1	O_1
Control	X_2	O_2

Campbell & Stanley, 1996:13) Figure 1. Design of Research

Description: X_1 = *brain based learning model* ; X_2 = cooperatif learning model

O = stated observation end (post-test), where the index of odd declared final observation in the experimental group and the index even declared final observations in the control group.

Figure 1, states that the applied learning model has two dimensions, namely models and cooperative learning model. At each treatment was also investigated its interaction with the capability of Science. ability consists of students who have a background in science and students who have a background in non Science. The design of this study using a 2x2 factorial experiment in the data analysis. Factorial design provides the opportunity to determine the effects of main and interactive effects of treatment variables.

Population and Sampling

The population in this study were all students of the second semester of the Department PGSD Singaraja Ganesha University of Education academic year 2015/2016. Students of the second semester consists of 6 classes as many as 205 students. Sixth grade distributed into classes that are academically equivalent. The sample consisted of two classes taken by random sampling technique. Number of respondents 73 students divided into two classes, namely class Brain Based Learning model learning and cooperative learning classes

Variable of Research

The independent variables consist two non-metric variables as treatment and one metric variables as covariates. Both variables such treatment include, (1) model of brain-based learning (MBBL) and cooperative learning model (MPK). One other independent variables as covariates is the ability of Science, consisting of background current students of SMA / SMK with a choice of subject areas of Science and non-science. In this study distinguished background in science and non science possessed by the students, because researchers suspect that a student who has been taught by the science that is not taught science will affect the mastery of concepts and creative thinking skills of students. The dependent variable in this research is the mastery of concepts and skill of creative thinking

Treatment of Research

This study uses a six-cell. Treatment in all cells require the same time, sequence, and a portion of the same material. The difference is the learning model and learning scenarios. In connection with the treatment, this study conducted a few stages as follows.

1. Develop and design a learning device that consists of a syllabus, SAP, Textbook and Student Worksheet (MFIs) on the subject of plant relationships that support learning models both on MBBL and MPK

2. Determine the difference background in science and non science students who have chosen to be Samel research

3. Applying the model of brain-based learning (MBBL) in the experimental class, while the applied control class Cooperative learning model (MPK).

4. Evaluation of mastery of concepts and skills of creative berikir students in the experimental class and control class.

Methods of Data Collection and Instruments Research

In this study the concept of student mastery of the data collected by tests of mastery concepts, creative thinking skills and the data collected with creative thinking skills tests

Test of Mastery Concept

Tests understanding of the concept serves to capture the misconceptions of students and students' understanding of concepts, principles and procedures before and after learning science (Santyasa, 2003). Concept mastery tests administered once named as post-test. Criteria for assessment tests understanding of the concept of using assessment rubrics as they are developed from Santyasa (2003) which diikthisarkan in Table 1.

Tests of Creative Thinking Skills

Creative thinking skills test is used to determine the ability of students to solve scientific problems creative thinking skills tests administered once that as a post test. Criteria for assessment tests problem solving skills using assessment rubrics in Table .2

Table 1 1 Rubric Assessment Concept

Score	Criteria
4	Answering correctly, the reason right, accompanied by the appointment of principles, formulas or calculations
3	Answering correctly, the reason right
2	Answering correctly without any reason or excuse
1	Answering but misconceptions / incorrect
0	No answer

Tabel 3.2 Assesment of Creative Thinking Skills rubrics

Dimensions of Problems	Number problem	Score	Characteristic
Fluency	1	3	• Answers are produced in two different ways with the given description and drawings • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		2	• Answer generated one way to given an explanation and images • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		1	• Answer generated one way with no explanation given and images • Formulated in a discussion that is less trace in a language that is not good
		0	• No answer or a wrong answer
Flexibility	2,4	3	• Answer produced two variations accompanied by explanations • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		2	• response produced two variations are not accompanied by explanations • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		1	• Answer generated a variation be accompanied by an explanation • Formulated in a discussion that is less trace in a language that is not good
		0	• No answer or a wrong answer
Elaboration	5,6	3	• Answer the resulting detail and accompanied by detailed logical explanation • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		2	• Answer the resulting detail and detail but with explanation • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		1	• Answer the resulting detail and detail without explanation • Formulated in a discussion that is less trace in a language that is not good
		0	• No answer or a wrong answer •

Dimensions of Problems	Number problem	Score	Characteristic
Originality	3	3	• Answer who produced the original with the given description and drawings • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		2	• Answer who produced the original without being given an explanation and images • Answer based discourse and the existing theory • Formulated in a discussion that trace the language properly.
		1	• Answer generated is not original and in accordance with the existing theory • Formulated in a discussion that is less trace in a language that is not good
		0	• No answer or a wrong answer

Methods of Data Analysis

For purposes of comparability between the models of brain-based learning and cooperative learning in science kemamuan students used multivariate analysis of covariance (MANCOVA) 2 × 2 factorial (Santyasa, 2006). To test the hypothesis of the study will be used multivariate analysis of covariance factorial 2 × 2 with SPSS Statistics 17.0. Null hypothesis testing is done with a significance level of 5% (α = 0.05). The hypothesis to be tested in this study were as many as six are as follows

1. There are differences between the groups of student mastery of concepts that use brain-based learning models (BBL) and a group of students using cooperative learning model

2. There are differences between the groups of student mastery of concepts that use brain-based learning models (BBL) and a group of students using cooperative learning model (MPK).
   $H_0(1)$: $[\mu_{A1}Y_1] = [\mu_{A2}Y_1]$, vs $H_A(1)$: $[\mu_{A1}Y_1] \neq [\mu_{A2}Y_1]$

3. There are differences between groups mastery of concepts students who have the ability of science and non-science. $H_0(2)$:
   $[\mu_{B1}Y_1] = [\mu_{B2}Y_1] = [\mu_{B3}Y_1]$, vs $H_A(2)$: $[\mu_{B1}Y_1] \neq [\mu_{B2}Y_1] \neq [\mu_{B3}Y_1]$

4. There are interactive effects between the model (brain-based learning and cooperative) and the ability of science (background science and non-science) on student mastery of concepts H_0

(3): $\mu_A x \mu_B = 0$, vs H_A (3): $\mu_A x \mu_B \neq 0$

5. There are differences in creative thinking skills among the group of students who use brain-based learning models (MBBL) and a group of students using cooperative learning model (MPK). H_0 (1) : $[\mu_{A1}Y_2] = [\mu_{A2}Y_2]$, vs $H_A(1)$: $[\mu_{A1}Y_2] \neq [\mu_{A2}Y_2]$

6. There are differences in creative thinking skills among the group of students who have the ability kemamuan science and non-science. $H_0(2) [\mu_{B1}Y_2] = [\mu_{B2}Y_2] = [\mu_{B3}Y_2]$, vs $H_A(2)$: $[\mu_{B1}Y_2] \neq [\mu_{B2}Y_2] \neq [\mu_{B3}Y_2]$

7. There are interactive effects between the model (brain-based learning and cooperative) and the ability of science (background science and non-science) to the creative thinking skills of students. H_0 (3): $\mu_A x \mu_B = 0$, vs H_A (3): $\mu_A x \mu_B \neq 0$

To test the three hypotheses F test through multivariate analysis of covariance (MANCOVA) 2 × 2 factorial. Multivariate test or tests conducted among subjects tehadap figures statistical significance of the F value Pillai's Trace, Wilks 'lambda, Hotelling' Trace, Roy's Largest Root. Figures significance of less than 0.05 means that H0 is rejected, which means that there are differences in the dependent variables between groups, according to

103

sources. As a follow-up tests of significance MANCOVA are average values between groups using the Least Significant diference (LSD) was used formula Montgomery (Montgomery in Santyasa, 2004).

$$LSD = t_{\alpha/2, N-a} \sqrt{\frac{2MS\varepsilon}{n}}$$

With α = significant level, N = total sample , a = total group, n = total sample in group The criteria used is reject H0 if the absolute value> LSD which means that there are differences in the average value of the dependent variables between groups. Given the calculation of the multivariate analysis of covariance (MANCOVA) is fairly complex and require considerable time, then in its analysis used SPSS Statistics 17.0. All hypothesis testing performed at a significance level of 5%

3. Discussion of Results

Research data presented in this section are (1) the data mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning, (2) the data mastery of concepts students who attend based learning model brain students who follow the model of cooperative learning students who have interest in non-science capabilities, and (3) the data creative thinking skills among students who follow the model of the brain based learning with students following the model of cooperative learning in students who have the ability science . In the description of the results of this study, the analysis revealed the frequency and percentage of research data in each group learning model. In a sequence of data analysis results are presented in tables and histograms depicted in graphical form. Then proceed with the grouping of the distribution of scores based on the assessment criteria for determining the benchmark reference for the group of students classified as very high, high, enough, less and very less. Results of the analysis of the frequency distribution of scores mastery Research data presented in this section are (1) the data mastery of concepts and skills and creative thinking of students between students who attend based learning model of the brain with the students following the model of cooperative learning, (2) the data mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning on students who have

the ability of science and non-science, and (3) the data creative thinking skills among students who attend based learning model of the brain with students modeled cooperative learning in students who have the ability of science and non science. In the description of the results of this study, the analysis revealed the frequency and percentage of research data in each group learning model. In a sequence of data analysis results are presented in tables and histograms depicted in graphical form. Then proceed with the grouping of the distribution of scores based on the assessment criteria benchmark reference (PAP). Results of the analysis of the frequency distribution of scores mastery of concepts and skills of creative thinking on each unit of analysis is shown in Table 3 and Table 4 below.

Table 3 The frequency of distribution scores on the mastery of concepts students to learn in brain-based models and cooperative learning model.

No	Model Based Learning			Model Kooperatif		
	Interval	Frequency	Percent	Interval	Frequency	Percent
1	64-68	5	13.5	47-52	2	5
2	69-73	4	10.8	53-58	3	8
3	74-78	10	27	59-64	5	14
4	79-83	3	8	65-70	10	27
5	84-88	4	11	71-76	5	14
6	89-93	5	14	77-82	8	22
7	94-99	6	16	83-90	4	11
	Total	37	100.0	Total	37	100.0

Table 4 The frequency of distribution score of creative thinking skills of students who studied with brain-based models and model of cooperative learning

Analysis of the data used in the study is the first factor ANOVA factorial 2 (row) is a learning model, which consists of the brain-based models and cooperative learning. The second factor (column) is the ability of science, which can be divided into the ability of science and non-science capability. Before the multivariate analysis (MANOVA) is displayed, first tested the assumptions of the data mastery of concepts and creative thinking skills of students. Test results showed the assumption that the data were normally distributed, the variance between homogeneous groups and did not happen multi colinearity. Therefore, the analysis requirements are met, then MANOVA can be continued Testing the hypothesis of the study conducted by the multivariate analysis (MANOVA), which aims to

investigate the influence of independent variables on the dependent variable together. In this study used is MANOVA MANOVA two lines that are used to investigate the effect of the interaction between science learning model and the ability of students to mastery of concepts and creative thinking skills of students. Furthermore, if known no interaction then continued with LSD test to determine the interaction effects (simple effect) which one is better, through the Post Hoc in Manova. 2x2 factorial MANOVA using SPSS 17.0 for Windows. 2x2 factorial MANOVA results. Multivariate analysis of the data mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students who attend the cooperative learning model gives the figure of significance = 0.001 at F Wilks' Lambda = 45.279. The significance of the figure is less than 0.05. This means that the null hypothesis (H0) is rejected or H1 accepted that conclusion there are differences in the mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students following the model of cooperative learning. On average mastery of concepts students who attend based model of the brain is 80.95 while for students who follow the cooperative learning, the average mastery of concepts is 70.32. Average of creative thinking skills of students who attend based model of the brain is 63.84 while for students who follow the cooperative learning, an average of creative thinking skills was 73.84. Multivariate results on the effect of the interaction between learning model with the ability of science students' mastery of concepts and creative thinking skills of students, resulting in significant numbers on the F value = 0.001 Wilk's Lambda = 14.428. The significance of the figure is less than 0.05, which means that the null hypothesis (H0) is rejected or working hypothesis (H1) is received, so the conclusion there is an interaction effect between teaching model with the ability of science students' mastery of concepts and creative thinking skills of students. The third research hypothesis states that there are differences in the mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students following the model of cooperative learning, the student has the ability of science.

Based on the results of the multivariate analysis of the data mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students who attend the cooperative learning model gives the figure of significance = 0.001 at F Wilk's Lambda = 24.186. The significance of the figure is less than 0.05. This means that the null hypothesis (H0) is rejected or working hypothesis (H1) is accepted that conclusion there are differences in the mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning, the student has the ability science , On average mastery of concepts students who attend based model of the brain is 88.00 while for students who follow the cooperative learning, the average mastery of concepts is 74.77. Average of creative thinking skills that follow based model of the brain is 78.76 while for students who follow the teaching of creative thinking skills, the average was 68.54. The fourth research hypothesis states that there are differences in the mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students following the model of cooperative learning, the students who have the ability to non-science. Based on the results of the multivariate analysis of the data mastery of concepts and creative thinking skills of students among the students who follow based learning model of the brain with the students following the model of cooperative learning, the students who have the ability to non-science gives the figure of significance = 0.001 at F Wilks' Lambda = 29 57. The significance of the figure is less than 0.05. This means that the null hypothesis (H0) is rejected or H1 accepted that conclusion there are differences in students creative thinking skills among students who follow the model of the brain based learning with students following the model of cooperative learning, the students who have the ability to non IPA. The average mastery of concepts that follow based model of the brain is 71.69 while for students who follow the cooperative learning, the average mastery of concepts is 59.82. Average of creative thinking skills that follow based model of the brain is 67.38 while for students who follow the cooperative learning, an average of creative thinking skills was 52.73.

The analysis showed that: there are differences in the mastery of concepts students creative thinking skills among students who follow the model of the brain based learning with students who attend cooperative learning model (F = 45.279, p = 0.001 <0.05). This difference indicates BBL models are better able to improve the mastery of concepts and creative thinking skills. This can be explained because the model of brain-based learning is an instructional model that is aligned with the workings of the brain that is designed by nature to learn through the learning situation is challenging, fun, and active and meaningful for students. Learning in the classroom that uses brain-based learning models attempt to optimize the work of both hemispheres of the brain that is the left brain and right brain because the brain is a parallel processor that can perform several activities at the same time. This is consistent with the opinion of Jensen (2011: 25) states that the events did occur in one hemisphere of the brain can affect development in other parts of the cerebral hemispheres apart at the same time. Therefore, the application of brain-based learning models seek to create optimal learning activities include the strength of both hemispheres. The concept of learning that stimulate the brain, and assumes that the brain is the processor parallel and have a wave, and every brain cells (neurons) serves as station relay, receiving and processing / processing the signal to another cell (neorotransmiter) findings are in line with the findings of Weiss (2000 : 28). Background origin student school were the presence of interactions between instructional model with the ability of science (the chosen field of study in SMA / SMK) toward mastery of concepts and creative thinking skills of students (F = 14.428, p = 0.001 <0.05). This condition can be explained that the origin and background of previous experiences affect the understanding of the concept. Work. This condition is in accordance with Scaffolding Theory, ie if the technique to change the appropriate level of creativity assisted learners' performance, it will obtain optimal learning results (Joyce et al., 2009: 16, Santrock, 2007). Previous experience will provide the creativity different, the condition is in line with theories have zone proximal development (ZPD), if learners are given zone developments nearby via elaboration with peers, the learners will enhance the learning experience for the

better theory of ZPD and Bruner (Santrock, 2007: 63) ,Result of observations that there are differences in the mastery of concepts and creative thinking skills of students among the students who follow the model of the brain based learning with students following the model of cooperative learning, the student has the ability of science. This reinforces the condition that the background has a mastery of science concepts and skills are higher. This can be explained that students who come from backgrounds science learning empowered greater in aspect alignment with the help of the utilization approach scientifically through observation, questioning, analysis, and conclude approach scientific aims to facilitate students remember the content material because the brain has the ability to correcting visuals have been observed and help the students to continue to give attention to the content provided by the lecturer. The media utilization will optimize the work of the right brain in the learning process. Learning to use a model of brain-based learning can improve student engagement. The learning process undertaken able to involve students actively follow the stages of learning. One was at the stage of pre-exposure, the learning process of science, carried out taking into account students' prior knowledge. Based on the knowledge, students become active and attempt to explore various knowledge has ever experienced, and is associated with the content being studied so that the learning experienced by students become meaningful. This is in line with the opinion of Jensen (2011: 82) states that the brain is always trying to find meaning in learning. In addition, students are also involved actively to use the given media, giving an example to the front of the class, and is actively involved in the group. Students are also asked to arrange themselves the results of discussions that have been conducted and presented to the class. Through such involvement, more students have the opportunity to use the knowledge that has been owned. Differences mastery of concepts and creative thinking skills among students who follow the model of the brain based learning with students following the model of cooperative learning, the students who have the ability to non science. It is due to that the Brain-Based Learning Model-aided visual media seeks to create a learning situation is challenging, fun, and active and meaningful for students so that the primary learning system includes the

emotional, social, cognitive, physical, and reflective thrive. Classroom activities that can train students emotion will help students focus reason and logic so that the logic will help students find the goal to be achieved, and the emotional side will give you patience and perseverance for students to do something, including in terms of learning. Through the implementation of this model, emotional nurture of the students will greatly help students discover a passion for learning and therefore contributes to the learning outcomes obtained. In addition, the application of the Brain-Based Learning aided visual media focused on social learning system. Social learning system can be realized through cooperation of individuals within the group so that such activity may give positive feedback and indirectly develop students into a better direction. This finding is consistent with several studies that have been conducted by Adiastuty et al (2012) which shows that the application of the model Brain-Based Learning can effectively improve the problem solving ability of students with an average higher when compared with students who follow the model of expository. Learning is enhanced by challenge and inhibited by threat therefore every brain is unique (Connell, 1995) This finding, confirms that students in terms of developing mental PGSD through a process of creative thinking to formulate the problem can not be done because it is not accustomed to using meta cognitive ability (Agustiana, 2015). Therefore treatment to degenerate class is not optimal in promoting the concept of science and creative thinking skills, because it has not established scientific thinking (Campbell, 2015). Use of time, facilities and strategies capable to understand a problem congruent with the system performance of the brain learners are not familiar with the condition of generated classes (Campbell, 2015).Excess of brain-based learning is creating a challenging learning environment thinking skills of students, creating a fun learning environment, creating a situation of active learning and meaningful for students (active learning).

4.Conclusion

Based on the analysis and discussion as it has been described in the previous section, it can be concluded :

1. There are differences in the mastery of concepts students creative thinking skills among students who follow the model of the brain based learning with students who attend cooperative learning model ($F = 45.279$, $p = 0.001 < 0.05$),

2. There is an interaction effect between the learning model ability IPA (the chosen field of study in SMA / SMK) toward mastery of concepts and creative thinking skills of students ($F = 14.428$, $p = 0.001 < 0.05$),

3. There are differences in the mastery of concepts and creative thinking skills among students who follow the model brain-based learning with the students following the model of cooperative learning, the student has the ability IPA ($F = 24.186$, $p = 0.001 < 0.05$), (4) there are differences in the mastery of concepts and creative thinking skills among students who attend the brain-based learning model with students who attend cooperative learning model, the student has the ability to non IPA ($F = 29.57$, $p = 0.001 > 0.05$)

5.References

Caine, R.N and G. Caine. 2013. Reinventing Schoole Through Barin Based Learning, April, pp 43

Davis, A. 2004. "The Credentials of Brain-Based Learning". Journal of Phylosophy of Education, Volume 38, Nomor 1 (hlm. 21-35).

Duman, B. 2006. "The Effect of Brain-Based Instruction to Improve on Students' Academic Achievement in Social Studies". 9th International Conference on Engineering Education, 23-28 July 2006 in San Juan. Tersedia pada: http://www.icee.usm.edu/icee/conferences/icee2006/ papers /3380 .pdf (diakses tanggal 3 Januari 2009).

Depdiknas, 2005. Rencana Strategis Departemen Pendidikan Nasional Tahun 2005-2009. Jakarta: Depdiknas.

Edelenbosch, R., Kupper. F., Krabbends L, and Broese, J.E . 2015, Internasional Mind, Braind and Education Society and Wiley , Perioical, Inc. Vol 9. No.1

Given, B.K. 2007. Brain Based Teaching (merancang kegiatan belajar-mengajar yang melibatkan otak emosional, sosial, kognitif, kinestetis, dan reflektif). Bandung: Kaifa.

OECD.2013. PISA. 2012. What Student and Can Do-Student Performance in Reading, Matemathetics and Science; Volume I, http://dx.doi.org/10.1787/9789264201118-en[diakses 18 Juli 2014)

Ozden, M. & Gultekin, M. 2008. The effects of brain-based learning on academic achievement and retention of knowledge in science course, Electronic Journal of Science Education. 12(1), 1-16. Tersedia pada http://ejse.southwestern.edu/volumes/v12n1/articles/art1-ozden.pdf, diakses 26 Pebruari 2010.

Partlow P,J., Medeiros K, Mumford M, D., 2012, Creative Thinking: Process, Strategies and Knowledge.

OECD.2010.Pisa 2009. Result: What Student and Can Do-Student Performance in Reading, Matemathetics and Science; VolumeI, http://dx.doi.org/10.1787/9789264091450-en[diakses 18 Juli 2014)

OECD.2013.PISA. 2012. What Student and Can Do-Student Performance in Reading, Matemathetics and Science; Volume I, http://dx.doi.org/10.1787/9789264201118-en[diakses 18 Juli 2014)

Norman G. 2013," Erratum to : On competence curiosity and creativity adv. In health. Sci. eduVol. 18; 157.

Sapa'at, A. 2007. Brain Based Learning. Tersedia pada http://matema-tika.upi.edu/artikel/brain_based.htm, diakses 24 Desember 2007.

Sarkim, T. 1998. "Humaniora dalam Pendidikan Sains". Dalam Suwarno, P. J., Suparno, P., Rahmanto, B., Budi, K. F., & Sarkim, T. (Eds.) Pendidikan Sains yang Humanistis. 127-145. Yogyakarta: Kanisius.

Suastra, I W. 2002. Strategi belajar mengajar. Buku Ajar. Jurusan Pendidikan Fisika IKIP Negeri Singaraja.

Thomas, CI, 1993, Taber's Cyclopedia Medical, Dictionary, Phildelpia,: F.A.Davis

Suzan,Z., Nana Kohn, Pao.K., Friedman, 2013, Critical Thinking of Registereed Nurses, in a Fellowship Program, The Journal of Continuing Education in Nursing Vol 44, No. 8 .

Jones RW. Problem-based learning: description, advantages, disadvantages, scenarios and facilitation. Anaesth Intensive Care. 2006; 34:485–488. PMID: 16913347

Graff De. Kolmes, 2003, Characteristics of Problem-Based Learning, Int. J. Engng Ed. Vol,3

McParland M, Noble LM, Livingston G. The effectiveness of problem-based learning compared with traditional teaching in undergraduate psychiatry. Med Educ. 2004; 38:859–867. PMID: 15271047

Connell D. 2009. The Global Aspects of Brain-Based Learning , Horison

Agustiana. T. I G.A. 2015. Model Pembelajaran Opemes dalam meningkatkan Keterampilan Berpikir Kreatif Mahasiswa PGSD. Makalah. Diselenggarakan Program Studi Pendidikan Sains Program Pascasarjana Universitas Negeri Surabaya. Surabaya: Prosiding Seminar Nasional Pendidikan Sains. ISBN: 978-602-72071-0-3. Hal. 1423-1433.Anderson, dkk. (Eds) A Taxonomy of Learning, Teaching, and Assessing, Revision of Bloom's Taxonomy of Educationnal Objectivees, New York: Longman.

SCIENCE AND TECHNOLOGY

K-Means Clustering of Learners' Cognitive Domain Measured Using Bloom's Taxonomy-based Serious Game

I.N Sukajaya [2*], I.K.E Purnama [1], Mauridhy Hery Purnomo [1]

Department of Multimedia and Networking Engineering,Institut Teknologi Sepuluh Nopember,Surabaya, Indonesia[1]
Educational Mathematics Department, Universitas Pendidikan Ganesha, Singaraja [2]*

nyoman.sukajaya@undiksha.ac.id

Abstract

Cooperative learning is a learning approach which is commonly implemented in classroom management. A group/cluster could be learners of homogeneous or heterogeneous cognitive domain. Whether the groups which are created are homogeneous or heterogeneous, instructor should know well characteristic of learners in advance. In case of a large class size and time restricted, learners' clustering is often difficult to be conducted. That is why there is a tendency that is the probability of inappropriate value while clustering is high. We couldn't remark that inappropriate result obtained while clustering is always caused by lack of instructor knowledge, but limited information is also one among factors that is potency to make contribution to the result. In this paper we proposed the usage of Bloom's taxonomy-based serious game technology as an alternative approach of measuring cognitive domain of learners and K-Means method to clustering. The implementation of Bloom's taxonomy-based serious game collects more data which are theoretically more representative to identify specific learner. Analysis using K-Means method was conducted into three types of procedure: raw data, transformed data into average value without consideration on cognitive domain of Bloom's taxonomy, and transformed data into average value with consideration on cognitive domain of Bloom's taxonomy. K-Means clustering method obtains a similar result for the first and third data model. This result shows that is the integration of Bloom's taxonomy into serious game technology is potentially conducted in measuring learners' information in learning.

Key words: K-Means Clustering, Learners' Cognitive Domain, Bloom's Taxonomy, Serious Game

1. Introduction

Modern learning lets learners to construct their knowledge and skill in the way that is the most suitable to their experience (Obikwelu and Read, 2012). Learners learn what they should learn, learn at time compatible to their condition, or implement learning aid that is potentially help learners to understand aspect they want to learn. In general; we could say that learning should adaptive to learners' requirement. Such kind learning is usually stated as adaptive learning.

To design a lesson plan that is potentially support learners to construct the required knowledge and skill is not always simple. There is requirement for instructors to know well learners' characteristic in order to able to set a learning environment that is suitable to their characters. The more data gathered in relation to learners, the closer instructors understood their characteristic.

The data requirement to present learners' characteristic are gathered of three learning domains. Those domains are: affective, cognitive, and psychomotor. Affective domain is related with how one approaches learning. It includes feelings, values, appreciation, enthusiasms, motivations, and attitudes. Psychomotor domain is related with physical movement, coordination, and use of the motor skill areas. It is stated that learning characteristic of learners should involve widely characteristic of individual learners.

In a classroom-based leaning; comprehensive understanding of learners' characteristic as the way to cluster them into a suitable class is difficult to be conducted. Some constraints which are frequently thought as a causal of difficulty in clustering learners' characteristics are: a short time arranged to gather learners' data, much attributes involved in clustering, and many students are registered as classroom learners. In case that the data has been gathered; clustering process also does not simple to be conducted due to much data should be involved in a number of iteration process and it is conducted in a short time process. This condition shows that it is urgently required a solution to gather a representative data of individual learners in a short time and in a natural manner.

In this paper; we propose the utilization of serious game as an alternative solution for

gathering and clustering individual learners. It is proposed to support instructors in getting more suitable class of learners and easier in managing classroom learning. Reasoning given on the implementation of serious game as an alternative solution is as follows. First; the implementation of serious game is not only aimed at getting entertainment for player but it supports the existence of transfer of knowledge while playing the game (Van Eck, 2006; Kirkley et al. 2007; Wallner, 2013; Bergeron, 2006; El-Nasr et al. 2013; Cannon-Bowers, 2010). It automatically records a greater number of attributes of players' experiences while playing the game into a gameplay data. Together with the implementation one among clustering methods; it is thought that the proposed approach will support instructtors taking a shorter time to know well learners' characteristic and clustering them into a suitable class. In this paper we proposed K-Means method which is recognized as a good and widely used method for data clustering (Han, Kamber and Pei, 2005). Furthermore; iteration procedure of K-Means method is simple.

The rest of this paper discusses: literature review, research methodology, results and discussion, and concluding remark.

2. Literature Review

2.1 Bloom's Taxonomy-based Serious Game

We differentiate serious game from game for entertainment. A serious game is a game technology that supports the availability of transfer of knowledge while playing a game besides of its function for entertainment.

We also refer to a Bloom's taxonomy-based serious game (BoTySeGa) as a game technology that integrates cognitive domain of Bloom's taxonomy to control the difficulty of challenge which is arisen in each level of game (Sukajaya, 2015). The design on the integration of Bloom's cognitive domain into game system is to give a chance for learners to construct their knowledge from the simple to the complex. The design is subjected to synchronize knowledge construction while utilizing serious game follows procedure of knowledge construction that is implemented in classroom learning i.e. starting from simple and gradually increasing to more complexes (Fullerton et al., 2013). Logically; effort taken to construct knowledge through learning design increased gradually from a simple to complex is believed bring students away from frustration or boredom (Sampayo et al. 2013).

2.2 K-Means Clustering Method

K-Means clustering method is a branch of statistic and one of the oldest and widely used clustering algorithm (Han, Kamber and Pei, 2005). It was first proposed over 50 years as an interdisciplinary endeavour. Taxonomists, social scientists, psychologists, biologists, statisticians, mathematicians, engineers, computer scientists, medical researchers were disciplines who contributed in development of K-Means method (Jain, 2010). K-Means is a simple partitioned clustering algorithm that focuses at obtaining k best clusters which is represented by their centroids. Input of K-Means clustering algorithm was k (number of cluster) and a set of m n-dimensional data points. Number of cluster (k) must be less than or equal to n.

Follows are main steps of K-Means clustering algorithm (Jain & Dubes, 1988). First, select randomly k objects of m data points. These k objects were used as initial cluster centre. For m-k remaining data; assigned each data to which a cluster is most similar based on the distance between the object and the cluster mean. It will distribute data into k clusters. Update cluster means based on current objects in clusters. Reassign each data to a new cluster mean as was performed on the previous step. This process was repeated until criterion function converges. It attempts to minimize square-error function which is defined as: where E is the sum of the square error for all objects in the data set; p is the point in space representing a given object; and μ_i is the mean of cluster C_i. K-Means clustering algorithm is shown below.

```
K-Means Algorithm
   Algorithm for partitioning, each clus-
   ter's center is represented by mean
   value of objects in cluster.
Input:
   k: the number of clusters,
   D: a data set containing n objects.
Output: A set of k clusters.
Method:
   1. arbitrarily choose k objects from D
      as the initial cluster centres;
   2. repeat
   3. (re)assign each object to the clus-
      ter to which the object is the most
      similar, based on the mean value of
      the objects in the cluster;
   4. update the cluster means, i.e. cal-
      culate  the  mean  value  of  the
      objects for each cluster;
   5. until no change;
```

Procedure of K-Means clustering was illustrated at Figure 1 (a-c). Twenty one seed points were initially clustered into three clusters with three points as cluster centres.

Intermediate iteration moved some seeds across the clusters. Finally, clustering procedure met convergence state.
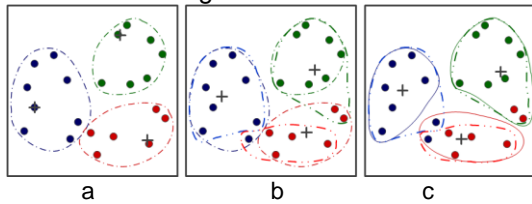

Figure 1. Illustration of K-Means Clustering

3. Research Methodology

In this section, we discuss step-by-step procedures which were conducted in our research. Those procedures are depicted at Figure 2. Detail of each procedure is described at the following sub-section.
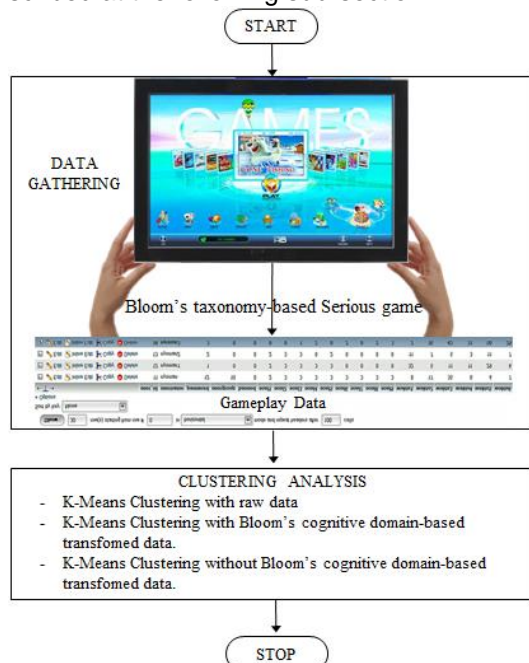

Figure 2 Research Procedure

3.1 Data Gathering

Eighty five students of fifth grade of SD N 3 Banjar Jawa and SD Laboratorium Universitas Pendidikan Ganesha were involved as research subjects. They are grouped into some groups with ten players belong member of each group. Data were gathered at the laboratory of Computer Centre and SD Laboratorium Universitas Pendidikan Ganesha through the operation of ten stand-alone personal computers.

Students/players played BoTySeGa during the time the gathering of gameplay data. Players are pleased to feel free as their pleasure to play the game until they completely finish with a winner or game over status. Players' behaviour during playing the game is automatically recorded as gameplay data. Three attributes representing players'

behaviour were gathered as gameplay data. Those attributes are: score, time completion, and the number of accessing to the Help. One attribute was gathered as paper-based data i.e. players' achievement on game's content knowledge. Besides, we also gathered similar data from teachers of students involved as research subjects. The data gathered from teachers were used as comparisons data to make sure that data obtained are really representing players' profile.

Data gathering was scheduled on three days starting from 08.00 a.m. until 02.00 p.m. in every day. We present two personals of researcher to observe players' behaviour beyond the behaviour which has been recorded automatically by system. Besides; they are also in charge of supervise players in case of trouble occurring while playing game.

Gameplay data was faced with pre-process prior to applying K-Means clustering method. Pre-process procedures are including: defin-ing a large number of time for players who did not submit solution of game challenge, transforming number of accessing the Help from time to frequency, and labelling stu-dents' achievement into one of three labels: Good, Fair, and Poor. Students' achieve-ment labelling is conducted as follows.

- Calculate mean value (μ) and standard deviation (σ) of 85 students' achievement.
- Create label category following the rule:

$\mu + 1.5\sigma \leq$ score : Good

$\mu - 1.5\sigma \leq$ score $< \mu + 1.5\sigma$: Fair

score $< \mu - 1.5\sigma$: Poor

- Label students' achievement by the way of finding in which label category is the value take place.

3.2 Clustering Analysis

Clustering analysis was conducted applying K-Means method. We cluster gameplay data into three classes and conducted in three different procedures. Those procedures are: (a) applying K-Means clustering on raw data, (b) applying K-Means clustering method on average data with consideration on Bloom's cognitive domain, and (c) applying K-Means clustering method on average data without consideration on Bloom's cognitive domain. Each of analysis procedure was conducted in ten times of repetition.

Below are procedures that are conducted along with clustering analysis:
- execute K-Means in each procedure involved in this research,
- find cluster pattern with the most frequently appear in each procedure, and
- determine one among three labels: Good, Fair, and Poor which is the best suitable labelled for cluster 1, 2, and 3 based on the percentage of occurrence on each cluster.

4. Result and Discussion

4.1 Before vs. After Pre-process Gameplay Data

Part of 85 players involved in this research is shown in Table 1. The First nine values that are recorded into column s_1, s_2 … s_9 represent players' score on nine problems arisen as BotySeGa's challenges. Players' score were recorded in ordinal data type 0, 1, 2, and 3. A value 0 represents that player submitted a wrong solution or he/she did not submit solution for the problem. Meanwhile a value 1, 2, and 3 represents that player submitted a right solution of successively low, middle, and high level of problem difficulty.

The next nine values t_1, t_2 … t_9 record completion time taken to solve BotySeGa's problems. Data were recorded using a unit time second (sec). In case those players do not submit solution of BotySeGa's problems; system will record default value that is 0.

The last values $A2H_1$, $A2H_2$ … $A2H_9$ record the second time unit at the time of players' request to access to the Help. Players are permitted to send request more than once. Supposing players do not access the Help; system records a value 0 for data the number of accessing to the Help.

Table 1: Gameplay Data before Pre-process

No	Score			Completion time				Number of Accessing to the Help			
	s_1	s_1	---	s_9	t_1	t_2	---	t_9	$A2H_1$	$A2H_2$	---	$A2H_9$
1	2	0		0	10	52		0	0	0		0
2	0	0		3	71	57		48	0	0		0
3	2	3		0	12	20		0	0	0		0
6	2	0		3	25	40		68	0	31		0
85	0	0		1	103	22		30	54	0		0

Technically; system records a completion time value 0 for gameplay data of player who did not submit solution of BoTySeGa's problem. It produces data inconsistency in which players who did not submit the solution was categorized taken a shortest time to solve BoTySeGa's challenge. As a correction we set a large value of time that is 600 that is never happened as empirical data of players' completion time. Furthermore, what we need in relation with the number of accessing to the Help in clustering analysis is the frequent of activities happened. It is not the time when accessing to the Help happened. So, we need to convert players' data into a number representing how often players accessed the Help before they make decision to submit the solution of game problem. Gameplay data after pre-process are shown in Table 2.

Table 2: Gameplay Data after Pre-process

No	Score			Completion time				Number of Accessing to the Help			
	s_1	s_1	---	s_9	t_1	t_2	---	t_9	$A2H_1$	$A2H_2$	---	$A2H_9$
1	2	0		0	10	52		600	0	0		0
2	0	0		3	71	57		48	0	0		0
3	2	3		0	12	20		600	0	0		0
6	2	0		3	25	40		68	0	1		0
85	0	0		1	103	22		30	1	0		0

4.2 K-Means Clustering Results

Fragment of K-Means clustering of 85 game-play data is shown at Table 3. We did ten times repetition on each procedure. Based on the Table, it is found that cluster pattern which is frequently occurred in each proce-dure is as shown at those columns with light brown colour.

Table 3: Fragment of K-Means clustering of 85 Game-play Data

Occurrence percentage of students' achievement label: Good, Fair, and Poor in each cluster of the three procedures are shown at figure 3-5.

4.3 Discussion

K-Means clustering with ten times repetition to cluster gameplay data into three clusters gives results as follows.

On the procedure 1 we apply K-Means clustering to the original data. Based on the

cluster pattern that is frequently happened; it is found that students' achievement label
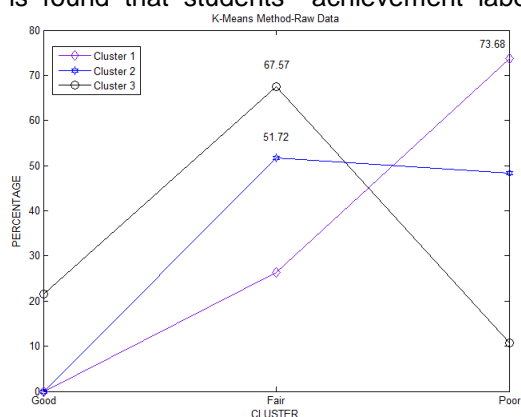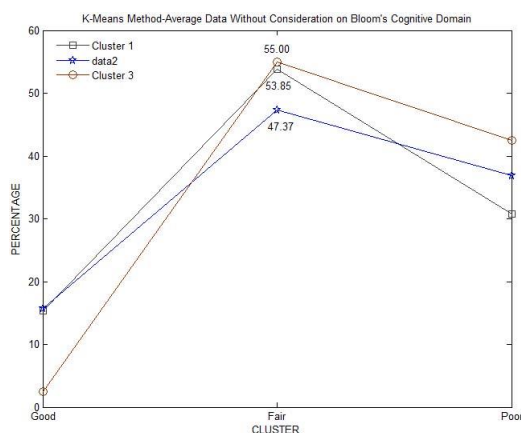

Figure 3 K-Means Method-Raw Data

Figure 4 K-Means Method-Average Data without Consideration on Bloom's Cognitive Domain
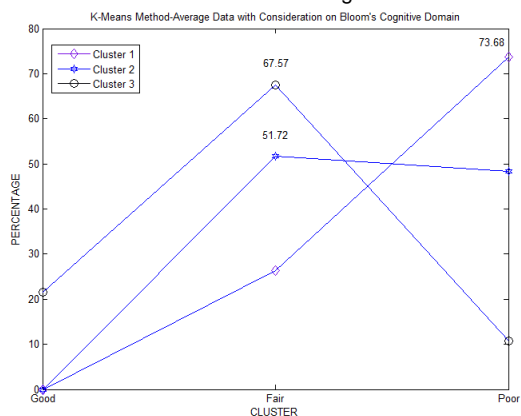

Figure 4 K-Means Method-Average Data with Consideration on Bloom's Cognitive Domain

Poor has the highest percentage at cluster 1 that is 73.68%. The second highest percentage is Fair at cluster 3 with the value is 67.57%. Supposing we label cluster 1 as Poor, cluster 3 as Fair; it is automatically a label for cluster 2 is Good with the value of percentage is 0%. This is a labeling that is not suitable with the real data. A Good students' achievement label recorded as label of 8 students. So we need to change the label for cluster 2 with Fair and cluster 3

with Good. This is thougt as a suitable labeling for the three clusters.

Different result was shown on the implementation of K-Means clustering with average data without consideration on Bloom's cognitive domain (procedure 2). Result shows that the highest percentage located at one among three labels that is Fair (Figure 3). It is difficult to compose reasoning which could be used to match a cluster to a suitable label.

Similar result to the implementation of K-Means clustering with original data was shown on the implementation of K-Means clustering with consideration on Bloom's cognitive domain (procedure 3). Refer to the previous reasoning; we label clusters 1, 2, and 3 with the similar label we did on procedure 1.

Based on results produced through the three procedures; it seem likes that clustering with consideration on Bloom's cognitive domain could be worthed as the way to simplify clustering procedure.

5. Conclusion

We have utilized Bloom's taxonomy-based serious game to gather students/players behaviour on playing game as gameplay data. Those which are involving: score, completion time, and number of accessing to the Help are automatically recorded by system during the game playing. Data of students' achievement were gathered based on paper. Clustering with three number of cluster was analyzed applying K-Means method. The method was implemented on three procedures: K-Means with original data, K-Means with average data with consideration on Bloom's cognitive domain, and K-Means with average data without consideration on Bloom's cognitive domain. Results show that there is similarities on cluster pattern given on the implementation of K-Means with original data and average data with consideration on Bloom's cognitive domain. It implies that Bloom's cognitive domain is a feasible domain involved in serious game-based learning assessment to improve the accuracy of students' clustering in learning.

6. Acknowledgement

according to research plan. We also thank you to the students of SDN 3 Banjar Jawa and SD Laboratorium Undiksha for the responses that are delivered regarding to BoTySeGa.

7. References

Bergeron B. (2006). Developing serious games (game development series).

Cannon-Bowers J. (2010). Serious Game Design and Development: Technologies for Training and Learning: Technologies for Training and Learning. IGI Global.

El-Nasr M. S. Drachen A. and Canossa A. (2013). Game analytics: Maximizing the value of player data. Springer Science & Business Media.

Fullerton J. T. Thompson J. B. & Johnson P. (2013). Competency-based education: The essential basis of pre-service education for the professional midwifery workforce. Midwifery vol. 29 no. 10, pp. 1129–1136.

Han J. Kamber M. and Pei J. (2005). Data Mining: Concepts and Techniques. Second Edition. Amsterdam; Boston: San Francisco, CA: Morgan Kaufmann.

Jain A. K. & Dubes R. C. (1988). Algorithms for Clustering Data. Englewood Cliffs, N.J: Prentice Hall College Div.

Jain. A. K. (2010, June). Data clustering: 50 years beyond K-Means. Pattern Recognit. Lett. vol. 31. no. 8. pp. 651–666.

Kirkley J. Kirkley S. & Heneghan J. (2007). Building bridges between serious game design and instructional design," Des. Use Simul. Comput. Games Educ., pp. 61–83.

Obikwelu C. & Read J. C. (2102). The Serious Game Constructivist Framework for Children's Learning. Procedia Comput. Sci. vol. 15. pp. 32–37.

Sampayo-Vargas S. Cope C. J. He Z. & Byrne G. J. (2013). The effectiveness of adaptive difficulty adjustments on students' motivation and learning in an educational computer game. Comput. Educ. vol. 69 pp. 452–462.

Sukajaya I.N; I.K.E Purnama; Mauridhi Hery Purnomo. (2015). Intelligent Classification of Learner's Cognitive Domain using Bayes Net, Naïve Bayes, and J48 utilizing Bloom's Taxonomy-based Serious Game. International Journal of Emerging Technologies in Learning. Vol. 10 no. 2. pp. 46-52.

Van Eck R. (2006). Digital game-based learning: It's not just the digital natives who are restless. Educ. Rev. vol. 41 no. 2 p. 16.

Wallner G., (2013). Play-Graph: A methodology and visualization approach for the analysis of gameplay data. in FDG pp. 253–260.

DESIGN TETUM DICTIONARY BASED ON ANDROID

Natalia Magdalena R. Mamulak

Informatics Engineering, Widya Mandira of Catholic University, Kupang[*]

mamulak.natalia@gmail.com

Abstract

East Nusa Tenggara (NTT), particularly the city of Kupang is one of the goals in continuing higher education. Based on the survey results of the last 3 years at several universities in the city were approximately 55% is derived from Democrato Republic of Timor Leste (East Timor). Colloquially people of East Timor are Tetum so in education in Indonesia is very difficult to interact with the local community, fellow students and the process of teaching and learning activities. Based on the results of interviews with 30 people students active from several universities, said that the main obstacle is the Indonesian leading to the longer travel time education. Therefore, it needs to be made android based dictionary Tetum making it easier for students to understand the Indonesian East Timor.

The method used in this study is the Unified Process. This research was conducted in several stages of system development begins with a literature study on the various references relating to research conducted. Further data collection by conducting interviews and surveys related constraints experienced by students from East Timor during the lectures and interaction with local people and fellow students. The next step is to analyze the system and make the system requirements specification to determine the needs of the developed system. Once the analysis stage is done, the next step is to design the system and create a description of software design in order to obtain a detailed picture of the system to be developed. The next stage is to make program information system (coding).

Results from this study will generate a Tetum-Indonesian dictionary based on Android that will help students RDTL communication with local communities and fellow students using Indonesian.

Key words: Tetum, Dictionary, RDTL, Indonesia

1. Introduction

East Nusa Tenggara (NTT), particularly the city of Kupang is one of the goals in continuing higher education. Based on the survey results of the last 3 years at several universities in Kupang about 55% comes from Democrato Republic of Timor Leste (East Timor). Colloquially people of East Timor are Tetum so in education in Indonesia is very difficult to interact with the local community, fellow students and the process of teaching and learning activities. Based on the results of interviews with 30 active students from several universities, said that the main obstacle is the Indonesian leading to complete his education time is longer.

This obstacle can be overcome with a tool that is a dictionary. However Tetum-Indonesian dictionary currently no.

The mobile phone has a lot of progress with the add function as a medium of entertainment, media as well as media information learned or more commonly known smartphone. The most widely used by the students is a smartphone based on Android. These mobile devices are generally owned by each student.

Therefore, with the Tetum-Indonesian dictionary based on Android will allow students to communicate and conduct a search word in the Indonesian language that is not understood.

Based on the description above background it can be formulated problem is How to design a wake-Indonesian dictionary Tetum-based android

The goal of the design of the android based dictionary which produces a Tetum-Indonesian dictionary based on Android to help students RDTL can communicate with local people and fellow students using Indonesian.

2. Theory

Studies of android based dictionary has been developed, among other research that has been conducted by the Design Build Applications Saputra Conversation Dictionary Arabic-Based Mobile Using J2ME Technology. This research resulted in a dynamic dictionary and in this application, users can perform additional new vocabulary manually by the user and the word can be edited and deleted.

Another study was also conducted by Wibowo (2013), the Dictionary Application Design Flora And Fauna Indonesia-Based Android. This

research resulted in flora and fauna Indonesian Dictionary application based on Android can be to translate the name of Indonesia to the scientific name or vice versa, picture and information about the flora and fauna.

Another study was also conducted by Fadlullah (2012), the Design Build Applications German-Indonesian dictionary-based Android. This research resulted in the German-Indonesian dictionary based on Android, but can only display 180 vocabulary translation in Indonesian and 184 vocabulary in German.

This study will complement the research that has been done by Fadlullah to display more Tetum-Indonesian translation

Dictionary is a kind of reference book that explains the meanings of words. Dictionary also serves to help someone recognize new words. In addition to explaining the intent word, the dictionary also may have guidelines designation, origin (etymology) something words and examples of use for something words. To clarify sometimes there is also illustrated in the dictionary.

First electronic dictionary produced by the Japanese in 1979 under the name of electric pocket translating machine. Physically, the shape is similar to an electronic dictionary that exist today. Because of the high price of memory chips, these products are expensive. However, the pace and level of efficiency can be proud of. Several Japanese electronics companies now manufacture these products with the Japanese version.

Android is an operating system for mobile phones based on Linux. Android provides an open platform for developers to create their own applications for use by a variety of mobile devices. Initially, Google Inc. bought Android Inc., newcomers who make software for mobile phones pirant. Then to develop Android, formed the Open Handset Alliance, a consortium of 34 companies hardware, software, and telecommunications devices, including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile, and Nvidia.

Tetum is a subsidiary branch of the Austronesian languages, with the main speakers in the territory. In East Timor, this language is an official language, besides Portuguese. Under the state constitution, Indonesian and English are working languages. For them, Tetum serves as the unifying language and tribal, like Indonesian.

Tetum growing in East Timor experienced a process of mixing with the Portuguese, so many loan words found in that language. The language is often called "Tetun Dili" because it originated from the city of Dili.

Tetum in Indonesia is quite different because it is only slightly affected by the Portuguese and even a lot of absorbing said Indonesia and the

Netherlands. Language is what is considered as a form of native Tetum, which is often called "Tetun Scorching". Spoken in Belu, East Nusa Tenggara, this language is only used as an everyday language, while for other matters primarily used official language of Indonesia.

3. Methods

The method used in this study is the Unified Process. This research was conducted in several stages, namely:
1. Development of the system began with the study of literature on the various references relating to research conducted.
2. The collection of data by conducting interviews and surveys related constraints experienced by students from Timor Leste during the lectures and interaction with local people and fellow students.
   Applications dictionary Tetum - Indonesia based on android aims to help those who want a quick and practical in finding kosa-words in Tetum and Indonesian. With this application, the user is presented with a choice in looking for a translation, both translations from Tetum into Indonesian or from Indonesian into Tetum more effective and efficient.
3. The design of the system and create a description of the design of the software to get a detailed picture of the system to be developed.
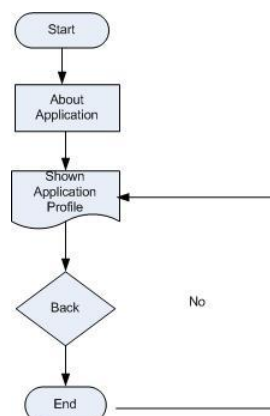
a) Flowchart

Figure 1. Flowchart Dictionary Tetum-Indonesia

b) Use Case Diagram
Use case diagrams describe interactions that can be done by an actor (user). This application use case diagram is shown in Figure 2.
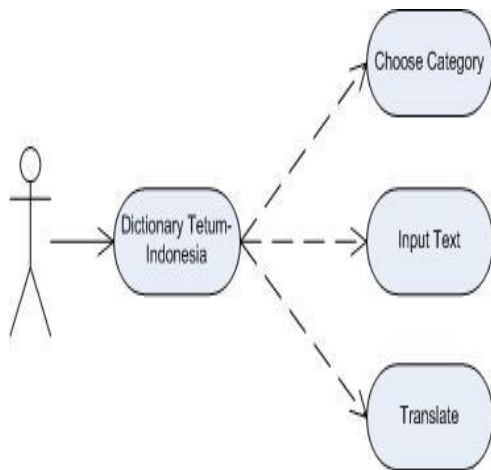
Figure 2. Use Case Dictionary Tetum-Indonesia

4. Result and Discusion

In applications Tetum-Indonesian dictionary based on Android is composed of several halamam interface (interface) that is splashscreen, Main Menu, Menu translate Tetum-Indonesian, Indonesian-Tetum translate Menu and Menu translate text.Display of the applications that have been built, among others:

a. Home

Figure 4. Home

b. Menu Utama

Figure 5. Menu Utama

c. Translate Tetum-Indonesia

Figure 6. Translate Tetum-Indonesia

d. Translate Indonesia-Tetum

Figure 7. Translate Indonesia-Tetum

e. Translate text

Figure 8. Translate text

5. Conclusion

Based on the results of the discussion and implementation have been done, it can be concluded that this android based dictionary Tetum is helping students RDTL can communicate with local people and fellow students using the Indonesian language so that the education they are easy to understand.

6. References

Departemen Pendidikan dan Kebudayaan. (2002). *Kamus Besar Bahasa Indonesia*, *Edisi Ketiga*. Jakarta: Balai Pustaka.

Fadlullah, M. (2012). Rancang Bangun Aplikasi Kamus Jerman –Indonesia Berbasis Android, Skripsi, *Unpublished*, Fakultas

Teknologi Informasi, Universitas STIKUBANK (unisbank), Semarang

Jogiyanto. (2005). Metodologi Sistem Informasi : Pedoman dan Contoh Melakukan Penelitian di Bidang Sistem Teknologi Informasi, Andi : Jogjakarta

Pressman, R. (2002). Rekayasa Perangkat Lunak, Andi Offset: Yogyakarta

Rickyanto, I. (2003). Dasar Pemrograman Berorientasi Objek dengan Java 2: JDK 1.4, Andi Offset: Yogyakarta

Safaat, N. (2011). Pemrograman Aplikasi Mobile Smartphone dan Tablet PC Berbasis Android, Informatika:Bandung

Saputra, R. C., Rancang Bangun Aplikasi Kamus Percakapan Bahasa Arab Berbasis Mobile Menggunakan Teknologi J2ME, Skripsi, *Unpublished*, Jurusan Sistem Informasi, Sekolah Tinggi Manajemen Informatika & Komputer Surabaya

Sholiq. (2010). *Analisis dan Perancangan Berorientasi Obyek*. CV. Muara Indah. Bandung

Wibowo, T.A. (2013). Perancangan Aplikasi Kamus Flora Dan Fauna Indonesia Berbasis Android, Skripsi, *Unpublished,* Jurusan Teknik Informatika, Sekolah Tinggi Manajemen Informatika Dan Komputer Amikom, Yogyakarta

https://id.wikipedia.org/wiki/Bahasa_Tetun diakses tanggal 20 Oktober 2015 jam 10.00 Wita

.

Improvement Cycle of Green IT Implementation Processes to Support Sustainability Objectives

I Made Ardwi Pradnyana [1], Kridanto Surendro [2]

Informatics Education Department, Ganesha University of Education, Singaraja [1]
School of Electrical Engineering and Informatics, Bandung Institute of Technology, Bandung, Indonesia [2]

pradnyana.ardwi@gmail.com

Abstract

The increasing use of IT raises both positive and negative impacts to the environment. Therefore, organization must be able to understand the concept of green IT and then applying it. This paper is a theoretical study that proposes an improvement cycle of green IT implementation processes. Improvement cycle can assist organization in implementing green IT processes to be more structured and repeatable that enables processes quality improvement so that it can support sustainability objectives.

Key words: theoretical study, green IT, improvement cycle, sustainability objectives

1. Introduction

Information technology (IT) is used by individual and organization around the world. In addition, IT also plays a key role for economic growth within the society. Development and increasing use of IT has resulted in either positive and negative impacts significantly on the environment. Negative impact of IT on the environment will increase in the future, but its positive impact has some potential to enable environmental sustainability in all areas of human activity.

World Wildlife Fund (WWF) has announced that ICT would contribute on at minimum 7% to at maximum 25 % of CO_2 emission by 2030 (Kim, Kim, Kim and Jung, 2009). SMART 2020 also has reported that about 15 % of CO_2 could be reduced by using ICT on other sectors (Kim, Kim, Kim and Jung, 2009). This indicates that the ICT is a part of the problem as well as solutions for environmental sustainability (Murugesan, 2010).

Green IT is a term that describes the relationship between IT and environmental sustainability. Environmental sustainability or eco-sustainability has been applied in various sectors and industries in order to minimize the environmental impact of the use of IT. Whilst organizations have embraced the concept of green IT, they fail to translate it into action.

To assist organizations on the implement of green IT, this paper propose an improvement cycle of green IT implementation processes. The cycle is adopting quality management approach to improve the process in achieving sustainability objectives.

2. Literature Review

2.1 Process

Chrissis, Konrad, and Shrum (2003) mentioned that process can enables organizations to customize the way of doing business, utilizing the resources and examine business trends, address scalability and provide a way to incorporate knowledge about how to do things better. Focus on process means providing the infrastructure needed to deal with dynamic world and to maximize human as well as technology to become more competitive.

Software Engineering Institute (SEI) suggests that there are three dimensions that can be used as a focus to improve the work done within the organization (Chrissis, Konrad, and Shrum, 2003). The dimensions are people with expertise, training and motivation, procedures and methods that define the connectivity between tasks as well as tools and equipment. These three dimensions are run together in a process (Chrissis, Konrad, and Shrum, 2003).

Process is a set of interrelated activities necessary to transform inputs into outputs. Within this paper, green IT implementation process requires collaboration that includes people, procedures and methods as well as tools and equipment to be able to implement green IT initiatives effectively and efficiently within the organization.

2.2 PDCA Cycle

Qing-ling, Shu-min, Lian-liang and Jun-mo (2008) mentioned that PDCA cycle is the basic procedure of Total Quality

Management (TQM). PDCA cycle has been widely applied in the quality control and become an indispensable approach to improving quality.

PDCA provides a method to improve every process systematically. PDCA cycle consists of four stages which can be executed repeatedly. Practitioners used PDCA as a guide to analyze the process. The objective is to identify errors or omissions which cause the output of the process is not as expected (Marquis, 2009).

The improvement cycle of green IT implementation processes in this paper was prepared using PDCA cycle approach. The reason is because PDCA cycle provides an excellent approach to improve the quality, starting from planning, implementation plans, checking of the implementation and processing the results of the implementation. In addition, the process also had executed repeatedly so that the quality can be improved continuously.

2.3 Sustainability

Hart (1997) mentioned that sustainability is often refers to meeting the needs of present generations without compromising the ability of future generations to meet their needs (Molla, 2009). While Elkington (1997) identifies sustainability is about the balance or harmony between economic, social and environmental sustainability known as "triple bottom line" or "Triple-P (People, Planet, and Profit)" concept (Silvius, 2012).

The potential of technology to create economic and social sustainability has focused attention on the relationship between technology and sustainability thereby creating concept so-called the green IT. Howard and Lubbe (2011) mentioned that the green represents the environmental pillar of sustainability. Principles and practice of green embodies the principles and practices on every aspect of life in order to achieve environmental sustainability.

Green IT principles and practices are applied within organizations to enables them achieve environmental sustainability which then supports sustainability objectives. Sustainability within this paper is defined as meeting the needs of current generations without compromising the ability of future generations to meet their needs by balancing environmental, economic, and social sustainability.

2.4 Green IT

Green IT contains green principles and practices that applied on IT to achieve environmental sustainability. Mann, Grant,

and Singh Mann (2009) mentioned that the concept of Green IT essentially entails the application of environmentally friendly IT activities to further business-oriented organizational goals. Therefore, the vast import of Green IT derives from its potential to create a functional bridge between corporate motivations and environmental ones, to create mutually satisfactory benefits.

Green IT means many things to different people. Various literatures called green IT with a different term and definition. Elliot (2007) mentioned that green IT or environmental sustainability of ICT (ESICT) is design, production, operation and disposal of ICT and ICT-enabled products and services in a manner that is not harmful and may be positively beneficial to the environment during the course of its whole-of-life. While Murugesan (2010) declared green IT or green computing refers to the study and practice of designing, manufacturing, and using computer hardware, software, and communication systems efficiently and effectively with no or minimal impact on the environment. Green IT is also about using IT to support, assist, and leverage other environmental initiatives and to help in creating green awareness.

Green IT within this paper is defined as IT operations process effectively and efficiently to minimize negative impacts while creating initiatives to increase positive impacts on environmental, social, and economic sustainability.

O'Flynn (2009) proposed that every sustainability initiative must be developed with a solid link to business benefits. Potential benefits of implementing a green IT strategy may include i.e. reduced demand for energy, more efficient use of infrastructure, reduced carbon footprint, optimized supply chain and cost reductions (O'Flynn, 2009). Potential benefits can be grouped into two main benefits i.e. the environmental benefits and cost reduction (Brooks, Wang and Sarker, 2010). The environmental benefits associated with the reduction of carbon footprint generated in IT operations. Cost reduction benefits associated with the level of power consumption optimization, which in turn can lower the cost of IT operations.

3. Improvement Cycle Of Green It Implementation Processes

The Improvement cycle of green IT implementation processes is a cycle to

improve the quality of the processes. This cycle enables organizations to improve the efficiency and effectiveness of the processes. The Improvement cycle consists of a set of processes necessary for implementing green IT in the organization with reference to the PDCA cycle.

Processes in the cycle analyze from 5 (five) green IT implementation frameworks that classified into post adoption green IT research categories. Each of frameworks discussed PDCA cycle with varying scope is like shown in Table I. Differences in terms of each framework such as sustainable ICT, environmental sustainability, Green IS and green ICT refers to the term green IT within this paper.

Table 1: Scope Discussion Mapping of Green IT Frameworks

Topics	References	Scopes			
		P	D	C	A
Framework Green ICT	Connection Research (2010)	-	√	-	-
Green IT: An Implementation Framework	Mann, Grant and Singh Mann (2009)	√	√	√	√
A Capability Maturity Framework for Sustainable Information and Communication Technology	Donnellan, Sheridan and Curry (2011)	√	√	√	-
Towards A Practice-Oriented Green IS Framework	Butler (2011)	-	√	-	-
Approach to Green IT Business at Fujitsu Australia Limited	O'Flynn (2009)	√	√	√	-

Butler (2011), Connection Research (2010) and Mann, Grant and Singh Mann (2009) discussed a number of green IT initiatives that can be implemented within organizational environment.

According to the Australian Information Industry Association (AIIA) (2009), each initiative may not be appropriate for every organization. Therefore, careful considerations should be made before adopting these initiatives. These considerations relate to the state or kind of organization mainly related with the advantages and losses that will be acquired.

Fujitsu identifies Green IT initiatives in two categories (www.fujitsu.com):

1) Quick win: initiatives that can be implemented within a very short timeframe and at minimal cost.

2) Transformation: initiatives that typically require greater investment and which may cut across lines of business and therefore involve a broader range of stakeholders.

The composition of processes improvement cycle can be seen in Table 2. Composition indicates references and activities within processes.

Table 2. Composition of Improvement Cycle for Green IT Implementation Processes

Composition		Processes
Activities	References	
Green IT initiatives Connection	• www.fujitsu.com • Mann, Grant and Singh Mann (2009) • Research (2010) • Butler (2011)	Strategic Planning (8 activities)
Eight-point action plan	• http://ivi.nuim.ie/it-cmf/sustainable-ict	
Strategy and planning CBB's Category	• Donnellan, Sheridan and Curry (2011)	
Strategic alignment phase	• O'Flynn (2009)	
Business transformation and change phase	• O'Flynn (2009)	Implementation (6 activities)
People and culture and Process management CBB's Category	• Donnellan, Sheridan and Curry (2011)	
Realisation of the benefits phase	• O'Flynn (2009)	Monitor and Evaluate (6 activities)
Governance and Process management CBB's Category	• Donnellan dkk. (2011)	
Governance CBB's Category	• http://ivi.nuim.ie/it-cmf/sustainable-ict	

Although using PDCA cycle approach, improvement cycle of green IT implementation processes does not include the act stage. This is because the act stage may or may not be necessary at a particular point in time. In other words, action of incorporating the change if important did occur will result, or trying another improvement theory if the initial change did not work out (Fryman, 2002).

Improvement cycle of green IT implementation processes in this paper consists of 3 (three) processes. The cycle begins with the strategic planning process,

implementation processes and monitoring and evaluation processes as shown in Figure 2.

Figure 2. Improvement Cycle of Green IT Implementation Processes

Improvement cycle of green IT implementation processes is a continuous process cycle. The quality of green IT implementation process will be improved by completion each cycle of the process. Through a cycle of green IT implementation process, the problems solved and its quality is continuously improved so that the process more effective and efficient as well as close to the desired goal.

Activities within improvement cycle composed of green IT framework. These activities are interrelated between each process. Here is the explanation of the process description with objectives, activities and outputs.

3.1 Strategic Planning

Strategic planning process is the first process in the green IT implementation cycle. The purpose of this process is to define and execute green IT strategic plans by integrating and aligning business sustainability objectives. Output of the strategic planning process is a green IT strategy plan report which will be input to the next processes. Activities within strategic planning process:

1) Confirm business priorities and drivers for sustainability.
2) Agree accountabilities.
3) Assess current state and desired future state.
4) Ensure integration with the organization's overall sustainability strategy and programs.
5) Agree objectives, priorities, timeframes and measures.
6) Identify quick wins and transformations.
7) Develop and implement awareness, education and communication plans.

8) Set review points to monitor progress and make course corrections.

3.2 Implementation

Implementation process consists of the implementation activities of green IT initiatives that have been planned in the strategic planning process. The purpose of this process is to execute the change program and embed the principles of sustainability to improve IT and sustainability objectives across the extended enterprise. The output of implementation process is green IT implementation report. Activities within implementation process:

1) Operate IT systems to deliver sustainability objectives.
2) Provides IT systems that enable improved sustainability outcomes across the extended enterprise.
3) Defining, structuring, and executing the change programs include the selection and prioritization of strategic initiatives through the development of a program roadmap.
4) Embed sustainability principles across IT and the extended enterprise.
5) Define, communicate, and use common sustainability language and vocabulary across IT and other business units, including the extended enterprise, to leverage a common understanding.
6) Proclaiming the success of sustainability and contributes to industry best practice.

3.3 Monitor and Evaluation

Activities within implementation process needs to be reported, monitored and evaluated to improve the quality of processes and checks for compliance against a predefined plan. Monitor and evaluation process aims to report and monitor compliance and realization of benefits, as well as set policies to improve IT and sustainability objectives across the extended enterprise. Outputs of monitor and evaluation process are IT objective sustainability report, program benefits of green IT initiatives report, IT and regulatory compliance and business sustainability regulations report as well as green IT policies. Monitor and evaluation process consists of several activities:

1) Report and demonstrate progress against IT specific and IT enabled sustainability objectives, within the IT business and across the extended enterprise.

2) Monitor and report realization of benefits generated during process of implementing green IT initiatives.

3) Enable and demonstrate compliance with IT.

4) Enable and demonstrate compliance with business sustainability legislation and regulation.

5) Clarifies accountability for sustainability roles and decision-making across IT and the enterprise.

6) Establishes common and consistence policies to support an IT sustainability strategy to meet current and future sustainability objectives, as part of periodic review.

4. Conclusion

This paper is a theoretical study that proposed an improvement cycle of green IT implementation processes. Processes improvement cycle consists of 3 (three) processes that is executed repeatedly. Each of processes is equipped with objectives processes, activities and outputs processes which mutually supporting.

Improvement cycle of green IT implementation processes enables organizations to implement green IT processes which can foster initiatives to mitigate the negative impacts of the use of IT and to optimize the use of IT to create a more environmentally friendly impact. In addition, the cycle also provides guidance for organizations to improve the quality of the process of implementing green IT with the quality management approach. The better quality of the green IT implementation processes, the more effective and efficient in achieving sustainability objectives.

This paper offer further research. One is the assessment of green IT processes capability implementation within the organization. The objective is to know the capabilities processes on achieving current and future processes objectives.

5. References

Brooks, S., Wang, X. and Sarker, S. (2010). Unpacking Green IT: A Review of The Existing Literature. Americas Conference on Information Systems (AMCIS) 2010 Proceedings, Paper 398.

Butler, T. (2011). Towards A Practice-Oriented Green IS Framework. European Conference on Information Systems (ECIS) 2011 Proceedings, Paper 102.

Chrissis, M. B., Konrad, M. and Shrum, S. (2003). CMMI: Guidelines for Process Integration and Product Improvement, Addison Wesley.

Connection Research. (2010). A Green ICT Framework Understanding and Measuring Green ICT. Australia.

Donnellan, B., Sheridan, C. and Curry, E. (2011). A Capability Maturity Framework for Sustainable Information and Communication Technology. Institute of Electrical and Electronics Engineers (IEEE) IT Professional.

Elliot, S. (2007). "Environmentally Sustainable ICT: A Critical Topic for IS Research. Pacific Asia Conference on Information Systems (PACIS) 2007 Proceedings, Paper 114.

Fryman, M. A. (2002). Quality and Process Improvement, Delmar, United States of America.

Howard, G. and Lubbe, S. (2011). Theoretical Discussion: Green IT and its Development in South Africa. Proceedings of the 5th European Conference on Information Management and Evaluation.

Kim, E., Kim, Y., Kim, H. J., and Jung, H. W. (2009). Standardization Activities on ICTs & Climate Change. Telecommunications Energy Conference, 2009. INTELEC 2009. 31st International.

Marquis, H. (2009). How To Roll the Deming Wheel. Vol. 5.28, 2009, downloaded from http://itsmsolutions.com on February 20, 2013.

Mann, H., Grant, G. and Singh Mann, I. J. (2009). Green IT: An Implementation Framework. Americas Conference on Information Systems (AMCIS) 2009 Proceedings, Paper 121.

Molla, A. (2009). Organizational Motivations for Green IT: Exploring Green IT Matrix and Motivation Models. Pacific Asia Conference on Information Systems (PACIS) 2009 Proceedings, Paper 13.

Murugesan, S. (2010). Making IT Green. Institute of Electrical and Electronics Engineers (IEEE) IT Professional, Volume: 12, Issue: 2, Page 4–5.

O'Flynn, A. (2009). Approach to Green IT Business at Fujitsu Australia Limited. FUJITSU Sci. Tech. J., Vol. 45, No. 1.

Qing-ling, D., Shu-min, C., Lian-liang, B. and Jun-mo, C.(2008). Application of PDCA Cycle in the Performance Management System. 4th International Conference Wireless Communications, Networking and Mobile Computing.

Silvius, A.J.G. (2012). The role of Organizational Change in Green IS: Integrating

Sustainability in Projects. International Conference on Information Resources Management (CONF-IRM) 2012 Proceedings, Paper 35.

Australian Information Industry Association (AIIA) (2009), Greening Your Business Through Technology, 2009, downloaded from http://www.aiia.com.au on March 11, 2013.

http://ivi.nuim.ie/it-cmf/sustainable-ict accessed on March 11, 2013.

http://www.fujitsu.com/uk/Images/green-it-assessment.pdf accessed on April 5, 2013.

Development of Fuzzy Logic Application to Determine Credit Limit Based on Total Deposit, Income and Collateral Inputs (Case Study: XYZ Credit Union)

Yulianti Paula Bria [1*], Yusvina De P. Lengga [2]

Department of Informatics Engineering, Widya Mandira Catholic University, Kupang City
bria.yulianti.p@gmail.com

Abstract

XYZ Credit Union is a union which has 2,259 members in which there are 386 members who could not repay the loan on time. It is caused by credit analysis factors that were not accurate and also caused by financial reports were careless because it was still done manually. Therefore, it was necessary to develop the application of fuzzy logic to determine a credit limit based on total deposit, income and collateral inputs that were expected to help resolve problems in the process of calculation in determining the credit limit quickly and accurately. The fuzzy inference method used was Mamdani method, while the programming language used was C # (C Sharp) with MySQL as database. Fuzzy logic application produces an application that can be used to help employees, especially in the credit department at XYZ Credit Union in determining the credit limit based on total deposit, income and collateral that can minimize losses on union.

Key words: fuzzy logic, fuzzy inference, Mamdani, C Sharp, Credit Union

1. Introduction

XYZ Credit Union is one of the financial institutions and business entities that raise funds from members in the form of deposit (savings) and subsequently distribute to members in the form of credit. The purpose of this union is to improve the welfare of members and their families and improve the welfare of the surrounding community through serve saving and credit easily and efficiently supported by the participation of its members.

XYZ Credit Union often have the problem that the amount of loans granted by union to members can not pay on time both basic loan and interest money are set so that it becomes problematic. At January 2015, XYZ Credit Union has 2,259 members where there are 386 members who can not pay on time. It is caused by credit analysis that are not accurate and financial reports that careless, so that the union suffered losses.

To overcome these problems, need to be made an application to handle the process of calculation in determining the credit limit by using fuzzy logic, so it can be minimize bad credit that harm to the union. Previous research conducted by Sry and Puput (2013), has successfully developed a decision support system to determine of credit limit and provide decision alternatives

in terms of whether approved or not the loan application by the credit applicant. This approach is done to solve the problem in this research.

Based on the above problems, it will be made development of fuzzy logic application to determine credit limit based on total deposit (savings), income and collateral inputs which is expected to help resolve problems in the process of calculation in determining the credit limit quickly and accurately so there is no longer a problem credits.

2. Literature Review

Fuzzy logic is a logic dealing with the concept of truth in part, in which classical logic to claim that everything can be expressed in terms of binary (0 or 1). Fuzzy logic is considered able to map an input into an output without ignoring the existing factors. The advantages of fuzzy logic are conceptually simple and easy to understand, can tolerate data imprecises, and fuzzy logic is based on natural language (Mulyanto et.al., 2010). Fuzzy logic is one of the important aspects that influence decision making (James and Chad, 2006).

Mardison (2012) conducted research about "Decision Suppot System In Credit Disbursement Customers of the Bank by

Using Fuzzy Logic And Java Programming Language" that can deliver the results in credit disbursement customers quickly, efficiently and effectively.

Arifah (2013) also conducted research about Mamdani Fuzzy method application in determining total production that can estimate the number of batik tulis production in the Melati Mekar Mandiri company with truth reaches 91.75%.

Bria and Saidjuna (2013) also conducted research about fuzzy logic that can help cattle farmers to determine weight gain of cattle based on water and food consumption inputs.

Departing from previous studies, this research develop fuzzy logic application to determine credit limit based on three inputs namely the amount of savings (total deposit), income and collateral with output in the form of credit limit, where the fuzzy inference method used is Mamdani and defuzzification method is centroid. This method can provide output or output that is more accurate and more in accordance with the pattern of problems to be solved and to be accepted by many people.

3. Methods
3.1 Data Retrieval Phase
Data retrieval is adapted to the needs of the application that is as follows:
a. Observation
   Observation is conducted by direct intervention on the XYZ Credit Union, especially in the credit department to examine and inquire about problems in determining the credit limit.
b. Literature study
   At this stage we collected and looked for data relating to credit or loan and references to fuzzy logic through books, journals and internet.
c. Interview
   Interviews is conducted with relevant parties, ie employees of XYZ Credit Union, especially in the credit department in order to obtain information related to this research, especially the creation of the rule base.

3.2 Application Analysis Phase
The application is made for inputting data such as the amount of savings (total deposit), income and collateral and provide output in the form of large loans (credit limit), where the application has only one user role

namely an employee of, credit department of XYZ Credit Union.

Application analysis phase generated use case diagram. Use case diagram is a logical model of data or processes are created to describe people who are interested and associated with the application that can be seen in figure 1.
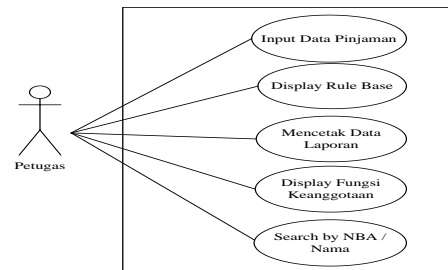

Figure 1. *Use Case* Diagram

3.3 Application Design Phase
In the design stage of the application, there are 3 main fuzzification process, the process of reasoning (evaluation rule in the rule base) and defuzzification. In the process will be determined fuzzification membership function (MF) of 3 input variables (amount of savings, income and collateral) and 1 output variable (big loan). Next will be the process of reasoning or fuzzy matching between the values of the rule base fuzzification process is used as a knowledge base. Rule base contains rules that form if ... then (IF ... THEN). Output produced in this section is fuzzy output. Decision-making technique used is the max-min. At max-min method, decisions are based on the rules of operation according to Mamdani. Furthermore fuzzy output is converted into numbers firmly in the process of using centroid defuzzification as the final result of the application that is used to determine the credit limit.

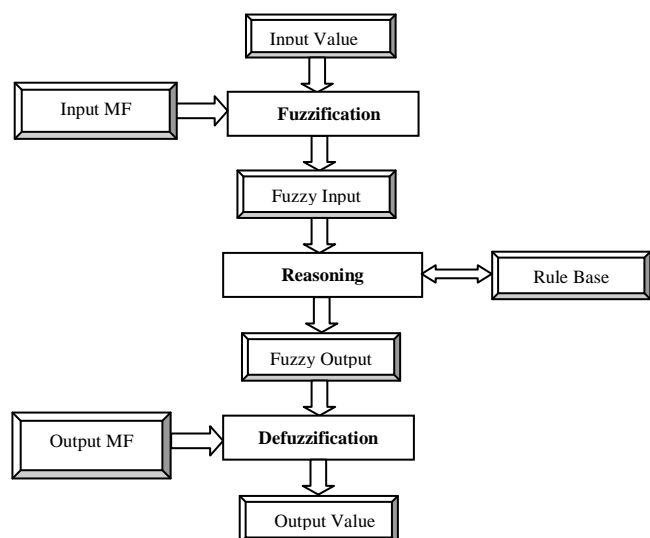A block diagram of fuzzy logic can be seen in figure 2.

Figure 2. Block diagram of fuzzy logic (Wahyudi, 2005).

3.3.1 Fuzzification

Fuzzification is the process of changing the input system that has a firm value become linguistic variables using membership functions which is stored in the knowledge base. Membership function is a curve that shows the mapping of points of input data into membership values with interval of 0 to 1.

The following explanation will show the membership functions of linguistic variables from the input variables such as total deposit, income and collateral as inputs and credit limit as an output.

1. Membership Function of total deposit
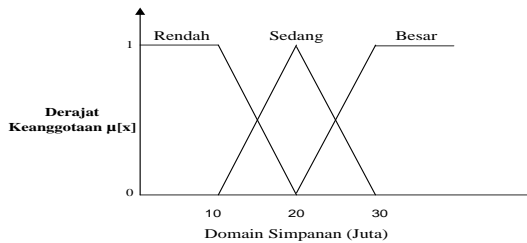
Figure 3. Membership function of total deposit (domain simpanan)

Range	: 0 – 40 (Rp)
Value of small linguistic variable (rendah)	: 0, 0, 10, 20
Value of middle linguistic variable (sedang)	: 10, 20, 30
Value of large linguistic variable (besar)	: 20, 30, 40, 40

2. Membership Function of income.
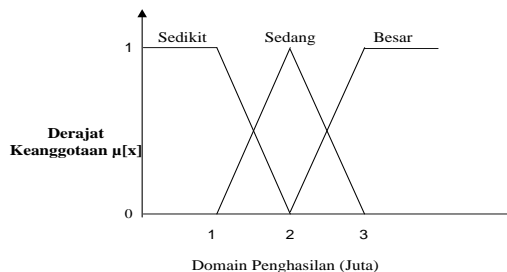
Figure 4. Membership function of income (domain penghasilan)

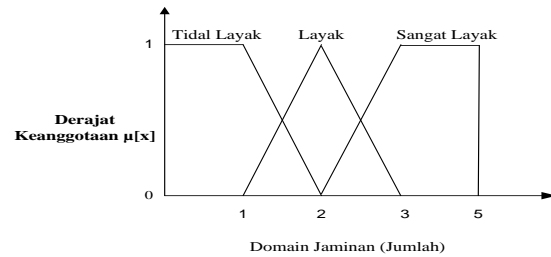| Range	: 0 – 4 (Rp)
Value of small linguistic variable (Sedikit)	: 0, 0, 1, 2
Value of middle linguistic variable (sedang)	: 1, 2, 3
Value of large linguistic variable (besar)	: 2, 3, 4, 4

3. Membership Function of collateral

Figure 5. Membership function of collateral (domain jaminan)

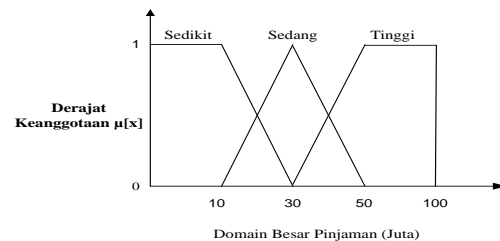| Range	: 0 – 5
Value of not proper linguistic variable (tidak layak)	: 0, 0, 1, 2
Value of proper linguistic variable (layak)	: 1, 2, 3
Value of very proper linguistic variable (sangat layak)	: 2, 3, 5 , 5

4. Membership Function of credit limit

Figure 6. Membership function of credit limit (domain besar pinjaman)

Range	: 0 – 100 (Rp)
Value of small linguistic variable (sedikit)	: 0, 0, 10, 30
Value of middle linguistic variable (sedang)	: 10, 30, 50
Value of large linguistic variable (tinggi)	: 30, 50, 100, 100

3.3.2 Reasoning Process

Reasoning is the process of using fuzzy rules If-Then to transform fuzzy inputs into

fuzzy output. While the rule / knowledge base is a collection of knowledge or rules that necessary to achieve the objectives. Mechanism of fuzzy reasoning: match the fuzzification result with the rules which is exist in the knowledge base and display fuzzy operations to perform inference.

There are knowledge base of the application:

1. If deposit (simpanan) is small (rendah) and income (penghasilan) is small (sedikit) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
2. If deposit (simpanan) is small (rendah) and income (penghasilan) is small (sedikit) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
3. If deposit (simpanan) is small (rendah) and income (penghasilan) is small (sedikit) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is middle (sedang).
4. If deposit (simpanan) is small (rendah) and income (penghasilan) is middle (sedang) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
5. If deposit (simpanan) is small (rendah) and income (penghasilan) is middle (sedang) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
6. If deposit (simpanan) is small (rendah) and income (penghasilan) is middle (sedang) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is middle (sedang).
7. If deposit (simpanan) is small (rendah) and income (penghasilan) is large (banyak) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
8. If deposit (simpanan) is small (rendah) and income (penghasilan) is large (banyak) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
9. If deposit (simpanan) is small (rendah) and income (penghasilan) is large (banyak) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).
10. If deposit (simpanan) is middle (sedang) and income (penghasilan) is small (sedikit) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
11. If deposit (simpanan) is middle (sedang) and income (penghasilan) is small (sedikit) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
12. If deposit (simpanan) is middle (sedang) and income (penghasilan) is small (sedikit) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is middle (sedang).
13. If deposit (simpanan) is middle (sedang) and income (penghasilan) is middle (sedang) and (collateral) jaminan is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
14. If deposit (simpanan) is middle (sedang) and income (penghasilan) is middle (sedang) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
15. If deposit (simpanan) is middle (sedang) and income (penghasilan) is middle (sedang) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).
16. If deposit (simpanan) is middle (sedang) and income (penghasilan) is large (banyak) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
17. If deposit (simpanan) is middle (sedang) and income (penghasilan) is large (banyak) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is middle (sedang).
18. If deposit (simpanan) is middle (sedang) and income (penghasilan) is large (banyak) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).
19. If deposit (simpanan) is large (besar) and income (penghasilan) is small (sedikit) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).
20. If deposit (simpanan) is large (besar) and income (penghasilan) is small (sedikit) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is large (tinggi).
21. If deposit (simpanan) is large (besar) and income (penghasilan) is small (sedikit) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).
22. If deposit (simpanan) is large (besar) and income (penghasilan) is middle (sedang) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).

23. If deposit (simpanan) is large (besar) and income (penghasilan) is middle (sedang) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is large (tinggi).

24. If deposit (simpanan) is large (besar) and income (penghasilan) is middle (sedang) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).

25. If deposit (simpanan) is large (besar) and income (penghasilan) is large (banyak) and collateral (jaminan) is not proper (tidak layak) Then credit limit (besar pinjaman) is small (sedikit).

26. If deposit (simpanan) is large (besar) and income (penghasilan) is large (banyak) and collateral (jaminan) is proper (layak) Then credit limit (besar pinjaman) is large (tinggi).

27. If deposit (simpanan) is large (besar) and income (penghasilan) is large (banyak) and collateral (jaminan) is very proper (sangat layak) Then credit limit (besar pinjaman) is large (tinggi).

3.3.3 Defuzzification

The output of the rule evaluation is fuzzy value and will be changed in the form of firm value in the process of defuzzification with the help of output membership function and centroid defuzzification method.

Defuzzification is the process of changing the amount of fuzzy presented in the form of the fuzzy output associations with the membership function to regain the firm form. This is necessary because it is known as the true scope of the regulatory process is firm value. Defuzzification method used is the centroid method. Centroid method is also known as a method of COA (Center of Area) or method Center of Gravity. In this method, the output value of firm obtained based on the center of gravity of the yield curve decision-making process that can be illustrated in the figure below.
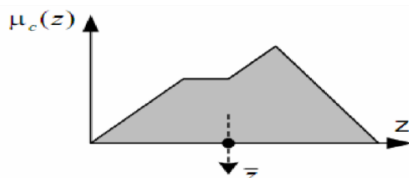

Figure 7. Centroid method

The equation of the centroid method:

$$z = \frac{\sum_{z=1}^{n} z_j \mu(z_j)}{\sum_{j=1}^{n} \mu(z_j)} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Description:
  $\mu(z)$ = aggregation output of membership function
  z = fuzzy output value

4. Implementation
This stage implementing thn phase using C # Sharp programming language.

4. Discussion of Results
4.1 Process Page Views
Process page views consist of 3 part. There are fuzzification, reasoning and defuzzification part. Process page views for the application of fuzzy logic can be seen in figure 8.
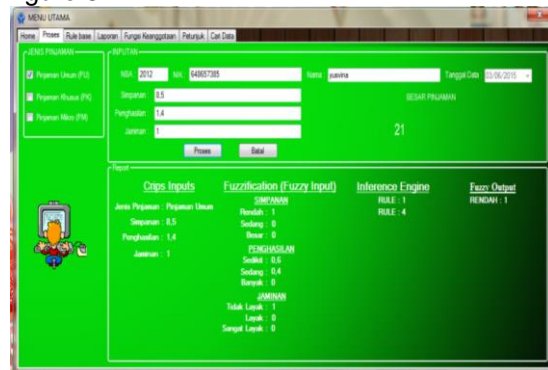

Figure 8. Process page views

Process page view is used for inputting data such as: type of loan, nba, nik, name, savings, income and collateral that will be processed and produce output results in the amount of loans form as the credit limit.

4.2 Rule Base Page Views
Rule base page views for the application of fuzzy logic can be seen in figure 9.
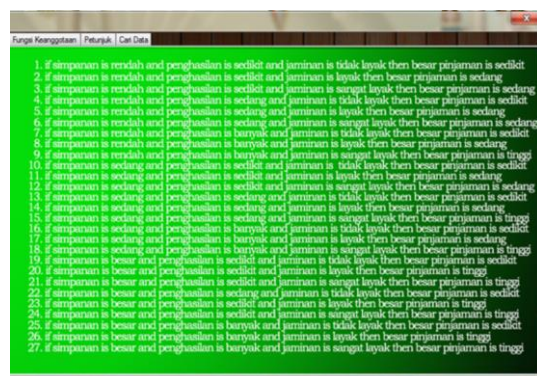

Figure 9. Rule base page views

On the rule base page views contains 27 rules which is generated from application of fuzzy logic.

4.3 Membership Function Page Views
On page views membership functions for fuzzy logic applications can be seen in figure 10.
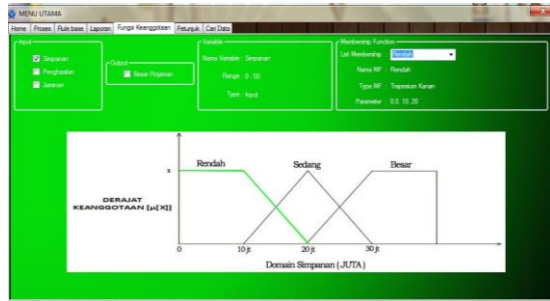

Figure 10. Membership function page views

Membership function page views contains a function to display a degree of membership in the form of a triangle and trapezoid curve, variable names, variable range, variable type, membership function name, the type of membership function and parameters of total deposit/savings, income, collateral and credit limit.

4.4 Report Page Views
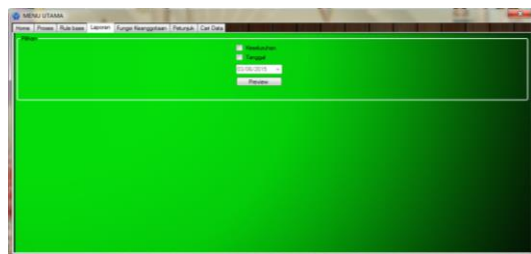Page Views report for the application of fuzzy logic can be seen in figure 11.

Figure 11. Report Page Views

On the report page views contains a function to look back on the input data as a whole or by date, month and year.

5. Conclusion
The conclusion that can be drawn from the results of the analysis and testing has been done on the development of the application of fuzzy logic to determine a credit limit based on total deposit, income and collateral as follows:

1. The application is made by using fuzzy logic can determine credit limit with common types of loans, special loans and micro-loans based on total deposit, income and collateral, and generate output in the form of credit to be received by the members.

2. The application of calculation in determining the credit limit using fuzzy logic method is able to provide the results of decisions quickly and more accurately.

6. References

Arifah, E. D. (2013). Aplikasi Metode Fuzzy Mamdani Dalam Penentuan Jumlah Produksi.

Bria, Y.P., Saidjuna, D. (2014). Development Of Fuzzy Logic Application To Determine Weight Gain Of Madura, Bali And Dairy Cattle Based On Water And Food Consumed. *International Seminar on Scientific Issues and Trends (ISSIT)*. Bina Sarana Informatika Jakarta Timur.

James, W., Chad, G. (2006). Fuzzy Logic Control for Robot Maze Traversal: an Undergraduate Case Study, São Paulo, Brazil.

Mardison. (2012). Sistem Pendukung Keputusan Dalam Pencairan Kredit Nasabah Bank Dengan Menggunakan Logika Fuzzy Dan Bahasa Pemrograman Java. *Jurnal Teknologi Informasi & Pendidikan*. Vol. 5 No. 1.

Mulyanto, E., Sutojo, T., Suhartono, V. (2010). *Kecerdasan Buatan*. Yogyakarta. Andi.

Sri, S., Puput, Y. (2013). Sistem Pendukung Keputusan Penentuan Plafon Kredit Dengan Fuzzy MDAM (Multiple Attribute Decissio Making) Menggunakanan Metode SAW (Simple Additive Weightin). *Skripsi*. STMIK Duta Bangsa Surakarta : Surakarta.

Wahyudi. (2005). Implementasi Fuzzy Logic Controller Pada Sistem Pengereman Kereta Api Transmisi, Vol.10. No.2,9-13.

INFORMATION SYSTEM DESIGN AND IMPLEMENTATION OF TELEHEALTH AS A TOOL OF HEALTH CARE QUALITY EQUALIZATION IN INDONESIA USING PROTOTYPING APPROACH

Himawat Aryadita[1*], Yusi Tyroni Mursityo[2], Dwi Cahya Astriya N [3]

Information System Department, Faculty of Computer Science, University of Brawijaya, Malang, Indonesia
Information System Department, Faculty of Computer Science, University of Brawijaya, Malang, Indonesia
Computer Science Department, Faculty of Computer Science, University of Brawijaya, Malang, Indonesia

Email : himawat@ub.ac.id

Abstract

Health service records in Indonesia as yet manual (using paper in collecting data) and conventional. In addition, this is espoused by the facts that in remote areas have lack of specialists. Hence, patients have difficulty to obtain better health care directly from a specialist. Currently, health care for patients in remote areas is only conducted by doctors in Puskesmas. Patients have to go to the nearest city which sometimes is very far in order to obtain health care. To overcome this problem, an application that can connect the patient to a specialist as well as doctors in Puskesmas to a specialist is required. In this case, terms such as telehealth or telemedicine could be used interchangeably to address in the use of electronic technology for patients with distance limitations. Through Telehealth, intensive care and gives orders to the doctors in Puskesmas in remote areas to treat some patients could be conducted by using computer and internet telecommunications technology. Based on the result from functional testing, it is found that 100% of telehealth information system functions is valid, meanwhile based on the result of usability testing, 60% agreed that telehealth information system is easy to use.

Keyword: Telehealth, Telemedicine, Health, Information System

1. Introduction
1.1 Background Research
Some of developed countries have their problems in aging population [5] while in developing countries has the biggest population in rural area whis is relatively underdeveloped and rarely available in terms of health resource and infrastructure [6]. We are motivated by the increases of health care costs in many countries [7]

Specialist doctors is one of health professions that should be involved in health development whether in the world or in Indonesia. One of the goals of health development is equal distribution of quality health services to all regions in Indonesia. Until now, health development in Indonesia is still not evenly distributed, the development is still concentrated in the main Java island and several big cities. Moreover, the difficulties of public access to health care facilities become a problem that is being faced by Indoensia government. Those are because Indonesia is an archipelago that separated by oceans and distance.

Rapid development of information and communication technology, known as Information and Communication Technology (ICT), has penetrated many areas of life, no exception with the health sector. But even so, the reality shows that health care services conducted in Indonesia is operating manually and conventional, not yet accompanied by adequate information systems or technology devices. One of developments in the field of health information technology that continues to evolve, namely telehealth. Telehealth is an alternative to improve the range of health services for people throughout Indonesia, including people in remote areas and rural areas, so that equalization of health care quality in Indonesia can be implemented. Telehealth is an effort to use information technology in providing health care, in a condition there is a physical distance between *Puskesmas* doctors and specialist doctors, specialist doctors and patients, or between doctors themself. With Telehealth information system, the intensive care,

monitoring and giving orders to the doctor or nurse in remote areas or public health clinic to treat some patients can be done remotely by using computer and telecommunication technologies which are controlled from the central healthcare facilities.

1.2 Telehealth

Telehealth is the use of telecommunications technologies to deliver health-related services and information that support patient care, administrative activities, and also health education. Telehealth is being touted as a means to improve access to care, while reducing costs of transportation and increasing convenience to patients in obtaining care [1]. Telehealth services typically include sets of activities for achieving a common business objective [2]. Such services are thus naturally workflows that separate various works of a specific process into group of well-defined steps where each work contains many tasks as different logic steps [3]. The tasks may be executed manually by humans or automatically by applications relevant to the process represented by a workflow.

2. Research Method

This research followed the prototyping method which helps the client and the developer can compare if the software made matches the software specification [4]. The protoyping model are presented in Figure 1:
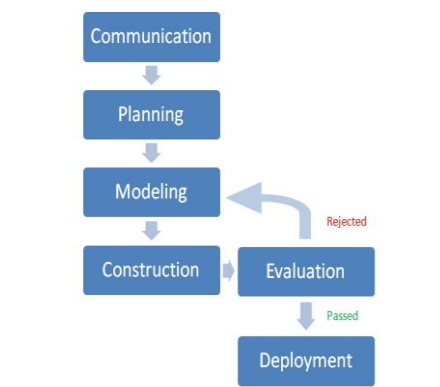

Figure 1 Research Method

3. Planning

In general, in this research we designed a web-based Telehealth information system used to improve health services using telecommunications technology. In this system, a health clinic nurse or doctor can enroll patients who will be diagnosed by a doctor or a health center and a specialist

doctor. A clinic doctor will refer the patient to a specialist doctor to be handled further. Telehealth information system is also used for intensive care, monitoring and giving orders to the doctor in local health centers or remote areas health centers to treat some patients that can be done remotely using computer and telecommunication technologies which controlled from the center.

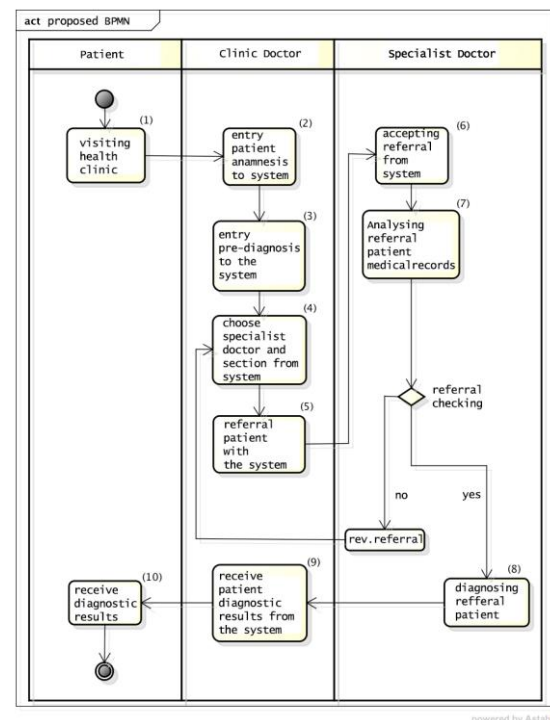Below are a business process in Telehealth system and usecase diagram in Telehealth information systems.

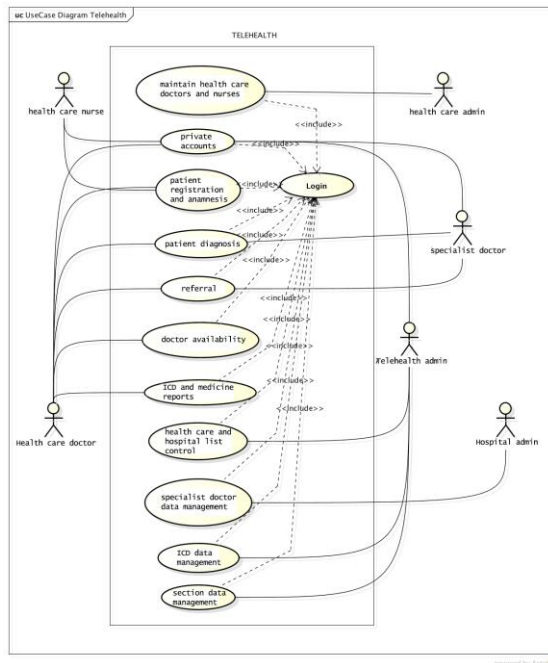**Figure 2** Business process in Telehealth system

Figure 3 Telehealth Use Case Diagram

4. Implementation

This Telehealth system has been implemented locally, the user is public health center at Malang which in collaboration with Medical Faculty of Brawijaya University. Below are the appearance of Telehealth system:
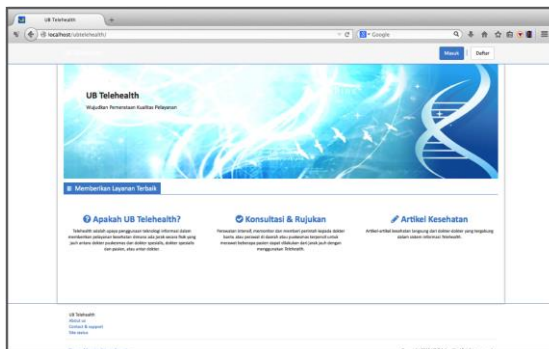
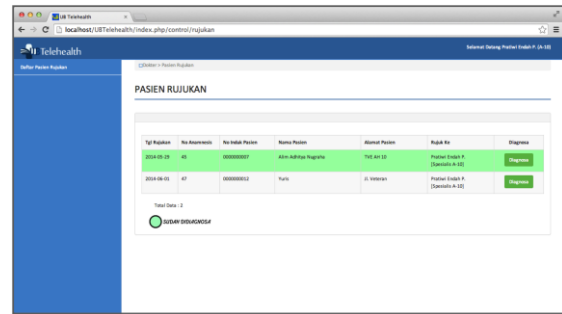### 4.1 User Interface
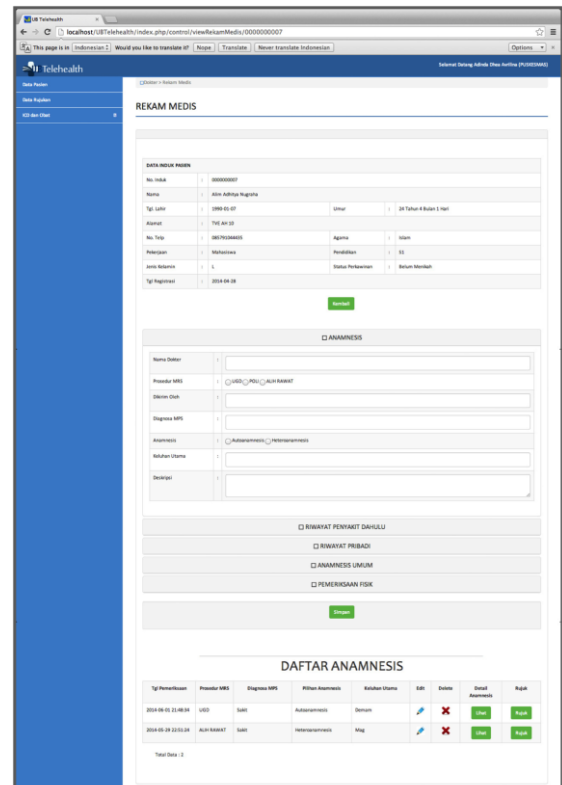

Figure 4 Main page of Telehealth

Figure 5 Registration and Patient List Page

Figure 6 Patient Referrals Page

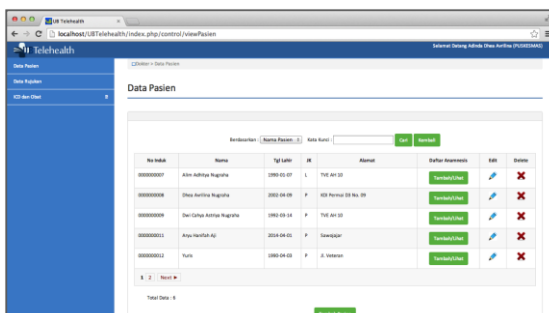**Figure 7** Form of Anamnesis Page

Figure 8 Form of Diagnosis Page

5. Testing

In the implementation of this Telehealth system design we were conducted two testing from software engineering, they are functional testing dan usability testing

5.1 Functional Testing

Functional testing will be done by providing input on tested component, then examined the results of the output. Valid status if the generated output according to the requirement and invalid status if the output result does not match or there is an error.

Based on the results of functional tests produced 100% valid status of telehealth information system features.

5.2 Usability Testing

Usability testing will be measured against the ease of application utilization from the user side. Ease of use is measured from the four parameters, namely: easy to learn, easy to remember, easy to operate, and easy to explored.

Usability testing here trying out the system to users. Statement of testing designed by factors ease of use of the system. From these activities tested to the doctor who will be using the application.

Recapitulation of the questions used to measure the ease of use of Telehealth information system is shown in Figure 9
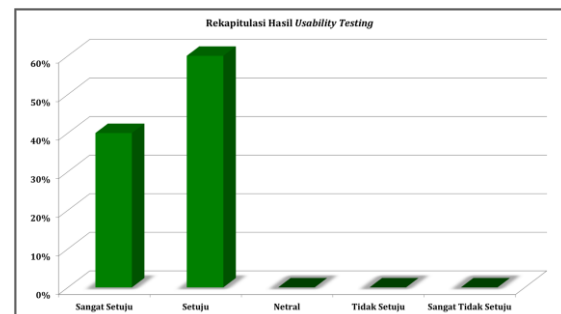

Figure 9 Recapitulation of *Usability Testing Result* in Percent (%)

From the above recapitulation can be seen users agree that Telehealth information system meets the ease of use. It can be based on the results of recapitulation in amount of 60% of users agree that Telehealth information system is easy to use.

6. Conclusion

Based on results of research conducted, it can be concluded as follows:

1. The design of a web-based Telehealth information system has been made in accordance with users needs who have previously analyzed.
2. Implementation of Telehealth information system prototype has been in accordance with the design of systems.
3. All functions of Telehealth information system prototype can run well that based on the results of functional testing showed 100% valid function.
4. User agrees that Telehealth information system prototype is easy to use. This can be seen on the results of usability testing which showed that 60% of users agree to the ease of use of the application.

7. Future Works

As continuations for the next development of the Telehealth information systems, among others:

1. It is recommended to do some re-testing if the Telehealth information system will be integrated on larger systems or when there are additional features or new modules.

2. Data security should be improved so that the system is less susceptible to a security or network attacks.

8. References

[1] Dexon, Brian E., Hook, Julia M, & McGowan, Julie J. (2008). Using Telehealth to Improve Quality and Safety. *AHRQ Publication No. 09-0012-EF.* December 2008.

[2] W. Liu, M. Fu, S. Luo, (2011) "Use case based service oriented analysis and modelling", *International Conference on Internet Computing and Information Services.*

[3] P.Srichetta, S. Tangsripairoj, (2008) " Using social network analysis to better understand the dependencies in UML use cases collection", *Ninth ACIS International conference on software enginnering, artificial intelligence, networking, and parallel/distributed computing.*

[4] Todd Grimm: (1998) The Human Condition: A Justification for Rapid Prototyping. *Time Compression Technologies, vol. 3 no. 3. Accelerated Technologies, Inc..*

[5] C. McGregor, J.M. Eklund, (2008) "Realtime service oriented architectures to support remote critical care : Trends and challenges", *Annual IEEE International Computer Software and Applications Conference.*

[6] N. Yudistira, B. Priyambadha, H. Aryadita, (2012) "Service Oriented Telehealth Analysis and design Using Use Case Driven Approach", International Congress on Informatics, Environment, Energy and Applications-IEEA

[7] N. Chaamwe, (2010) " Telehealth services in the context of Zambia, a developing country", Second International Conference on Information Technology and Computer Science

Biomolecular Aspect Of Physical Activity And Healthy Diet On Atherosclerosis Patomechanism In Cardiovascular Disease

Made Kurnia Widiastuti Giri[1], Bambang Purwanto[2], Herka Maya Jatmika [3]

Faculty of sport and health, Ganesha University of Education, Singaraja, Indonesia
Doctorate Program Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia
Faculty of sport science, Yogjakarta State University, Yogyakarta, Indonesia

Email : drnia82 @gmail.com

Abstract

The present article reviews the relationship between imbalance between physical activity and dietary energy intake, how they affect the risk of cardiovascular diseases through biomolecular analysis. Nowadays, sedentary lifestyle and overweight are major public health, clinical, and economical problems in worldwide societies. The worldwide epidemic of excess weight is due to imbalance between physical activity and dietary intake. Sedentary lifestyle, unhealthy diet, and consequent overweight and obesity markedly increase the risk of cardiovascular diseases. Daily physical activity shows substantial inter-individual variation, and low physical activity is associated with obesity leads to increase cardiovascular incidence. An anamnesis, physical examination, Electrocardiography, echocardiography and an adjuvant measure test on plasma of blood are important to examine the atherosclerosis in cardiovascular system. Plasma test nowadays goes to biomolecular aspect measures many proteins on plasma according to the process flows as same as symptoms appear or its silent. Biomolecular test proteins such as citokines and chemokines which are an important in inflammation chain process. Inflammation signed by an unequal state of oxidant and antioxidant in the organ system. Healthy diet contains many antioxidant and physical activity could decreased proinflammantory citokines so it would be the best combination cutting the ile of biomolecular processed in atherosclerosis which is based on inflammtion. Thus, it is argued that the best way to lower the risk of cardiovascular diseases is by implication of regular moderate intensity physical activity, a healthy diet, and avoiding unhealthy weight gain are effective and safe ways to prevent and manage cardiovascular diseases.

Key words: physical activity, healthy diet, atherosclerosis, cardiovascular disease

1. Introduction

Many studies have enlightened the role of inflammation in atherosclerosis, changing our perception of "vessel plaque due to oxidized lipoproteins", similar to a "rusted pipe", towards a disease with involvement of many cell types and cytokines with more complex mechanisms. Although "physical activity" and "physical exercise" are two terms with some differences in meaning, compared to sedentary lifestyle, active people have lower cardiovascular risk and lower inflammatory markers. Activities of skeletal muscle reveal "myokines" which have roles in both the immune system and adipose tissue metabolism (Erbek And Cicero, 2012). Inflammation is also revealed in conditions increasing cardiovascular disease risk such as insulin resistance, visceral obesity, metabolic syndrome and type 2 diabetes, with higher proinflammatory cytokines secreted by macrophages infiltrating visceral fat (Schuster, 2010; Back, 2009). Additional tools to further stratify the risk of patients

are biomarkers. According to the National Institutes of Health defi- nition, a biomarker is "a characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention" (Biomolecular Working Group, 2001). Accurate assessment for clinical signs and biomolecular ascpects of cardiovascular risk is essential for clinical decision making; the benefits, risks and costs of management strategies must be weighed to choose the best individually tailored preventive strategy.

2. Biomolecular aspects of atherosclerosis

Inflammation is an important process in the pathogenesis of atherosclerosis (Ross, 1999). Several inflammatory markers including high sensitivity C-reactive protein (hs-CRP) have been shown to pro- vide incremental information for the prediction of future cardiovascular events beyond

traditional risk factors (Ridker, 2007; Nambi, 2009).

A biomarker (biological marker) is a measurable product or substance used as an indicator of the biological state, to objectively determine the body's physiological or pathological processes. In sport, biomarkers are key parameters to assess the impact of exercise on different systems, tissues and organs (Bouchard, 1994).

The role of chronic inflammation in propagation from atherogenesis to thrombotic events described in the medical literature led clinicians to use inflam- matory markers to evaluate disease activity, in par- ticular leukocyte count, high sensitivity C-reactive protein (hsCRP), interleukins (IL-6, IL-18), and soluble CD40 ligand (Pickard, 2008).

In diet-induced obese rats, both acute and chronic exercise blunt Toll-like receptor-4 (TLR-4) signalling and cause improved post-receptor insulin action (Oliviera, 2011). Exercise reduces protein tyrosine kinase phosphatase 1B activity and insulin receptor substrate 1 serine phosphorylation, with concomitant reduction in c-jun N-terminal kinase activities in the muscle of diet induced obese rats (Da Silva, 2010).

Studies in Zucker diabetic fatty rats, a rodent model of type 2 diabetes, show that 10 weeks of exercise as 5 km/day running significantly de- creased IL-6, haptoglobin, malondialdehyde levels and JNK phosphorylation, and also decreased hepatic phosphoenolpyruvate carboxykinase levels and Ser(307)-phosphorylated insulin receptor sub- strate-1. All these changes indicate decreased JNK activity and decreased hyperglycemia (Kiraly, 2010). This model of rats also showed increased adiponectin and decreased CRP levels after regular exercise (Lemos, 2007). Treadmill exercise may also decrease CRP in renal proximal tubules and increase IL-10. It also restores renal dopamine D1 receptor functions in rats suggesting interaction of exercise with inflammatory cytokines and kidneys (Asghar, 2007).

Exhaustive exercise and endurance exercise training differently modify the physiological status of the body, and therefore may have different anti- inflammatory results. Studies on rats revealed that endurance training increased the rate of tricarboxylic acid cycle and antioxidant activity whereas exhaustive exercise increased urea markers and inflammation in rat liver tissue (Huang, 2010).

In diet-induced obese mice, physical exercise decreases expression of TNF-α, MCP-1, PAI-1 and IKK-β in adipose tissue but not in liver (Bradley, 2008); therefore there may be cross-talk between muscle and adipose tissue just after muscle activity, causing changes directly in adipose tissue.

In contrast, overtraining may activate pro-inflammatory cytokines. In fact, overtrained groups of rats showed elevated levels of IL-10 and IL-6 in adipose tissue, accompanied by increased TLR-4 and NFkBp65 compared to control and trained groups (Lira, 2010). Training may provide necessary changes to adapt to exercise and to trigger mechanisms against inflammation that will occur after muscle activity. Acute exercise causes endoplasmic reticulum stress (detected as increased mRNA levels and x-box binding proteins), and increases inflammatory markers (e.g. IL-6, TNF-α) and oxidative stress (detected as increased metallothionein 1F, metallothionein 1H, and NADPH oxidase) That means the effects of acute exercise are extremely different from those of chronic training (Kim, 2011).

The authors conclude, according to all research findings above , that in mice with a high fat diet, so that exercise ameliorates the progression of endothelial dysfunction and decreases a patomechanism of atherosclerotic areas. An inflammantory process is the core point within atherosclerosis pathomechaminsm which is influenced by dietary intake and exercise level activity.

3. Atherosclerosis Risk among Unhealthy diet and Less Physical Activity

From the classical studies on diet and cardiovascular disease, it is accepted that components of the diet are important in the development, prevention, and treatment of cardiovascular diseases (Mello, 2011).

Apart from the endogenous antioxidants, which are obviously regulated by exercise, exogenous antioxidants such as vitamin C, E, and carotenoids are taken up with the food or are used as dietary supplements. The question therefore arises whether such supplements can be considered beneficial during exercise (Steinbecher, 2015). To address this question, there is a research studies investigated the effects of a diet supplemented with vitamin C and E on exercise-induced insulin sensitivity as measured by glucose infusion rates during a hyperinsulinemic, euglycemic clamp in previously untrained and pre-trained healthy

young men. Interestingly, exercise was found to increase parameters of insulin sensitivity (including adiponectin) only in the absence of antioxidants in both previously untrained and pretrained individuals. This was paralleled by increased expression of ROS sensitive transcriptional regulators of insulin sensitivity and ROS defense capacity, peroxisome proliferator-activated receptor (PPAR) and PPAR coactivators PGC-1 and PGC-1 only in the absence of antioxidants. Molecular mediators of endogenous ROS defense (Mn-SOD, Cu, Zn-SOD and GPX) were also induced by exercise, and this effect was again blocked by antioxidant supplementation. The authors concluded that exercise induced oxidative stress ameliorates insulin resistance and causes an adaptive response promoting endogenous antioxidant defense capacity and that supplementation with antioxidants may preclude these health-promoting effects of exercise in humans. It was demonstrated that exercise causes an activation of mitogen-activated protein kinases (MAPKs: p38, ERK 1 and ERK 2), which in turn activates nuclear factor kB (NF-kB) in rat gastrocnemius muscle and consequently the expression of important enzymes associated with defense against ROS (SOD) and adaptation to exercise—endothelial nitric oxide synthase (eNOS) and inducible nitric oxide synthase (iNOS) (Cabrera, 2004). The expression of these enzymes can be inhibited by allopurinol, an inhibitor of XO indicating also that the prevention of ROS formation causes an inhibition of an adaptive response. The authors therefore conclude that in all likelihood, antioxidant supplements should not be recommended before training as they interfere with muscle cell adaptation. Thus, physical exercise is considered a double-edged sword: when practiced strenuously it causes oxidative stress and cell damage; in this case application of antioxidants may be helpful. But when practiced in moderation, it increases the expression of antioxidant enzymes and thus should be considered an antioxidant (Cabrera, 2008) Supportive evidence for this assumption comes from studies on physical overtraining. That studiesexamined the responses of oxidative stress biomarkers to a resistance training protocol of progressively increased and decreased volume/intensity in male test persons and observed significantly increased levels of urinary isoprostanes (7-fold), serum levels of thiobarbituric acid reactive substances (TBARS), protein carbonyls, CAT, GPX, and

GSSG and significantly decreased levels of GSH, the GSH/GSSG ratio, and total antioxidant capacity in blood serum of over-trained individuals. Similarly, other studyinvestigated the effects of overloaded training (OT) with athletes exercising for a duathlon before and after a four week OT and found that at rest conditions, OT induced an increased plasma GPX activity and a decreased plasma total antioxidant status, while OT resulted in higher exercise-induced variations of blood GSH/GSSG ratios, TBARS levels and decreased total antioxidant status in exercise conditions indicating that OT could compromise the antioxidant defense mechanisms. By comparing the oxidative stress response in control athletes and athletes with overtraining syndrome Research study by Taskanen et al, further able to show that exercise to exhaustion led to an increase in oxygen radical absorbance (antioxidant) capacity and malondialdehyde in the controls but not in the over-trained athletes. Instead, over-trained athletes showed negative correlations between oxygen radical absorbance capacity at rest and protein carbonyls after exhaustive exercise indicating that increased oxidative stress may play a role in the pathophysiology of overtraining syndrome. Although these observations are not yet conclusive they indicate that adaptation to exercise is limited and that its protective effect can be exceeded leading to oxidative stress that cannot be dealt with by the endogenous antioxidant system (Taskanen, 2010). The authors conclude that dietary intake in healthy programms have a great deals with prevention of atherosclerosis. Whether it is helpful to apply exogenous antioxidants under such conditions as suggested still has to be elucidated.An antioxidants could took an important placed in order to mantained homeostasis in immunological process.

4. Physical Activity Advantages Cardiovascular Disease

It is well established that muscle contractions during exercise lead to elevated levels of reactive oxygen species (ROS) in skeletal muscle. These highly reactive molecules have many deleterious effects, such as a reduction of force generation and increased muscle atrophy.
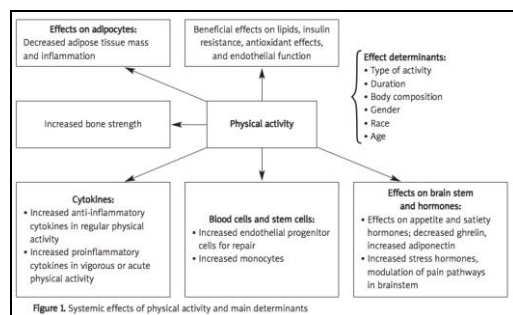
Figure. 1. Systemisc effects of Physical ActivitySource: Ertek, 2012.

Since the discovery of exercise-induced oxidative stress several decades ago, evidence has accumulated that ROS produced during exercise also have positive effects by influencing cellular processes that lead to increased expression of antioxidants. These molecules are particularly elevated in regularly exercising muscle to prevent the negative effects of ROS by neutralizing the free radicals. In addition, ROS also seem to be involved in the exercise-induced adaptation of the muscle phenotype. This review provides an overview of the evidences to date on the effects of ROS in exercising muscle. These aspects include the sources of ROS, their positive and negative cellular effects, the role of antioxidants, and the present evidence on ROS-dependent adaptations of muscle cells in response to physical exercise (Steinbecher, 2015).

The authors analyzed that physical activity in proportional programme gives many benefits beacused that were the chronic processed. Even in acute phase of exercise could be many imbalance of ROS and antioxidants in muscles but that would be a great benefits in adaptations phase.

Table I. Types of physical activity in prospective clinical studies on inflammation-related parameters (Ertek, 2012)

Activity	Patients	Reference	Result
Treadmill exercise for 3 months	Patients with intermittent claudication (n = 82).	Tisi, *et al.* 1997 [122]	Beneficial
Individually trained treadmill exercise programmes mean 2.5 h/week	High cardiovascular risk people (n = 43)	Smith, *et al.* 1999	Beneficial

Activity	Patients	Reference	Result
Long distance running – 9 months of training, mean distance increased from 31 ±9 km to 53 ±15 km	Healthy subjects (n = 14)	Mattusch, *et al.* 2000	Beneficial
Jogging and aerobic dancing	Adults over 17 years (n = 4072)	King, *et al.* 2003 (NHANES III study after adjustments)	Beneficial
Individually tailored moderate intensity resistance training for upper and lower extremity large muscles, group walking and hiking	Middle-aged overweight subjects (n = 522)	Lindström, *et al.* 2003 (Finnish Diabetes Prevention Study)	Beneficial
Low- to moderate-intensity aerobic exercise	Healthy men (n = 140)	Rauramaa, *et al.* 2004 (DNASCO study)	Beneficial
Four weeks of aerobic exercise training	Normal, impaired glucose tolerance and type 2 diabetic patients (n = 60)	Oberbach, *et al.* 2006	Beneficial
Individually tailored aerobic exercise	Post-acute myocardial infarction patients (n = 60)	Balen, *et al.* 2008 [126]	Beneficial

Activity	Patients	Reference	Result
Twice-a-week supervised aerobic and resistance training plus structured exercise counselling	Sedentary type 2 diabetics and metabolic syndrome patients ($n = 606$)	Balducci, et al. 2010 (IDES study)	Beneficial
40-minute walking for 5 days per week	Coronary heart failure patients ($n = 28$).	Tsarouhas, et al. 2011	Beneficial

Table above showed that many research findings proved a significant results of exercise benefits within manydifferent health condicitions.

5. Conclusion

While risk scores are invaluable tools for adapted preventive strategies, a significant gap exists between predicted and actual event rates. Additional tools to further stratify the risk of patients at an individual level are biomarkers. A surrogate endpoint is a biomarker that is intended as a substitute for a clinical endpoint. In order to be considered as a surrogate endpoint of cardiovascular events, a biomarker should satisfy several criteria, such as proof of concept, prospective validation, incremental value, clinical utility, clinical outcomes, cost-effectiveness, ease of use, methodological consensus, and reference values. Most of the biomarkers examined fit within the concept of early vascular aging. Biomarkers that fulfill most of the criteria and, therefore, are close to being considered a clinical surrogate endpoint are carotid ultrasonography, ankle-brachial index and carotid-femoral pulse wave velocity; biomarkers that fulfill some, but not all of the criteria are brachial ankle pulse wave velocity, central haemodynamics/wave reflections and C-reactive protein; biomarkers that do no not at present fulfill essential criteria are flow-mediated dilation, endothelial peripheral arterial tonometry, oxidized LDL and dysfunctional HDL. Nevertheless, it is still unclear whether a specific vascular biomarker is overly superior. A prospective study in which all vascular biomarkers are measured is still lacking. In selected cases, the combined assessment of more than one biomarker may be required.

6. Acknowledgements

7. References

Asghar M, George L, Lokhandwala MF. Exercise decreases oxidative stress and inflammation and restores renal dopamine D1 receptor function in old rats. Am J Physiol Renal Physiol 2007; 293: F914-9.

Bouchard C, Shephard RJ, Stephens T. Physical activity; fit- ness and health: International proceedings and consensus state- ment. Champaign III: Human Kinetics; 1994.

Bradley RL, Jeon JY, Liu FF, Maratos-Flier E. Voluntary exercise improves insulin sensitivity and adipose tissue inflammation in diet-induced obese mice. Am J Physiol Endocrinol Metab 2008; 295: E586-94.

Da Silva AS, Pauli JR, Ropelle ER, et al. Exercise intensity, inflammatory signalling, and insulin resistance in obese rats. Med Sci Sports Exerc 2010; 42: 2180-8.

de Lemos ET, Reis F, Baptista S, et al. Exercise training is associated with improved levels of C-reactive protein and adiponectin in ZDF (type 2) diabetic rats. Med Sci Monit 2007; 13: BR 168-74.

Ertek S and , 2012. Impact of physical activity on inflammation: effects on cardiovascular disease risk and other inflammatory conditions

Huang CC, Lin WT, Hsu FL, Tsai PW, Hou CC. Metabolomics investigation of exercise modulated changes in metabolism in rat liver after exhaustive and endurance exercises.

Eur J Applied Phys 2010; 108: 557-66.

Karch I, Olszowska M, Lidia Tomkiewicz−Pająk, Sylwia Drapisz, Joanna Łuszczak, Piotr Podolec, 2013. The effect of physical activity on serum levels of selected biomarkers of atherosclerosis.Kardiologia Polska 2013; 71, 1: 55–60

Kim HJ, Jamart C, Deldicque L, et al. Endoplasmic reticulum stress markers and ubiquitin-proteasome pathway activity in response to a 200 km run. Med Sci Sport Exerc 2011; 43: 18-25.

Király MA, Campbell J, Park E, et al. Exercise maintains euglycemia in association with decreased activation of c- Jun NH2-terminal kinase and serine phosphorylation of IRS-1 in the liver of ZDF rats. Am J Physiol Endocrinol Metab 2010; 298: E671-81.

Lira FS, Rosa JC, Pimenel GD, et al. Inflammation and adipose tissue :effects of progressive load training in rats. Lipids Health Dis 2010; 9: 109.

Mello APQ, da Silva IT, Abdalla DSP, and Damasceno, 2011. Electronegative low-density lipoprotein: Origin and impact on health and disease. Atherosclerosis *215 (2011) 257–265*

Oliviera AG, Carvalho BM, Tobar N, et al. Physical exercise reduces circulating lipopolysaccharide and TLR4 activation and improves insulin signalling in tissues of DIO rats. Diabetes 2011; 60: 784-96.

Ross R,1999. Atherosclerosis--an inflammatory disease. N Engl J Med. 1999 Jan 14;340(2):115-26

BACTERICIDAL ACTIVITY PHORBAZOLE E ON GROWTH *STAPHYLOCOCCUS AUREUS*

Ni Putu Ristiati

Education Department of Biology, Math and Natural Sciences
Undiksha Singaraja

Email : puturistiati@gmail.com

ABSTRACT

Active compounds from marine organisms for the treatment of various types of diseases have been found, since marine organisms are a source of secondary metabolites and also a source of organic compounds of natural materials. Phorbazoles basic framework can be synthesized from 1-(p - tosyl groups) – pyrol- 2 - carbonyl chloride and phenacyl ammonium chloride salts . *Staphylococcus aureus* is a gram-positive bacteria, pathogens, blood cells hemolysis, plasm coagulate, and produce extracellular enzymes and toxins .

The aim of research to find out phorbazole E has bactericidal activity against the growth of *S. aureus* and at concentrations how phorbazole E most capable of causing bactericidal activity against *S. aureus* growth. The total number of 36 experimental units petri dishes and test tubes 36 (9 control units, 9 units of concentration of 10 mg/500 ml, 9 units of concentration of 18.75 mg/500 ml, 9 units of concentration of 37.5 mg/500 ml). The first test using Mueller Hinton broth at about 9 ml test tube is then inserted isolate suspension of 1 ml, incubation at a temperature of 370C for 24 hours to determine the bactericidal activity. The second test using Mueller Hinton agar in Petri dishes to determine the inhibition zone .

Obtained from laboratory tests: phorbazole E has bactericidal activity against *S. aureus* growth. Concentration of 37.5 mg/500 ml has bactericidal activity that is able to inhibit the growth of *S. aureus* .

Keywords : Bactericidal, phorbazole E, *Staphylococcus aureus* .

1.Introduction

Active compounds from marine organisms for the treatment of various types of diseases have been found, since marine organisms are a source of secondary metabolites and also as a source of organic compounds of natural materials. Phorbazole A, B, C and D were isolated from sponges *Phorbas clathrata*, has been identified as a known structure and a new ocsazol derivative containing chlorinated phenilpyroliloksazol unit, because it is expressed as an alkaloid derived from the sea . Fourth phorbazoles contains the same basic framework, only differ from each other in the substitution of chlorine atoms. of ethyl acetate extract obtained rendement phorbazole A, B, C, D respectively 2.5%, 0.25%, 0.025% and 0.01% (Rudi, et.al .1994).

Phorbazole and derivatives can be synthesized from 1-(p-tosyl groups) pyrrole–2-carbonyl chloride and ammonium chloride salts with rendement phenasil high enough through the four stages of the reaction, namely : (i) coupling reaction of both compounds (ii) i cyclodehydration (iii) hydrolysis (iv) chlorination . From this

synthesis was successfully obtained phorbazole E with rendement 26.3% (Muderawan,2003) were derivatives containing OCH3 (52.0%), H (34.7%), and Cl (52.5%) .

Research on the synthesis phorbazole E against microbes have been conducted by Muderawan, et al. (2003). From this research allegedly phorbazole E has potential as a drug substance. But how phorbazole E bactericidal activity against microbial growth has not been studied. For that we need research using a species of microbes such as *Staphylococcus aureus*.

Staphylococcus aureus is a gram-positive bacteria, pathogens, haemolysisi blood cells and coagulate plasm , and produce extracellular enzymes and toxins . A type of food poisoning is often caused by enterotoxin produced heat-resistant staphylococci. Staphylococcal quickly become resistant to many antimicrobial properties and lead to a difficult treatment process (Jawetz , et al.,2004).

Based on the above needs to be investigated phorbazole E bactericidal activity against *S. aureus* growth. From the things that have been described in the

above background, the problem can be formulated as follows : (1) Are phorbazole E has bactericidal activity against *S. aureus* growth ? ;(2) At what concentration phorbazole E has bactericidal activity against *S. aureus* growth ?

Results of this study are expected to contribute to the community , especially in the protection of public health . In more detail , the benefits of this research can be described as follows : (1) By knowing phorbazole E bactericidal activity against *S. aureus* growth, phorbazole E has the prospect to test a higher biological activity (clinical trials I, II clinical trials, and clinical trials III) that can be used for the treatment of *S. aureus* infections; (2) This research can enrich the alternative use of marine biological resources as the active compounds of natural ingredients that can be used as an effective drug to cure the disease.

2. Methods

This type of research is a true experiment . The population is 25922 ATTC *S. aureus* bacteria isolated pure culture of the microbiology laboratory Faculty of medicine Unud Denpasar. *S. aureus* bacteria sample is taken from a liquid culture. The treatment in this study is phorbazole E with a concentration of 10 mg, 18.75 mg, 37.5mg in 500 ml of distilled water. Number of replicates 9 times by (T-1) (R-1). Thus, the experimental units will total 9 tube containing Mueller Hinton broth medium for growing *S.aureus* and 9 Petri dishes containing Mueller Hinton solid medium to determine inhibition zone. Observation stage, the analysis carried out in the microbiology laboratory Faculty of medicine Unud. Stages of the activities carried out are : (1) preparation of tools and materials, (2) implementation, (3) observation.

Materials used : (1) phorbazole E used in this study is a synthesis in the laboratory, (2) The medium used for growth was Mueller Hinton solid and liquid, (3) The temperature used in this study is the temperature of 37^0 C (in an incubator) ; (4) The optimal pH of 6.4 to the growth of *S. aureus*; (5) *S. aureus* Isolates obtained from the microbiology Faculty of medicine Unud; (6) Alcohol 70%, sterile distilled water, rubbing alcohol, cotton swabs, filter paper, cotton, paper Whatman, Na_3PO_4, HCl.

Sterilization Equipment and Materials. Before the experiment began all the tools to be used sterilized beforehand. The tools are

made of glass soaked in Na_3PO_4 and then washed with water, then soaked in HCl for 24 hours, then washed again with clean water and then dried. Test tubes, measuring cups, erlenmeyer corked. Furthermore, the tools are sterilized in an oven at a temperature of 180^0 C sub 2 hours , including paper discs are also sterilized .

Manufacture of medium : For *Mueller Hinton* 21 grams and 1 liter of sterile distilled water were mixed, and then heated. The suspension is then sterilized in autoclave at a temperature of 121^0C for 15 minutes.

Making the bacterial suspension: Isolates of *Staphylococcus aureus* was isolated into individual test tubes that had contained 30 ml of nutrient broth at a concentration of 10 mg, 18.75 mg, 37.5 mg in 500 ml. All the tubes that had contained isolates incubated at a temperature of 37^0C for 24 hours. The suspension is ready for use as microbes.

Bioassay : Each bacterial suspension was taken as 1 ml, was added to each Petri dish. Furthermore poured 10 ml of Mueller Hinton media, and shaken simultaneously so that the growth of bacteria on a Petri dish evenly. Petri dish containing a suspension isolates have and Mueller Hinton media that has been frozen filled paper disc that has spilled/sprayed 10 mg, 18,75 mg, 37,5 mg phorbazole E in 500 ml of distilled water, and then incubated at a temperature of 37^0C for 24 hours. The same is treated in a reaction tube which already contains 9 ml of Mueller Hinton broth, then put 1 ml suspension isolates. Subsequently incubated at a temperature of 37^0C for 24 hours.Concentration compounds tested phorbazole E existing three are: 10 mg, 18.75 mg, 37.5 mg. The positive result is indicated by the formation of inhibition zones in the area around the paper disc. The size of the inhibition can be determined by measuring the inhibition zone with calipers.

Data were analyzed qualitatively. Data from experimental treatments in Mueller Hinton solid medium is then compared to the concentration of 10 mg, 18.75 mg, 37.5 mg in 500 ml to determine its inhibition zone.

Bactericidal activity observed by the growth of microbes in a test tube in Mueller Hinton broth using a 0.5 McFarland standard at the same concentration. If the media remains clear means not occur growth of bacteria that indicates the presence of compounds that are bactericidal in the compound being tested.

3. Results And Discussion
3.1. Observation Result

From the results obtained in the laboratory testing in the case of control growth, high turbidity. In the experiments the concentration of 10 mg/500ml occurs due to the growth of *S. aureus* test tube turbid, at 18.75 mg/500ml still occur even if the turbidity is less than the growth in concentrations of 10 mg, 37.5 mg was the clear test tube. Standard measurements performed with a 0.5 McFarland turbidity . This means that at a concentration of 37.5 mg/500ml does not occur growth of *S. aureus*, so forbazol E at a concentration of 37.5 mg/500ml has bactericidal activity against growth.

Table 3.1. The test results phorbazole E bactericidal activity against *S. aureus* growth .

No. sam peles	Contr ol	Conc entrat ion of 10 mg	Conce ntratio n of 18.75 mg	Conce ntratio n of 37.5 mg
1	+	+	+	_
2	+	+	+	_
3	+	+	+	_
4	+	+	+	_
5	+	+	+	_
6	+	+	+	_
7	+	+	+	_
8	+	+	+	_
9	+	+	+	_

Description : + = cloudy, there is a growth of *S. aureus*.

      - = clear, there was no growth of *S. aureus*.

Being in a solid medium to determine inhibition zone was measured with calipers, the results are shown in Table 2

Table 3.2. Inhibition zone measurement results with the accuracy of 0.05 mm

No. sam pele s	Cont rol	Conc entrati on 10 mg	Concen tration 18.75 mg	Concen tration 37.5 mg
1	4.85	6.25	8.05	11.05
2	5.05	5.95	8.25	12.10
3	4.95	5.85	8.10	12.15
4	5.10	6.20	8.15	12.20
5	4.90	6.10	8.20	12.25
6	5.12	5.90	8.15	12.15
7	5.10	6.15	8.35	12.05
8	5.05	6.15	8.10	11.95
9	5.12	5.95	8.15	11.85

From the data inhibition zone then made diagrams to get a clearer picture of the differences between the control, treatment 1 (10mg/500ml), treatment 2 (18.75mg/500ml), treatment 3 (37.5 mg/500ml)
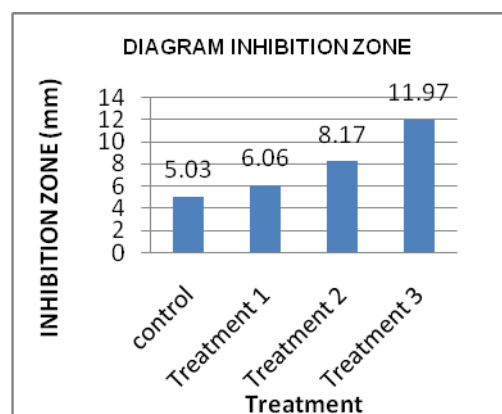

Figure 3.1 Inhibition Zone on control, , treatment 1,2 and 3

3.2. Discussion

From the research that has been conducted two kinds of data are obtained on phorbazole E bactericidal activity against *S. aureus* growth, and concentration forbazol which have bactericidal activity against *S. aureus* growth.

Bacterial growth can be inhibited by several antimicrobials as has been reported by several researchers, including Liu et al. (2004) stated that the antibiotics penicillin , enoxasin , and gentamicin in *E. coli* at different concentrations affect the growth of bacteria. Findings Martin et al. (2003) that carbon dioxide dissolves in the milk reported that carbon dioxide is significantly inhibits the growth of bacteria milk. Croisier et al. (2004) reported that gatifloxasin significantly inhibit the growth of *Streptococcus pneumoniae*. Growth is an increase in the entire chemical constituent cells. It is a process that requires replication of the entire structure, organelles and cell protoplasm components in the presence of nutrients in the surrounding environment. In the growth of bacteria, all essential substances must be available for the synthesis and maintenance of protoplasm, energy sources, and environmental conditions are appropriate.

Bacteria as a group is an organism which shows the enormous capabilities in

using scattered groceries, preparing inorganic materials into organic compounds are very complex. Some species also grows on a variety of ecological niches with temperature, acidity, oxygen and extreme pressure. The ability of bacteria to survive under such circumstances is the protection of high adaptability and capacity in the success reflexes respond to a stimulus that is considered foreign or never met.

From Table 1 shows that phorbazole E at a concentration of 37.5 mg/500 ml has bactericidal activity against *S. aureus* growth. At these concentrations phorbazole E could inhibit the growth of *S. aureus*, while the smaller concentrations of 10 ml/500 mg and 18.75 mg/500 ml is still going on *S. aureus* growth .

From Table 2 shows that phorbazole E at a concentration of 37.5 mg/500 ml has the highest zone of inhibition compared to other concentration. This means that at these concentrations phorbazole E has bactericidal activity against *S. aureus* growth Clearly the effect of concentration phorbazole E against the formation of inhibition zones in Mueller Hinton solid medium that had been inoculated with *S. aureus*. This is because phorbazole E containing ring oksazol which is able to inhibit the growth of microbes. Phorbazole E which has five active centers are: Cl, NH, N, O, and OH can form hydrogen bonds with the peptide portion of the substrate. This mechanism ,may lead to growth inhibition of *S. aureus*, but it still requires further research.

4. Conclusions And Recommendations
4.1 Conclusion

1. Phorbazole E has bactericidal activity against *S. aureus* growth.
2. At a concentration of 37.5 mg/500 ml phorbazole E has bactericidal activity against *S. aureus* growth.

4.2 Suggestion
1. It should be a good follow-up testing I clinical trials, clinical trial II, III clinical trials to determine the activity against animal experiments phorbazole E higher level.
2. It should be further tested using transmission electron microscopy (TEM) to determine the activity bactericidal phorbazole E on the part where the organelle of *S. aureus* that inhibited growth.

5. Reference

Brock, T. D., Madigan, M. T., Martinko, J. 2003. *Biology of Microorganisms*. New York : Prentice Hall .

Ichiba,T.Y., Scheuer,W.Y., Higa, P.J., Gravalos,DG.1991.Hennoxazoles :

Bioactive Bisoxazoles from Marine Sponge. *J.Am.Chem.Soc.* Vol. :113. p.3173-3178

Jawetz, Melnick, Adelberg.2004. *Medical Microbiology*.Thirdedition.NewYork : Published by Appleton & Lange.

Muderawan, I .W. 2003.Laporan RisetUnggulanTerpadu VIII BidangIlmu Kimia Dan proses. *SintesisdanUjiBioaktivitasForbazoldanTuruna nnya*. KementrianRisetdanTeknologiRI.LembagaIlm uPengetahuan Indonesia.

PelczarJr.,M.J.,Chan ECS.1993. *Microbiology :Consepts and Applications*. New York : McGraw-Hill Inc.

Radspieler,A. and Liebscher,2001. Synthesis of Chlorooxazoles related to Natural Products. *Synthesis*. Vol : 5.p.745-750.

Radspieler, A. 2000. UntersuchungenzurSynthese von Diazonamid A Und PhorbazolA Und C (dissertation). Humboldt-Universitatzu Berlin.

Rudi,A,1994.Phorbazoles A-D, Novel Chlorinated Phenylpyrrolyloxazoles from The Marine Sponge *Phorbasclathrata. Tetrahedron Letts*. Vol. :35.p.2589-2595.

Sulistia G.G.1998. *FarmakologidanTerapi*. Edisi 4. BagianFarmakologi FakultasKedokteran-Universitas Indonesia. Jakarta :Penerbit Gaya Baru.

Todar,K.2002. *Bacteriology 330 Lecture Topics : Staphylococcus*, University of Wisconsin Departement of Bacteriology,http://www.bact.wisc.edu/Bact330/ lecturestaph.

Walsh, C. 2000.Molecular Mechanisms that confer antibacterial drug resistence. *Nature. Vol. : 406*. p. 678-685.

Weaver, R. F. 2002.*Molecular Biology* .Second edition. Boston : McGraw-Hill

Effect Of Yoga On Atherosclerosis Risk In Type 2 Diabetes

Made Kurnia Widiastuti Giri[1] , I Wayan Artanayasa[2] Adnyana Putra[3]

Faculty of sport and health, Ganesha University of Education, Singaraja, Indonesia
Doctorate Program Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia

Email : drnia82 @gmail.com

Unhealthy lifestyles which signed by reduced physical activity and unhealty dietary intake, and an increased environmental pollution unwittingly contributing epidemiological transition with increasing cases of degenerative diseases, one of which is diabetes type 2. Yoga has established their positive effects that are beneficial in reducing stress oxidative in diabetes type 2. Objective: to analyze the effect of yoga asanas on the risk of cardiovascular disease and anxiety in patients with type 2 diabetes through the systolic and diastolic blood pressure, body mass index, glycemic parameters and anxiety scores. Methods: This study was a parallel randomized control trial on group members prolanis family doctor, with a power of 80%, α = 5%, the number of samples of 18 people in each group. Data were analyzed using parametric statistical tests paired sample t test to test the difference in results between the dependent variable and the initial observation period after treatment, while the differences between groups is done with the Chi square test. Results :In comparison with other physical activity (walking), yoga asanas resulted reduction in blood pressure in weight, waist circumference, BMI and anxiety (blood pressure −4.2 ± 4.9 vs. 0.8± 5.5, p < 0.01; weight −0.9 ± 2.3 vs. 1.7 ± 3.9, p = 0.03; waist circumference −4.1 ± 4.9 vs. 0.9± 4.5, p < 0.02; BMI −0.3 ± 0.9 vs. 0.6 ± 1.9, p = 0.04 Anxiety score −0.7 ± 2.2 vs. 1.6 ± 3.9, p = 0.02). There were no differences between group in fasting blood glucose and postprandial blood glucose Conclusion: Among patiens with type 2 diabetes, we found that participation in an 10-week yoga intervention was feasible and resulted reduction in blood pressure, BMI and anxiety. Thus would be repressed the risk of atherosclerosis but still need future research in biomolecular insight.

Keywords : Yoga, Type 2 diabetes, risk of atherosclerosis

1.Introduction

Lifestyle changing towards unhealthy lifestyles , reduced physical activity and increased environmental pollution unwittingly contributing epidemiological transition with increasing cases of degenerative diseases . Likewise, the pattern of leading causes of death indicates that the shifting epidemiological transition leading cause of death from infectious diseases to degenerative diseases . One of the chronic degenerative disease is diabetes type 2. Data Ministry of Health of the Republic of Indonesia in 2014 showed that the number of deaths compared to 2008 due to type 2 diabetes increased by 2.1% , hypertension 9.5 % , 12.1 % and stroke .

Diabetes is a disease that belongs to a group of metabolic diseases that have the characteristics of hyperglycemia caused by impaired insulin secretion or impaired function of insulin or both (American Diabetes Association, 2014). Number of patients with type 2 diabetes in the world is increasing. Data show that new cases of diabetes has reached 371 million by the year 2012 (IDF Diabetes Atlas, 2012).

Based on data from the World Health Organization (WHO) in 2013, the number of patients with type 2 diabetes reach 194 million people and is expected to rise to 366 million in 2025, and half of that number in developing countries, including Indonesia. WHO predicts diabetics in Indonesia will continue to rise until ranks 4th in the world in 2030. The prevalence of events is increasing worldwide every year, making the problem of type 2 diabetes is in need of continuous research in the development of prevention and therapy in the standard type 2 diabetes.

Conditions of chronic hyperglycemia in diabetes can cause damage , dysfunction until the condition of organ failure in multiple organs , especially the eyes , kidneys , nerves , heart and blood vessels . Chronic complications of DM in Indonesia consists of a neuropathy 60 % , 20.5 % of coronary heart disease , diabetic ulcers 15 % , 10 % retinopathy , and nephropathy 7.1% . (American Diabetes Association , 2014) . Data from registers Sanglah Hospital Medical Record in 2013 , showed that the prevalence of type 2 diabetes cases in Bali is currently quite high . Results of data collection through a

preliminary study conducted by researchers at the Sanglah Hospital in Denpasar , the data obtained outpatients in January 2011 to August 2013 amounted to 3156 patients and 613 souls of them experienced complications did not rule out the possibility that number will increase in the coming years.

Efforts to prevent the rate of increase in the prevalence of type 2 diabetes will require standard medications therapy, the increased knowledge and healthy behavior and psychological stress management considering that most major risk factors associated with type 2 diabetes is a lifestyle and psychological stress. American Diabetes Association (ADA) considered intervention in the form of a simple lifestyle changes, such as a healthier diet and regular physical activity, it can significantly reduce the risk of diabetes in those at high risk. Yoga is a physical activity that can be recommended for patients with Diabetes Type 2. Yoga has studied the positive effects that are beneficial in reducing oxidative stress in type 2 diabetes (Hedge, 2011). Research on the effects of yoga on oxidative stress, control blood glucose levels, blood pressure control, and anthropometry in type 2 diabetic patients with or without complications summed up the results of research that yoga can be used as an effective therapy in reducing oxidative stress in type 2 diabetes as well Yoga useful in improving glycemic parameters and body mass index and can be supplied as a standard therapy for lifestyle intervention in patients with risk factors of type 2 diabetes (McDermott, 2014). Metaanalysis of the effect of yoga on the risk of Cardiovascular Disease (CVD) showing the effectiveness of yoga was varied and found some biases of studies on yoga and the CVD (Hartley, 2014). Atherosclerosis in CVD is the cause of significant morbidity and mortality in type 2 diabetes (Papagianni et al., 2003)

Based on relevant phenomena and study mentioned above, researchers wanted menganailisis effectiveness of yoga to the risk of atherosclerosis in patients with type 2 diabetes is based on the concept of exercise physiology study the physical exercises in yoga is anaerobic exercise that uses free fatty acids as a source of primary metabolism . It will also be strengthened from the effects of yoga in the implementation of meditation associated with the influence of the hormone cortisol in the metabolism of glucose and lipids in type

2 diabetic patients .Through both the logic of the basic metabolism , the researchers analyzed the effect of yoga on the risk of atherosclerosis in patients with type 2 diabetes the systolic and diastolic blood pressure, body mass index, glycemic parameters and anxiety scores.

2. Methods
Study design and participants
This was a randomized controlled trial conducted in Buleleng,Bali, Indonesia. The study written informed consent was obtained from all participants. Participants were recruited over on week, (March 20, 2015- April 28, 2015) using physical examination result written on medical recoreds in primary care clinics of authors practice as family doctor. All of the participants, whom classified in prolanis group, having screening by inclusions criteria include :
: 1) diagnosed with T2DM ; 2) age between 40-50 years; and 3) willingness to participate in an 10-weeks yoga program. Exclusion criteria included: 1) an inability to provide informed consent; 2) taking medications associated with insulin resistance (e.g glucocorticoids, thiazide diuretics, nicotinic acid ß-blockers) ; 3) active other chronic disease; 4) pregnant.

Sample size and randomization procedures
Based on this study's primary feasibility and preliminary efficacy. Randomization was performed using computer generated random numbers and group assignments delivered in sealed, opaque envelopes generated by off-site study staff. Participants were not blinded to their group assignment.
Intervention
Yoga classes were offered on two days of each week. The classes were held in a community hall and taught by two yoga asanas trainers. While one instructor demonstrated postures for the class, the other instructor adjusted individual participant's postures or given them suitable alternative postures if necessary.

The yoga intervention was designed to manage glucose levels by increasing metabolism, reducing stress and facilitating a positive outlook. According to the methods of research study by Mc Dermott et al, 2014 so the authors agree to arrange each class lasted 60 minutes total and had the following components : diabetes and stress management education (10 minutes); breathing exercise (6 min); loosening exercise (10 min); standing poses (8min);

supine poses (8min); prone poses (8min); sitting poses (8min); relaxation/corpse pose (6min); chanting exercise and seated meditation (10 min) (see Table 1 for a more detailed account of postures). The total active time in poses was approximately 32 minutes (Dermott, 2014). . Evidence suggests that these poses specifically improve muscle metabolism and stress response (Alexander,2013) and the breathing exercise enhance basal metabolic rate (Telles, 1996)

Participants were asked to do a home practice if they were unable to attend at least three classes in a given week and were asked to keep track of each home practice in a daily diary.

Table 1 yoga class material and asana sequencing

1. Didactics-10 minute
   Diabetes causes, complications and lifestyle factors Principles, philosophy and practices related to a yoga based lifestyle program
   Stress response
   Maladaptive behavior and behavior change
   Emotion and coping.
2. Pranayama (breathing-exercises)-6 minute
   Hands stretch breathing
   Ankle stretch breathing
   Tiger breathing
   Rabbit breathing
3. Loosening exercise (any 3) – 10 minutes
   Jogging
   Forward, backward, sidebending
   Twisting
   Pavanamuktasana kriya (supine knees to chest)
   Surya namaskara (3 sun salutions)
4. Standing asana (any 3)-8 minutes
   Padahasthasana (food hand)
   Ardachakrasana (half moon)
   Parshvakonasana (side angle)
   Ardakti chakrasana (half wheel)
   Vrikshasana (tree)
5. Supine asana-8 minutes
   Sarvangasana (shoulder stand)
   Halsana (plough)
   Matsyasana (fish)
   Pavanamuktsana (supine knee chest position)
   Naukasana (boat)
6. Prone asana- 8 minutes
   Bhujangasana I,II,II (cobra)
   Shalabhasana-alternate legs both (locust)
   Dhanurasana (bow)

    Navasana (boat)
7. Sitting asana – 8 minutes
   Paschimottanasana (seated forward bend)
   Vakrasana/ardhamatsyendrasana (half twist)
   Ustrasana (camel)
   Sashankasana (Rabbit)
8. Relaxation shavasana (corpse) with guided scan-6minutes
9. Chating 'om' monosyllables, primordial sounds in Indian philosopy.

Control

The control group was asked to do 30 minutes of walking plus breaks for rest on two to three days per week during each of the 10 weeks of the study. In cluding rest breaks, the total time was approximately equivalent to the 60 minute yoga class.

Measure

Primary feasibility outcomes were blood pressure, weight and waist circumference, glycemic parameter which was FBG and Post Prandial Blood Glucoose. Blood pressure measured by staff who blinded to the group of participants doing checked by sphygmomanometer. That also in measurement of body weight, height and Waist circumference. For blood test in order to check the glycemic parameter was got from medical record for baseline data and aftre treatment by laboratory tested in RSUD Buleleng .

One of secondary outcomes related to psychological wellbeingwas anxiety. Anxiety was measured using the Hospital Anxiety Scale (HADS), a 14-item questionnaire that avoids measuring symptoms such as fatigue that may be influenced by diabetes risk factors (Zigmond,1983).

Data analysis

This study was a parallel randomized control trial on group members prolanis family doctor, with a power of 80%, α = 5%, the number of samples of 18 people in each group. Data were analyzed using parametric statistical tests paired sample t test to test the difference in results between the dependent variable and the initial observation period after treatment, while the differences between groups is done with the Chi square test.Within group changes and between group treatment effect associated with participation in the yoga intervention were evaluated using chi-square tests for categorical data and paired t-tests, independent sample t-tests. Change scores

were calculated as post intervention minus baseline measurements.

3. Result

In comparison with other physical activity (walking), yoga asanas resulted reduction in blood pressure, in weight, waist circumference, BMI and anxiety (blood pressure −4.2 ± 4.9 vs. 0.8± 5.5, p < 0.01; weight −0.9 ± 2.3 vs. 1.7 ± 3.9, p = 0.03; waist circumference −4.1 ± 4.9 vs. 0.9± 4.5, p < 0.02; BMI −0.3 ± 0.9 vs. 0.6 ± 1.9, p = 0.04 Anxiety score −0.7 ± 2.2 vs. 1.6 ± 3.9, p = 0.02). There were no differences between group in fasting blood glucose and postprandial blood glucose.

The two group were similar at baseline. In the yoga group, the mean age was 45.0±9.7 and 43%of participants were male compared to the control group where the mean age was 46.2±9.1 and

35% of participants had significantly greater reductions in weight, waist circumference and BMI versus the walking control participants (waist circumference −4.1 ± 4.9 vs. 0.9± 4.5, p < 0.02; BMI −0.3 ± 0.9 vs. 0.6 ± 1.9, p = 0.04 Anxiety score −0.7 ± 2.2 vs. 1.6 ± 3.9, p = 0.02) Table 3. There were no significant between group differences in FBG, PPBG, or anxiety.

Table 2 Baseline for yoga and control groups as

	Yoga (n=21)	Control (n=20)
Age (year)	45.0 ± 9.5	46.2± 9.1
FastingBG (mmol/L)	6.0 ±0.9	6.4± 1.9
PostprandialBG (mmol/L)	8.0 ±2.6	6.9± 1.2
BMI(kg/m2)	29.4 ±5.3	28.9± 2.0
Weight (kg)	70,3 ±30.5	60.7±301
Waist (cm)	93.5 ±7.3	90.8± 7.2
Sytolic (mmHg)	126.9 ±8.3	127.6±11.4
Diastolic (mmHg)	89.2±9.1	88.3± 6.3
Anxiety	7.9 ±5.2	8.8± 5.2

Table 3 change score within yoga and control, and difference between group with 95% CI

	Yoga (n=20)	Control (n=18)
Fasting BG (mmol/L)	0	-0.3
Postprandial BG (mmol/L)	-0.6	0.1
BMI (kg/m2)	-0.3	0.6
Weight (kg)	-0.9	1.7
Waist (cm)	-4.1*	0.9
Systolic (mmHg)	-4.3*	-5.4*
Diastolic (mmHg)	-5.3*	-3.6*
Anxiety	-0.7*	-1.6*

	Diff. (yoga-Ctrl) [95%CI]	P Diff.
Fasting BG (mmol/L)	0.3[-0.5 to 1.1]	0.43
Postprandial BG (mmol/L)	-0.7[-2.4 to 0.9]	0.38
BMI (kg/m2)	-0.8[-1.6 to -0.0]	0.05
Weight (kg)	-2.3[-4.1 to -0.4]	0.02
Waist (cm)	-4.9[-7.9 to -1.9]	<0.01
Systolic (mmHg)	0.1[-4.8 to 5.1]	0.95
Diastolic (mmHg)	-1.7[-7.6 to 4.1]	0.55
Anxiety	0.7[-1.7 to 1.1]	0.22

4. Disscussion

The authors found a significant decreaof se in measurements result weight, BMI and waist circumference in the yoga group compared to the control groups, however we did not see a decrease in FBG, PPBG, insulin, insulin resistance, blood pressure, or cholesterol. We did find significant within group decreases in blood pressure and total cholesterol in both yoga and walking control groups as well as within group improvements in measures of psychological well-being.

In the yoga group, positive changes in weight, BMI and waist circumference are similar to other reports in the literature (Ines, 2005; Yang, 2011; Seo,2012) while the lack of within group change in FBG is contratry to other report in high risk populations (Ines,2005;Kanaya, 2014)

While both groups had statistically significant within group improvements in measure of anxiety, there were also significant differences between group. The control group group likely experienced significant improvement in psychological well-being based on the walking that they were asked to participate in three to six days a week. While we had initially hypothesized that the yoga would improve mood based on a number of factors the effect of increased walking in the control group appears to have had an equally powerful effect.

Three are serveral important limitations in our study. First, several participants did not study was conducted in a small communitythat not could be a prepresentative of all communities in Bali. This potentially limits the generalizability of feasibility and adherence findings outside of Buleleng. Second, our study was not controlling the walking activity of control groups as their physical activities, and also for yoga group , we had not take a documentation by the participants whom done their yoga at home in a few days.

5. Conclusions

In summary, our study has several implications for future investigations of yoga-based interventions for patients with T2DM. Our result indicate that yoga is a feasible

intervention strategy and may help reduce weight BMI and waist circumference three important factors in T2DM risk. We did not find clear evidence of benefit in FBG and PPBG, however, over time, improvements in weight and waist circumference could yield additional improvements in these parameters. Among patiens with type 2 diabetes, we found that participation in an 10-week yoga intervention was feasible and resulted reduction in blood pressure, BMI and anxiety. Thus would be repressed the risk of atherosclerosis but still need future research in biomolecular insight.

6. Acknowledgements

The authors acknowledge Prof. Dr. Bambang Purwanto, former professor at Sebelas Maret University, Adnyana putra and artanayasa ,both as my team writing this article, Dr. Arie Suwastini , whose suggestions contributed to improve the quality of the final version of the manuscript. All familly and friends who gaves me support untill this article could be written. Reviwer and the ICIRAD's team for all the links create and make this manuscript accepted with suggestion for revissions.

7. References

American Diabetes Association (2014).Diagnosis and classification of diabetes Mellitus.*Diabetes Care*, Vol. 33, Suplement 1, pp: 562-569.

Alexander GK, Innes KE, Selfe TK, Brown CJ: More than I expecteD ; Perceived benefits of yoga practice among older adults at risk for cardiovascular disease. Complement Ther Med 2013,21:14–28.

Bailey L, 2015..*Encyclopedia of aging and public health : Yoga*. Springer Publishing Company, .Ed. 7.New York.

Bali H K, 2013.Yoga E An Ancient Solution To A Modern Epidemic.Ready For Prime Time?*Indian Heart Journal* 65 (2013),p :132-136

Barrett PH.,Ooi EM, Watts GF, Chan DC, Nielsen LB, Plomgaard P, Dahlbäck B, 2010.Association of apolipoprotein M with high-density lipoprotein kinetics in overweight-obese men.*Atherosclerosis.* May;210(1):326-30. doi: 10.1016/j.atherosclerosis.2009.11.024.

Ceriello A et al., 2005. Acute hyperglycaemia: a 'new' risk factor during myocardial infarction.*European Heart Journal* .

Daniele Martarelli, Mario Cocchioni, Stefania Scuri, and Pierluigi Pompei, 2011. Diaphragmatic Breathing Reduces Exercise-Induced Oxidative Stress. *Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine* Volume 2011, Article ID 932430, 10 pages doi:10.1093/ecam/nep169

Hartley L, Dyakova M, Holmes J, Clarke A, Lee MS, Ernst E, Rees K, 2014. Yoga for the primary prevention of cardiovascular disease.*Cochrane Database of Systematic Reviews* 2014, Issue 5. Art. No.: CD010072. DOI: 10.1002/14651858.CD010072.pub2.

Hegde SV, Adhikari P, Kotian S, Pinto VJ, and Vivian DZ. "Effect of 3-Month Yoga on Oxidative Stress in Type 2 Diabetes With or Without Complications :A controlled clinical trial "Diabetes Care, 2011. 34:2208–2210

Ines K, Bourguignon C, Taylor A: Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: A systematic review. J Am Board Fam Pract 2005,18:491–519.

International Diabetes Federation (2013).IDF Diabetes Atlas. Sixth edition. pp: 30-34.

Kanaya AM, Araneta MRG, Pawlowsky SB, Barrett-Connor E, Grady D, Vittinghoff E, Schembri M, Chang A, Lou Carrion-Petersen M, Coggins T, Tanori D, Armas JM, Cole RJ: Restorative yoga and metabolic risk factors: The Practicing Restorative Yoga vs. Stretching for the Metabolic Syndrome (PRYSMS) randomized trial. J Diabetes Complicat 2014, 28: 406–412.

McDermot A, Rao MR, Nagarathna R, Murphy EJ, Burke A, Nagendra RH, et al. "A Yoga Intervention For Type 2 Diabetes Risk Reduction: A Pilot Randomized Controlled Trial " *BMC Complementary and Alternative Medicine* 2014, 14: 212

Papagianni A,Lampropoulou IT, Stangou M, Didangelos T, Efstratiadis G.2014. TNF-α and microalbuminuria in patients with type 2 diabetes mellitus. *Journal of Diabetes Research*:394206. doi: 10.1155/2014/394206. Epub 2014 Dec 22.

Sahay BK: Yoga and diabetes. J Assoc Physicians India 1986, 34: 645–648.

Seo DY, Lee S, Figueroa A, Kim HK, Baek YH, Kwak YS, Kim N, Choi TH, Rhee BD, Ko KS, Park BJ, Park SY, Han J: Yoga Training Improves Metabolic Parameters

in Obese Boys. Korean J Physiol Pharmacol 2012, 16:175.

Telles S, Nagarathna R, Nagendra HR: Breathing through a particular nostril can alter metabolism and autonomic activities. Indian J Physiol Pharmacol 1994, 38: 133 –137.

Telles S, Nagarathna R, Nagendra HR: Physiological measures of right nostril breathing. J Altern Complement Med 1996, 2: 479–484.

Yang K, Bernardo LM, Sereika SM, Conroy MB, Balk J, Burke LE: Utilization of 3-Month Yoga Program for Adults at High Risk for Type 2 Diabetes: A Pilot Study. Evidence-Based Complement Altern Med 2011, 2011:1–6.

Zigmond AS, Snaith RP: The hospital anxiety and depression scale. Acta Psychiatr Scand 1983, 67: 361–370.

NATRIUM CHLORIDE AND CUPRI SULFATE AGAINST GROWTH OF CYANOPHYTE ALGAE ISOLATION FROM BRICK TEMPLE

N. L. P. Manik Widiyanti[1], I. A. P. Suryanti[2]
Biology Department of Education, Ganesha University of Education, Singaraja[1]
Biology Department of Education, Ganesha University of Education, Singaraja-Indonesia[2]

E-mail: manikwidiyanti@gmail.com

Abstract

Bali is popular as a thousand temples island because of the many temples in Bali. The main construction of the temple in Bali-based such as brick, sandstone and red rock. Prevention decomposition of building materials can be done by way of physics and chemistry. One of control to this growth of microorganism is use NaCl and cuprisulfate (CuSO4). The research about the effect of salt (NaCl) and cupri sulphate (CuSO4) against the growth of *Cyanophyte* algae aims to compare the various concentration between salt and cupri sulphate in inhibiting the growth of *Cyanophyte* algae isolated from brick temple building in the village of Tejakula Buleleng. This experimental research used *randomized control group design*. The procedure of this research is started with data collection, observation of objects by counting the number of algae growth in medium which given various concentration of salt and cupri sulphate, 0%, 5%, 10%, 15%, 20%, and 25%. Univariate analysis showed the influence concentration (5%, 10%, 15%, 20% and 25%) against inhibition growth of algae with 2 types treatment is NaCl and CuSO4, interaction between treatment showed less from 0.05 is 0.000 (significant different). The result showed that treatment with salt and cupri sulphate in different concentration inhibiting the growth of Cyanophyte algae. This is evidenced by the existence of barrier to the growth of algae in salt medium is better than cupri sulphate, except in 10% concentration. *Cyanophyta* algae isolated from brick temple building materials in Tejakula Village Buleleng also grow well on aquadest medium.

Keywords: Cyanophyte, isolated, inhibition, salt, cupri sulphate

1. Introduction

Bali is popular as a thousand temples island because of the many temples in Bali. This caused by activity pattern of Balinese society adheres to Hinduism and their daily activities. The main construction of the temple in Bali-based such as brick, sandstone and red rock. This objective is to strengthen the temple. Bricks as one of the basic ingredients of temples, originating from clay with other materials. Good brick containing a certain ratio of sand and clay so that when added to water is plastis. Lime is added in manufacture of bricks useful for melting process of sand during combustion and bind soil grain. This lime will react and expand when exposed to water so as to glue the brick. But if too much lime, bricks will crack. In addition to lime, bricks must either contain little iron oxide because of the shape of bricks rectangular, angled elbows sharp and flat surface (Swastikawati, 2012).

There are 2 tropical climate in Indonesia : the rainy season and dry season which causes the growing division of microorganisms such as algae, causing decomposition of the rock. Decomposition that occurs negative impact on weaker building construction, as well as the declining value of the beauty of the temple and community spiritual activity becomes disturbed. Prevention decomposition of building materials can be done by way of physics and chemistry. Electro-osmosis method using DC and EOP (Electro-Osmosis Pulse) 30V signals can control the water in the bricks (Wicaksono, 2012) where knowing, organism such as microorganisme include algae need of water in their growth. Chemical substance can be used to fill the grout between temple rock among others epoxi resin (syntetic of resin) for conservation Borobudur temple (Gunawan, et al., 2011). One of control to this growth of microorganism is use NaCl and cuprisulfate (CuSO4). The mechanism of action NaCl inhibit growth of microorganisme because clorine as one composition NaCl interfere with proteolytic enzymes cause protein denaturation.To compare the effect of NaCl with cupri sulfate normally used to inhibit the growth of algae in swimming pool. Cupri sulfate is a chemical compound with the formula CuSO4 ie salt anhidrus pale green form or in form of powder, as pentahydrate bright blue. Blue color is the result of hydration water. When heated in an open heating, crystal

dehydrated and turned into grayish-white. Cupri sulfate pentahydrate is also used as a drug (herbicide), fungicides and pesticides are used to control fungi that growth in apples, melons and grains. Cupri sulfate is also used in swimming pools as algacide. Others use in aquarium to overcome parasit infections in fish. Cupri sulfate use to prevent the growth of *Escherichia coli* bacteria. The aim of this research is to compare the various concentration between salt and cupri sulphate in inhibiting the growth of *Cyanophyta* algae isolated from brick temple building in the village of Tejakula Buleleng.

2. Methods

2.1 Type of Research

This research is true experimental research.

Design Of Research

This experimental research used *randomized pre-posttest control group design*. This design was used Complecated Randomized Design. In each treatment comprises 5 replication. Formulation of treatment and replication is : t (r-1) > 20; t = treatment, r = replication (Gazpersz, 1991).

Research Population and Sample

Population of this research is amount of algae growth in brick temple in Tejakula Buleleng-Bali. Sample in this research is pure culture of Cyanophyte algae isolation from brick temple in Tejakula Buleleng-Bali with *simple random sampling* technick.

Research Variable

Independent variable in this research is variying concentration of salt (NaCl) and CuSO4 (0%, 5%, 10%, 15%, 20% and 25%). Dependent variable in this

research is amount of cyanophyte algae isolated from brick temple in Tejakula Buleleng-Bali with treatment by varying concentration NaCl and CuSO4. Control variable in this research are : growth medium of cyanophyte algae in *Blue Green Media*-11 (BGM-11 : Sigma), environmental of isolation algae, incubation environment and equipment used the research. Formulation of Ble-Green Medium each 1 litre is NaNO3 :1,59g; K2HPO4 : 0,039 g; MgSO4.7H2O: 0,075 g; Na2CO3: 0,02 g; Ca(NO3)2.4H2O : 0,02g; Na2SiO3.9H2O : 0,058 g; EDTA : 0,001 g; Citric acid : 0,006 g; FeCl3 : 0,002 g; Microelement 1 ml comprises : H2BO4 : 2,86 g; MnCl2. 4 H2O :1,81 g; ZnSO4.7H2O : 0,222 g;NaMoO4.2H2O : 0,391 g; CuSO4.5H2O : 0,079g; Co(NO3)2.0,0494 g (James, 1978).

Research Equipment

This research was used equipment include : cotton, aluminium foil, glove, masker, label, plastick, transport medium, latex girdle, tube, sparger, glass beker, pippet, glass volume, analytical balance, erlenmeyer, bunsen, hot plate and autoclave.

Grouping of Data

Grouping of data by count of amount cyanophyte algae in BG-11 medium result the treatment.

Statistic Analysis of Data

Statistic Analysis of data by UNIVARIATE. If significant difference occure in each treatment continued analysis by Least Significant Different (LSD) in 5% level.

Results The Research

Table 3. The total of algae after treatment of NaCl and CuSO4

Table 3. The total of algae after treatment of NaCl and CuSO4

Concentration Replication	10-1	10-2	10-3	10-4	10-5	Average	CCRC
NaCl 5%							
1	2010	37300	255000	980000	9700000	2194862	21948620000
2	2110	26500	259000	1140000	8600000	2005522	20055220000
3	3290	21000	234000	1020000	9900000	2235658	22356580000
CuSO4 5%							
1	3980	38200	378000	3110000	32000000	7106036	71060360000
2	3420	29900	300000	3410000	30000000	6748664	67486640000
3	3610	23100	223000	3190000	10100000	2707942	27079420000

NaCl 10%							
1	2520	22200	156000	1410000	3900000	1098144	10981440000
2	2210	20100	168000	1630000	6300000	1624062	16240620000
3	1590	18900	143000	1120000	4000000	1056698	10566980000
CuSO4 10%							
1	4010	38300	400000	3000000	18500000	4388462	43884620000
2	2680	33300	377000	3020000	12300000	3146596	31465960000
3	2790	32100	370000	2670000	17200000	4054978	40549780000
NaCl 15%							
1	1440	13600	90000	710000	2900000	743008	7430080000
2	930	9700	29000	450000	3300000	757926	7579260000
3	690	9900	66000	270000	6000000	1269318	12693180000
CuSO4 15%							
1	1510	21500	198000	1690000	10800000	2542202	25422020000
2	1210	13500	210000	1290000	13000000	2902942	29029420000
3	1130	10200	189000	1010000	16500000	3542066	35420660000
NaCl 20%							
1	1100	9900	29000	290000	2700000	606000	6060000000
2	720	8700	24000	280000	3000000	662684	6626840000
3	320	4500	35000	250000	2900000	637964	6379640000
CuSO4 20%							
1	1030	19800	171000	930000	7200000	1664366	16643660000
2	1980	13000	123000	1000000	8800000	1987596	19875960000
3	950	15400	93000	950000	11100000	2431870	24318700000
NaCl 25%							
1	1200	3300	45000	300000	2900000	649900	6499000000
2	1010	3700	60000	590000	2700000	670942	6709420000
3	840	6500	70000	310000	2400000	557468	5574680000
CuSO4 25%							
1	1220	12900	210000	1290000	9300000	2162824	21628420000
2	1240	10200	101000	1170000	7600000	1776488	17764880000
3	1200	16800	191000	290000	10300000	2159800	21598000000

After the Kolmogorov Smirnov test and Levene test done, continued by Univariate analysis showed the influence concentration (5%, 10%, 15%, 20% and 25%) against inhibition growth of algae with 2 types treatment is NaCl and CuSO4, interaction between treatment showed less from 0,05 is 0,000 (significant different). That mean the hypothesis (H1) is accepted and H0 is rejected. That means There are influence of variying concentration against amount of algae. The continued analysis is LSD test after Univariate analysis. The LSD test results : treatment by NaCl showed concentration 5% is significant different with 10%, 15%, 20% and 25%. Treatment by NaCl which 10% concentration with NaCl 15% concentration not significant different. Treatment by NaCl 15% is not significant different with concentrations NaCl 20% and 25% respectively. Treatment by NaCl with 20% concentration not significant different with treatment by NaCl 25% concentration.

Treatment by CuSO4 showed concentration 5% is not significant different with 10% and 15% CuSO4 concentrations. Treatment by CuSO4 which 10% concentration with NaCl 15%, 20% and 25% concentrations not significant different. Treatment by CuSO4 15% is not significant different with concentrations CuSO4 20% and 25% respectively. Treatment by CuSO4 with 20% concentration not significant different with treatment by NaCl 25% concentration.

Interactions concentration and treatment in this study can be seen in Figure 1.
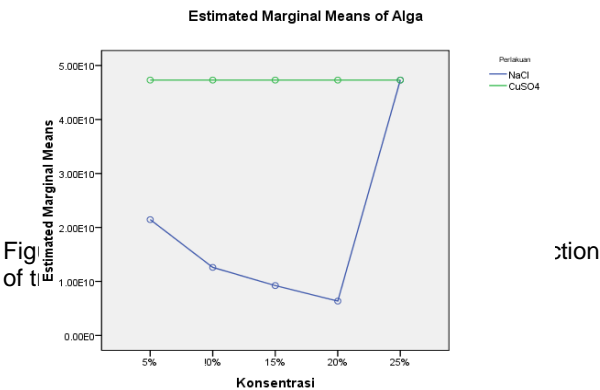
Estimated Marginal Means of Alga

Figure ... ction of t...

rocks wet or damp soil. Terrestrial blue-green is usually grown in the rainy season, and coating on the soil, beneath the surface of the soil and at a depth of a meter or more. There is also growing in hot spring with a temperature of 85^0C. In the hot springs water with the characteristics of water contain calcium and magnesium compound, espicially bicarbonate, blue green algae cause a precipitation (precipitated) calcium and magnesium salts in the form of an insoluble carbonate. The amount of carbonates thus precipitated is so considerable that material deposited may attain a thickness of 2-4 mm during the course of a week. The terraces of travertine thus formed are usually a brilliantly colored by overlying layer of algae (Smith, 1955).

The result showed the amount of algae isolated from brick temple in Tejakula Buleleng-Bali and grown on BG-11 medium is 4,7302780.10^{10} cell/ml. Algae isolated from brick, influence by environmental conditions likes temperature, moisture, humidity, pH and amount of light

...cyanophyta algae, the blue green algae, differ from other algae. There are the only one algae which the pigments are peripheral portion of the protoplast and include chlorophyl α, carotenes and distinctive xantophylls. In addition, there is a blue pigment (c-phycocyanin) and red pigment (c-phycoerythrin). Another unique feature of Cyanophyta is a primitive type of nucleus, the central body, which lacks a nucleolus membrane and nucleoli. The habitat is usually in freshwater,

Figure 2. Bubble in aquadest and treatment (documentation researcher)

Temperature in Tejakula in October 2014 is 28-30^0C. Samples taken in brick temple with 2 transects area measuring 1 cm x 1 cm. Algae growth on BGM-11 and treatment using NaCl and CuSO4 to determine its inhibition, conducted in 2014 October-Nopember in laboratorium of microbiology Ganesha University of Education in Singaraja-Bali. Temperature in laboratorium between 28-30^0C and the highest amount of light in afternoon is 700-744 luxmeter (from table 01). These conditions allow the growth of cyanophyte algae because the algae have chlorophyl pigment contained in protoplas for photosynthesis. Moisture and high humidity in the area both isolated algae and conditions in laboratorium are 58-64% and 20-25 respectively, allows algae to grow, because cyanophyte generally live in aquatic environment, rainy season and in land. Fusion tropical temperature, moisture and humidity provide the flourishing of algae in BG-11 medium (table 03) and also aquadest medium (table 06). The growth of cyanophyte algae also in hot spring with optimal temperature is 85^0C . The growth of cyanophyte algae in aquadest showed higher than BG-11 medium (table 06) with gain score is 6,28E+10 cell/ml. The growth of cyanophyte algae in aqudest showed high growth (table 06) with amount is 1,10088E+11 cell/ml, in accordance with statement Smith (1955), habitat of cyanophyte algae usually in freshwater, wet rock and wet soil. Beside that, cyanophyte algae

is the only alga that have pigments are localized in certain cromatophora is peripheral portion of protoplast and include into chlorophil α, caroteen and xantophylls. This causes cyanophyta algae assisted by light can produce of food through photosynthesis which marked the bubles in all media, showed the cyanophyte algae produce oxigen (bubbles) (Salisbury & Ross, 1995); Dwidjoseputro (1992).

Aquadest is a good medium for the growth of algae (Figure 2.a). At the time of treatment, the pH medium affects the growth of algae. Aquadest and NaCl have a neutral pH, whereas CuSO4 have acid pH. According Kaseno (BPPT, 2002), the characteristics of the media with acid pH is precipitate anorganic ions such as calcium, magnesium and sodium or natrium. This allows cyanophyta algae grow well in brick temple where the base material of brick is clay that consist such as Na and Mg, Ca, Si (Sitohang and Hazairin, 2002). Seen from the composition of BG-11 medium is medium growth of cyanophyta where that mineral is medium compositions growth of cyanophyta. The complete growth of cyanophyte medium is NaNO3 :1,59g; K2HPO4 : 0,039 g; MgSO4.7H2O: 0,075 g; Na2CO3: 0,02 g; Ca(NO3)2.4H2O : 0,02g; Na2SiO3.9H2O : 0,058 g; EDTA : 0,001 g; Citric acid : 0,006 g; FeCl3 : 0,002 g; Microelement 1 ml composed by : H2BO4 : 2,86 g; MnCl2. 4 H2O :1,81 g;

ZnSO4.7H2O : 0,222 g;NaMoO4.2H2O : 0,391 g; CuSO4.5H2O : 0,079g; Co(NO3)2.0,0494 g (James, 1978). Precipitation of inorganic ions cause bicarbonate becomes insoluble due to algae growth. Chalk (carbonate) or CO3 were added to the clay in the brick-making is useful to assit the process of melting the sand during warm of brick and bind soil grains. This carbonate will be react and expand when exposed to water so can glue the brick (Swastikawati, 2012). The water reacts with CO3 to form carbonic acid (H2CO3). Growth of algae that cause precipitate carbonate constituent brick, causing decomposition brick as building material temple. The results showed that treatment of NaCl and CuSO4 against growth of algae, NaCl inhibits growth of algae better than CuSO4. The function of salt (NaCl) as inhibit growth spoilage and patogenic microorganisms because it has anti-microorganisms that will increase the osmotic pressure of the substrate, causing the withdrawal of water from medium will reduce the growth of microorganisms, causing withdrawal of water in cell so that the cells will lose water and shrinkage, ionization ion salt will produce toxic chlor against microorganisms, and can disturb mechanism of action proteolytic enzyme because can cause denaturation of protein protein (Winiati, 1992). It is also disclosed by Estiasih (2009) is the addition of salt have function as preservation because the high salt concentration produces high osmotic pressure and low water activity. These extreem conditions cause most microorganisms can not survive (Estiasih, 2009). Cuprisulfate (CuSO4) is also expressed as inhibit to microorganism include fungi, algae, bacteria (Suheryanto, 2010), anti moss on pool, (Sukma, 2013), but the data obtained CuSO4 inhibit algae lower than NaCl.

The results was showed NaCl inhibit growth of algae better than CuSO4 for all concentrations is 5%, 10%, 15%, 20% and 25%. Sartini et al (2010) research shows CuSO4 as inducers of endofityc fungi isolated from the shell of cacao (*Theobroma caccao*) to produce polifenol oxidase enzyme where the function of enzyme to prevent bacterial infection in Parkinson's patient and melanin synthesis. Beside that, it also used extensively in food. In fungi is *Alternaria* sp, this enzyme is extracelluler. This means the function of CuSO4 as *growth factor* for certain enzyme in fungi. According to Arifin (2007) Cu is micro-mineral that roles in metabolisme process in body. Baker *et al* (1991)., Johnson and Engle (2003) stated that the copper metal forms provided with the feed mixturte is usually shaped like a copper salt like CuSO4, copper-oxide, copper-carbonate and copper-proteinat. CuSO4 aand copper-oxide often added to ruminant feed. According James (1978) CuSO4 is one of micro-elements needed for growth of *blue green algae.* Look at the characteristics of the chemical NaCl and CuSO4 in inhibit growth of algae (when compared to its growth in *aquadest*). Optimal inhibition CuSO4 aginst growth of algae in concentration 20%. Concentration CuSO4 25% in inhibit growth of cyanophyte microalgae less than concentration 20%. So the optimal use to inhibit of algae is CuSO4 20%. The high concentration of cuprum be a limiting factors of microalgae as stated by Tokarnia *et al* (2000) which states that the poisoning of Cu-metal infuence by several factors among others metal content that ingested, the duration of the consumption, age, species, sex, and habits of eating certain food. According Suheryanto (2010) Cupri sulfate (CuSO4) as inhibition of microorganisme include fungi, algae and bacteria.

4. Closing

There is the influence of the different concentration of salt and CuSO4 (0, 5%, 10%, 15% and 25%) against cyanophyte algae growth isolated from brick temple in Tejakula Buleleng-Bali. There is inhibition growth of cyanophyte algae isolated from brick temple in Tejakula Buleleng against treatment NaCl and CuSO4 except treatment by CuSO4 10% which is determined by gain score before and after treatment. Inhibition growth of cyanophyte algae isolated from brick temple in Tejakula Buleleng Bali used NaCl better than CuSO4. Cyanophyte algae isolated from brick temple in Tejakula Buleleng Bali also growth well in aquadest media.

5. References

Ahmadun, F., Alireza, P., Luqman, C.A., Dayang, R.A. B., Sayed, S.M., Zurina, Z.A. 2009. Review of Technologies for Oil and Gas Produced Water Treatment. J. Of Hazardous Materials. Hazmat -10003 : 1-5

Arifin, Z. 2007. Pentingnya Mineral Tembaga (Cu) dalam Tubuh Hewan dalam Hubungannya dengan Penyakit. Wartazoa. 17 (2).

Baker, D.H., J. Odle., M.A. Frank and T.M. Wieland. 1991. Bioavailability of Copper in Cupric Oxide and in a Copper-Lysine Complex. Poult.Sci. 70:177

Berdrikovetsky., P, G., Eric, J. M., Raphael M.PS., Flavia, M.R.P., Fransiska, F.S. 2009. Produced Water Re-Injection with Seawater Treated by Sulphate Reduction Plant : Injectivity decline, Analitycal Model. J. Of Petroleum Sci and Engineering

Burhanuddin, S. 2001. *Proseding Forum Pasar Garam.* Jakarta : Badan Riset Kelautan dan perikanan

Darmawan, R., Hidayat F., Sri, R.J., Farid, E., Dyah, W.R. Laboratorium Pengolahan Limbah Industri. Jurusan Tekhnik Kimia, Fak Teknologi Industri, ITS.

Darwis. 1990. Pengaruh Beberapa Jenis Media Organik Lapuk Terhadap Daya Bertahan Hidup Cendawan *Metarhizium anisopliae* (Metch) sorokin Dalam Hubungannya dengan Pengendalian Hama *Oryctes rhinocheros* L. Fakultas Pascasarjana. KPK IPB-UNSRAT

Dwidjoseputro, D. Pengantar Fisiologi Tumbuhan. Jakarta : PT Gramedia Pustaka Utama

Estiasih, T. 2009. *Tekhnologi Pengolahan Pangan.* Malang : Bumi Aksara

Gaspersz. V. 1991. *Tekhnik Analisa Dalam Penelitian Percobaan.* Bandung : Tarsito

Gunawan, A. Cahyandaru, N., Muhamad, R. 2011. Kajian Pengembangan Bahan Konservasi Mortar tradisional (Hyduaulic Mortar).

Irianto, A. 2004. *Statistik Konsep Dasar, Aplikasi, Dan Pengembangannya.* Jakarta : Kencana Prenada Media Group

James, D.E. 1978. *Culturing Algae*. U.S.A : Carolina Biological Supply Co.

Johnson, L.R and T.A. Engle. 2003. The Effect of Copper Source and Concentration Lipid Metabolism in Growing and Finishing Angus Steers. Asian Aust. J. Anim.Sci. 16(8) : 1131-1136

Kaseno (BPPT. 2002). Pengaruh Ion-ion anorganik Terhadap Pengendapan Abu-Molases. Oleh Kaseno. UPT-EPG BPP Teknologi Indonesia. *Dept of Chemical Engineering, Faculty of Technology. Tokyo University of Agriculture and Technology, Koganei, Tokyo184, Japan.*

Kurniawan, G. 2014. Studi Karakteristik Batu Bata Tanpa Pembakaran Berbahan Abu Sekam Padi dan kapur Banawa. Proposal. Palu : Jurusan Fisika FMIPA. Universitas Tadulako

Marzuki, F. P, dkk. 2006. Potensi Pembuatan Semen Alternatif Berbahan Kapur Padalarang dan Fly ash Suralaya UntukKonstruksi Rumah Sederhana. Bandung : FTSL ITB.

Meiyanto, E. CCRC (Cancer Chemoprevention Research Center) Fak. Farmasi. Univ. Gadjah Mada

Mulyono, H. 2009. *Kamus Kimia*. Jakarta : Bumi Aksara

Salisbury, F.B., Ross, C.W. 1995. Fisiologi Tumbuhan. Jilid 2. Bandung : ITB

Sartini., Patong, A.R., Halim., Pirman. 2010. Pengaruh Penambahan Tembaga Sulfat terhadap Produksi Enzim Polifenoloksidase dari Fungi Endofit Kulit Buah Kakao. Fak. Farmasi UNHAS, Jurusan Kimia FMIPA UNHAS dan Poltek Negeri Ujung Pandang Makasar

Sitohang, A dan Hazairin, 2002. Pemanfaatan Kapur dan Pozzolan Sebagai Bahan Baku Utama Pembuatan Semen Hidraulis Alternatif . Bandung : ITB

Smith, G.M. 1955. Cryptogamic Botany. Algae and Fungi. Reprinted 1983. New York : McGrow-Hill Book Company, Inc

Suganda dan Sugiarto. 1994. *Rancangan Percobaan Teori dan Aplikasi*. Yogyakarta : Andi Offset.

Suheryanto, D. 2010. Pengaruh *Konsentarasi Cuprisulfat terhadap Keawetan Kayu Karet*. Kusumanegara : Badan penelitidan Pengembangan Industri-Kementrian Perindustian RI

Sukma, D. 2013. Senyawa Kimia dan Kegunaannya. Diakses dari www.blogger.com

Swastikawati, A. 2012. Standar Pengujian Kualitas Bata Pengganti. Yogyakarta : Balai Konservasi Peninggalan Burobudur.

Tokarnia, C.H., J. Dobereiner., P.V. Peixoto and S.S. 2000. Outbreak of Copper Poisoning in Cattle Fed Poultry Litter. Vet. Hum. Toxicol. 42(2):92-95

Winiati, P.R. 1992. *Penanganan Limbah Industri Pangan*. Yogjakarta: Kanisius

Wicaksono, M.A. 2012. Perancangan Sistem Elektro-Osmosis untuk pengendalian air pada batuan candi. Surabaya : ITS

Usman, H dan Akbar, P.S. 2006. *Pengantar Statistika*. Edisi ke-2. Yogyakarta : Bumi Aksara

K-Means Based on Neighbors with Latent Semantic Indexing for Documents Clustering

Gede Aditra Pradnyana[1], I Putu Gede Hendra Suputra[2], Tri Adhi Wijaya[3]

Informatics Education Department, Ganesha University of EducationSingaraja, Bali, Indonesia[1]
Informatics EngineeringDepartment, Udayana University, Bali, Indonesia[2]
Informatics EngineeringDepartment, Dr. Soetomo University, Surabaya, Indonesia[3]

gede.aditra@gmail.com

Abstract

The use of neighbors concept in K-means algorithm in document clustering process can improve the quality of document clustering results. However, K-means clustering algorithm which is based on neighbors still has some weakness such as not pay attention to the meaning or semantic proximity between documents, has a high computational complexity, and not pay attention to the influence of document length in the document weighting process so that long document will likely get a higher weighting. In This study we propose a new method K-means based on neighbors with Latent Semantic Indexing (LSI) for the optimization of K-means clustering method to perform document clustering. This new method uses the concept of LSI in determining the neighbors of a document on the process of K-means, so that the meaning of the word or semantic proximity between documents will be taken into account. Weighting method and feature selection algorithm is also used to obtain better clustering results. Test results with the test data in the form of 850 pieces of news in Indonesian language document shows the F-measure and purity value of the K-means clustering method with LSI-based neighbors better than the initial algorithm,that is equal to 0.68 and 0.60 respectively. From these results it can be concluded that the application of the neighbors method with LSI on K-means algorithm in document clustering process can improve the quality of clustering results.

Key words: K-means, neighbors, latent semantic indexing, document clustering

1. Introduction

An increasing number of documents in text format significantly recently made the process of grouping or clustering document (document clustering) becomes important. Clustering is the process of dividing a set of objects into some number of groups (clusters) specifically (Katariya & Chaudari, 2015; Kwale, 2013; Zhao & Karypis, 2004). Clustering a document aimed at dividing the document into several groups so that the documents in the same cluster (intra-cluster) have in common is high, while the documents in different clusters (inter-cluster) have in common a low (Katariya & Chaudari, 2015; Zhao & Karypis, 2004; Steinbach, Karypis, & Kumar, 2000). Some of the challenges or problems encountered in the process of document clustering is the quality of the clustering, high dimensionality, and the size of the database is very large.

In general there are two main techniques in clustering process that is hierarchical and partitional clustering (Jain, Murthy, & Flynn, 1999). In recent years, research has proven that partitional clustering algorithm produces better results than the clustering algorithm and a hierarchical clustering is more suitable to be applied to document clustering with very large data base because it requires a low computational cost (Zhao & Karypis, 2004; Steinbach, Karypis, & Kumar, 2000). Type of partitional clustering algorithm often used in the process is a document clustering K-means algorithm(Hartigan, 1975). K-means clustering algorithm runs based on the idea that one can represent a cluster centroid. After selecting k initial centroid, every document that is grouped into one cluster based on the size of the gap (between the document and each centroid k), then k centroid is recalculated. This step is repeated until the optimal cluster k obtained based on a criterion function. K-means algorithm has several advantages over other clustering algorithms such as the process is simple and relatively low computational complexity. However, the K-means algorithm still has some disadvantages such as sensitive to the number and position of

initial cluster centroid and are often trapped in local optimal solutions (Cui & Potok, 2005).

Several studies had tried to address these issues as the use of optimization algorithms K-means clustering or merging with other algorithms (Shameen & Ferdous, 2009). In addition to the above problems of K-means, Guha, et al. (2000) and Luo, et al. (2009) express new problems when the K-means is used in clustering documents that use the K-means that only take into account the proximity between the two members / document (pairwise similarity) is less pretty and less fitting distance calculation documents to the centroid using the calculation of similarities such as cosine similarity. Measurement of similarity of two documents (pairwise similarty) by using the cosine function is often used and works well in the process of clustering documents (Steinbach, Karypis, & Kumar, 2000). However, when the number of clusters is not separated properly (not well separated), separation of cluster which is only based on the concept of pairwise similarity calculation certainly not enough because some documents in different clusters may has in common with one another, Therefore, the research by Luo et al., (2009) propose K-means clustering method based links and neighbors. The concept links and neighbors used in troubleshooting initialization centroid position by calculating the existing global information such as the number of links of each candidate cluster. It also introduced a new method based on cosine similarity value as well as links to measure the similarity between documents by centroid. Results of the research that had done to prove that the method of K-means based links and neighbors successfully improve the accuracy of the results of the traditional method of K-means. K-means clustering-based method proposed neighbors Luo et al., (2009) still has some weaknessesinclude has not been paying attention semantic meaning of a word or closeness between documents. In the calculation of the neighbors, this method represents a document in the form of vector space model then calculates similarity with cosine similarity function. This resulted in a document will be said to be neighbors only if both documents are using the same words, even though it might be a document using words that are not the same but it has similarity in meaning. The use of the concept of vector space model will also has problems such as scalability of algorithms and computational complexity are high (Song &

Park, 2007; Song & Park, 2009). In addition, the weighting process of this method does not pay attention to words that carried the influence of the long length of the document so that the document would be likely to get a higher weight.

Latent Semantic Indexing (LSI) is a method that tries to build a semantic structure in the textual data and find documents that are relevant to each other even though the document does not use the same words (Song & Park, 2007). LSI also will reduce the matrix term by a large document into smaller matrix so as to provide adequate space for the clustering process. This paper proposes a new method of clustering process documents by applying LSI method for the determination of neighbors and links in the K-means algorithm based neighbors.

2. K-Means based on Neighbors and LSI for Documents Clustering

This paper proposes a new method of document clustering process by optimizing the K-means algorithm based on neighbors and link clustering to obtain optimal results. The new method proposed applying the method of LSI on the K-means based links and neighbors, so that the meaning of words / semantic closeness between the document will be considered in the the process of determining neighbors and links. Besides, the LSI uses the calculation of Singular Value Decomposition (SVD) will be able to project the document term high dimensional vector space into a low dimensional vector space concept. To reduce computing time due to the addition of the LSI method it will use frequency-based feature selection algorithm to do the feature selection process.

As illustrated in Figure 1, an outline of the document clustering method can be divided into three main processes: text preprocessing, feature selection and documents clustering with K-Means based links and neighbors. Text preprocessing aims to get the weight of the features that have been extracted from the set of documents, while in the process of feature selection of existing features is reduced to reduce the computing time clustering process.

2.1 Text Preprocessing

In the text preprocessing, a document will be processed to obtain the features in document. Segmentation is the process of beginning in text preprocessing, which aims to break down the sentence on the document into words by punctuation. The

words are then selected in the stopwords removal process. Stopwords removal is the process of eliminating common words are considered to be non-specific or does not contain information to represent the contents of a document. This study used stopwords inside Indonesian dictionary which consists of 795 words.
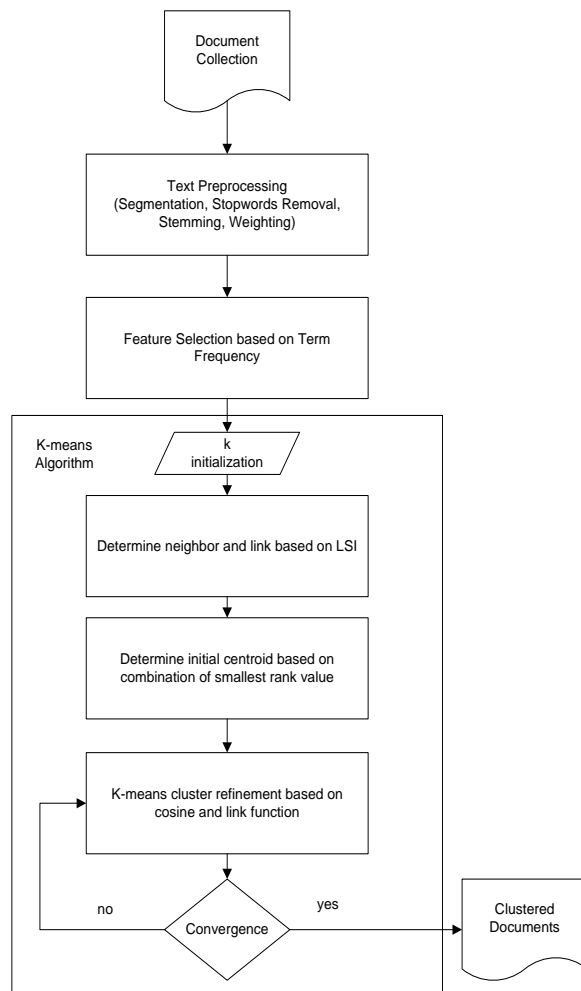

Figure 1. Flowchart K-Means Based on Neighbors and LSI for Documents Clustering

Stemming is one of the ways used to improve the performance of an information retrieval system by changing a word to its basic form (root word). Stemming existing methods will differ from each other depending on the language used. This study used enhanced confix Stripping Stemmer Algorithm for Bahasa Indonesia(Mahendra, 2008).

The last process in the text preprocessing is the weighting of a word (term). Weighting process aims to assess the relevance of a term contained in a document with the whole document contained in the collection. In this study, the

weighting process is done by applying the method of R-TF-IDF (Zhu & Xiao, 2011). Calculation R-TF-IDF carried out on the words that have been chosen as a feature in the feature selection document. Calculation R-TF-IDF is different from the classic tf-idf where in R-TF-IDF also take into account the long normalization issue documents and distribution of occurrence of a word in other documents that affect the value of the weight of the end of a word (Zhu & Xiao, 2011). Calculation R-TF-IDF is calculated by the following equation:

$$w_{ij} = \frac{f_{ij}}{max_l \, f_{lj}} \; x \ln\left(1 + \frac{n}{n_i}\right) x \ln\left(\frac{1 + \sum_{x=1}^{n} f_{ix}}{1 + \sum_{x=1}^{n} f_{ix} - f_{ij}}\right),$$
(1)

w_{ij} is the weight of the *i*-th word in the document *j*, f_{ij} is the frequency of the *i*-th occurrence of the word in the document *j*, *n* is the total number of documents in the corpus whereas n_i is the number of documents that contain the word *i*-th.

2.2 Feature Selection

Feature selection aims to reduce and get more features that are relevant for the process of clustering documents. Frequency-based feature selection is used as feature selection algorithm. These algorithms take the important words of all documents based on the frequency of occurrence word in the collection and taking the T-top word based on the word frequency in descending order.

2.3 K-Means based on Neighbors and LSI

K-means algorithm used for clustering documents optimized by applying the concept of neighbors with LSI. In this method the number of clusters (K) is determined manually by the user, but for the initial centroid position is no longer determined by random but is determined based on ranks. Ranks value determined using the concept of neighbors and links between documents, obtained from the calculation of semantic proximity between each document by LSI method.

Neighbors is a document which is a neighbor of a particular document. While the link is shared between a number of neighboring document by other documents. Adjacency function is determined by the value of similarity in semantic proximity calculation using the LSI.

LSI is a method that aims to extract dimensions in smaller quantities that indicate a stronger meaning than the overall dimensions (words)(Song&Park, 2009). When a term-document matrix is formed,

LSI requires SVD of the matrix to form a semantic vector space. Because of the choice of words, the dimensions of which are less important is regarded as noise and not calculated.

In the process of SVD, the corpus is represented as a term-document matrix A ($t \times n$), where t is the number of words used as a feature of n collections of documents. SVD of A is:

$$A = UHV^T, \qquad (2)$$

where U and V are matrices of left and right singular vector. U represents a matrix of term vectors and V represents the matrix of document vectors. $U^T U = I_t$, and $V^T V = I_n$. I_t and I_n is the identity matrix of t and n. where H is a diagonal matrix of singular value. $H = \text{diag}(\sigma_1, \sigma_2 \ldots \sigma_{\min\{t,n\}})$, $\sigma_i > 0$ for $1 < i \leq r$ and $\sigma_j = 0$ for $j > r$, r is the rank of the matrix A. If k is an integer and $k \ll \min \{t, n\}$, then the LSI approach of matrix A with rank-k is defined as follows:

$$A = U_k H_k V_k^T, \qquad (3)$$

as pseudoterm-document matrix with reduced dimensions. Where U_k consists of the first k columns of the matrix U dan V_k^T consists of the first row of the matrix V ^ T. H_k = diag (σ1, ..., σk) consists of the first k largest singular value..

When LSI is used with the aim of representing a document, a document d firstly initialized as a matrix t × 1 vector of a document is denoted by d. Vector representation of a document d, is determined by multiplying the matrix d^T with U^T.

$$\hat{d} = d^T U^T. \qquad (4)$$

To get the value of semantic similarity between documents, at the end of the process used LSI calculation of the cosine between vectors with other documents. After calculating the similarity with the next LSI between documents adjacency status is defined as follows:

$$sim\left(d_i, d_j\right) \geq \theta, \qquad \text{where} - \infty \leq \theta \leq 1. \qquad (5)$$

If the value of the similarity between two documents (d_i and d_j) meet the threshold value (θ) then both documents are neighbors. By setting an appropriate threshold value, the number of neighbors in the corpus of documents can be used to evaluate how many documents are adjacent to each other is semantic.

After the adjacency relationship of all documents specified, the next process is the formation of adjacency matrix as shown in Figure 2. The adjacency matrix M is a matrix $n \times n$ containing the value adjacency for every pair of documents. If a document in neighboring expressed by d_j then the i-th row and j-th column will be worth 1, and will be 0 if otherwise. The matrix can be determined from the candidates who will be the initial document centroid.

First, by checking the neighboring matrix which has been formed, then calculated the documents that have the highest to the lowest neighbor to find a set of candidate initial centroid. A number of m documents selected from the top of the list. M centroid initial candidate set is denoted by S_m where $m = K + n_{plus}$, where K is the number of the desired cluster and n_{plus} is the number of additional selected candidates. Because m number of candidates elected has the most number of neighbors, so it is assumed that m is the most suitable candidate to be a cluster centroid.

Next, look for the cosine values and link to each document in the S_m last couple couples sort documents in ascending based on cosine values and links owned. Cosine value is determined by an equation (6):

$$cos\left(d_i, d_j\right) = \frac{d_i \cdot d_j}{\|d_i\| \|d_j\|}, \qquad (6)$$

where d_i and d_j is a vector formed from document to document-i and j. While the value of a link between the two documents (d_i and d_j) can be determined by multiplying the i-th row of adjacency matrix M with the j-th column, as shown in the following equation:

$$link\left(d_i, d_j\right) = \sum_{m=1}^n M[i,m] * M[m,j]. \qquad (7)$$

A couple documents d_i and d_j, then $rank_{cosine(di,dj)}$ is the value of the rank is based on the value of cosine, $rank_{link(di,dj)}$ is the value of the rank is based on the value of the link, and $rank_{di,dj}$ is the sum value of $rank_{cosine(di,dj)}$ and $rank_{link(di,dj)}$. The smaler combination of $rank_{di,dj}$ value, would make a combination of these documents was elected initial cluster centroid where the smallest value is 0.

For example, suppose there is a data set S consisting of six (n) pieces of the document number $S = \{d1, d2, d3, d4, d5, d6\}$, the calculation of the link can be seen from the adjacency matrix (M) in Figure 2. When $\theta = 0.3$, $K = 3$ and $n_{plus}=1$, so that there will be four documents that become candidates centroid is $Sm = \{d4, d1, d2, d3\}$.

Selection K initial centroid of the m number of candidates, there $_mC_k$ possible combinations. Each of these combinations is K-subset of S_m, and the calculation of the rank of each combination com_k are:

$$rank_{com_K} = \sum rank_{d_i d_j}, \quad untuk\ d_i \in Com_K\ dan\ d_j \in Com_K$$

.
(8)
Equation (8) means that the value of the rank of a combination is the sum of all $_2C_K$ pair from the centroid initial candidate documents in combination. In this example there are four combinations available and rank-owned value shown in Table 2.

	d_1	d_2	d_3	d_4	d_5	d_6
d_1	1	1	0	1	0	0
d_2	1	1	0	1	0	0
d_3	0	0	1	1	1	0
d_4	1	1	1	1	0	0
d_5	1	0	1	0	1	0
d_6	1	0	0	0	0	1

Fig 2. Neighborhoods matrix (M) of Data Set $S=\{d_1, d_2, d_3, d_4, d_5, d_6\}$ with $\theta=0.3$

In accordance with Table 2, the chosen combination with the highest rank (rank the smallest value) as initial centroid for the K-means algorithm. In this example, the candidate selected documents is $\{d_1, d_2, d_3\}$ because the value of the smallest rank held among the three other candidates combined. After getting the initial centroid iteration the next process is to determine a document in order to enter into a cluster.

Calculation of similarity between documents by using the cluster centroid-based method and the combination of cosine function link in the process of K-means cluster refinement. Each document is calculated similarity with each cluster there is to specify a document entered into a certain cluster. The combination function is defined as follows:

$$f(d_i, c_j) = \alpha \times \frac{link(d_i, c_j)}{L_{max}} + (1-\alpha) \times cos(d_i, c_j)\ 0 \le \alpha \le 1$$

, (9)
where L_{max} is the greatest possibility of the link value, if all the neighboring documents L_{max} is n. α is a constant weighting between

links and cosine values. While the $link(d_i, c_j)$ is the number of neighbors shared between documents i-th and j-th cluster obtained by the following equation:

$$link(d_i, c_j) = \sum_{m=1}^{n} M'[i, m] * M'[m, n + j], (10)$$

matrix M' is a matrix formed by the addition of K column in the matrix M so that the size of the matrix is turned into $n \times (n + K)$. In the matrix M' there is an additional column $M'[i, n + j]$ of value 0 or 1 depends on the function of adjacency between a document to the i-th and j-th centroid. After the determination of the cluster of documents, will be recalculated K centroid change of position is based on a document that refers to the centroid of each cluster by finding the average value vector and the process of determining the cluster of a document re-done. The process is repeated continuously until reaching convergence.

3. Results and Discussion

This section will evaluated the performance of document clustering method that was developed by looking at the results of clustering and comparison with previous algorithms. The proposed method is implemented with the Java programming language on a computer with specs Intel Core i3 2.3 GHz, 2GB.

3.1 Test Data

The corpus is used as the test data were collected of 850 Indonesian-language document of news articles online www.kompas.com with different topics. News downloaded based on predefined categories, the category with the other one has a number of different documents (Rachmania & Arifin, 2011). The specification of the number of documents for each category can be seen in Table 3.

Table3:Test Data Specification

Category	Number of Documents
Nasional	100
Regional	110
Internasional	100
Metropolitan	100
Bisnis dan Ekonomi	100
Olahraga	110
Sains Teknologi	50
Edukasi	100
Pariwisata	80
Total	**850**

3.2 Evaluation Method of Clustering Results

For the evaluation of the results of the clustering process documents used F-measure value measurements and Purity. F-measure is a harmonic combination of recall and precision values used in information retrieval system (Abdelmalek, Zakaria, & Michel, 2007). Using test data that has been

described previously, each cluster is generated can be considered as the result of a query, while any documents that have not been classified can be considered as a document which is expected of the query. So the precision value P (i, j) and recall value R (i, j) in each cluster j of the i-th grade can be calculated.

Table 1. Similarity Measurement between Initial CentroidCandidate

d_i, d_j	cos	$rank_{cos}$	$link$	$rank_{link}$	$rank_{di,dj}$
d_1, d_2	0.35	2	3	3	5
d_1, d_3	0.10	1	1	0	1
d_1, d_4	0.40	3	3	3	6
d_2, d_3	0	0	1	0	0
d_2, d_4	0.50	4	3	3	0
d_3, d_4	0.60	5	2	2	7

Table 2. Rank Values from Initial CentroidCandidate

com_k	$_kC_2$centroid candidate	$rank_{comk}$
$\{d_1, d_2, d_3 \}$	$\{d_1, d_2 \},\{d_1, d_3 \},\{d_2, d_3 \}$	6
$\{d_1, d_2, d_4 \}$	$\{d_1, d_2 \},\{d_1, d_4 \},\{d_2, d_4 \}$	18
$\{d_1, d_3, d_4 \}$	$\{d_1, d_3 \},\{d_1, d_4 \},\{d_3, d_4 \}$	14
$\{d_2, d_3, d_4 \}$	$\{d_2, d_3 \},\{d_2, d_4 \},\{d_2, d_4 \}$	14

If n_i is the number of class members to-i, n_j is the number of members of cluster j and n_{ij} is the number of class members to-i, which are in cluster j, then P (i,j) and R (i,j) can be calculated by equation (11) and (12) the following :

$$P(i,j) = \frac{n_{ij}}{n_j} , \qquad (11)$$

$$R(i,j) = \frac{n_{ij}}{n_i} . \qquad (12)$$

F-measure values to the class-i at cluster j and the overall F-measure values expressed in the following equations:

$$F(i,j) = \frac{2 \times P(i,j) \times R(i,j)}{P(i,j) + R(i,j)} \qquad (13)$$

$$F = \sum_j \frac{n_i}{n} \ max \ \{F(i,j)\}, \qquad (14)$$

where n is the number of all documents, n_i is the number of documents in class i, and $max\{F(i, j)\}$ is the value of F (i, j), the largest found in class i-th for the entire cluster j. In general, the value of the high F-measure represents a good clustering results.

Purity value of a cluster represents part of a cluster according to the largest class of a document inserted into the cluster, the Purity of cluster j is defined as follows:

$$Purity(j) = \frac{1}{n_j} max_i \ n_{ij} \qquad (15)$$

Purity value of the entire process of clustering is the sum of each value of Purity cluster (Zhao & Karypis, 2004):

$$Purity = \sum_j \frac{n_j}{n} \ Purity \ (j). \qquad (16)$$

In general, higher Purity value indicates a better clustering results.

3.3 Document Clustering Results

The process of determining the neighbors of a document in the K-means algorithm based neighbors require a threshold value and the value of α. The determination of the threshold value and the exact value of α will affect the quality of clustering results. To find the appropriate threshold value, then the threshold value experiment with a range of values of 0 to 1, and then observed the impact on the value of the F-Measure and Purity results K-means clustering algorithm based neighbors with LSI and based only neighbors only. From Figure 3, it can be seen that the optimal threshold value which produces the best F-Measure and Purity value in K-means algorithm based neighbors with LSI is 0.1, while for K-means algorithm based neighbors without LSI the optimal threshold value is 0.4.

Same as the determination of the threshold value, the determination of the optimal value of α is also done through an experiment with a range of values α is 0 to 1. The results of experiments carried out showed that the optimal value of α for the K-means algorithm based neighbors with LSI is 0.2, whereas α optimal value for K-means algorithm based neighbors without LSI is 0.7

By using the optimal threshold value and α, then performed a comparison between the results of clustering documents with the classical K-means algorithm, K-means algorithm based neighbors without LSI and K-means algorithm based neighbors with LSI.
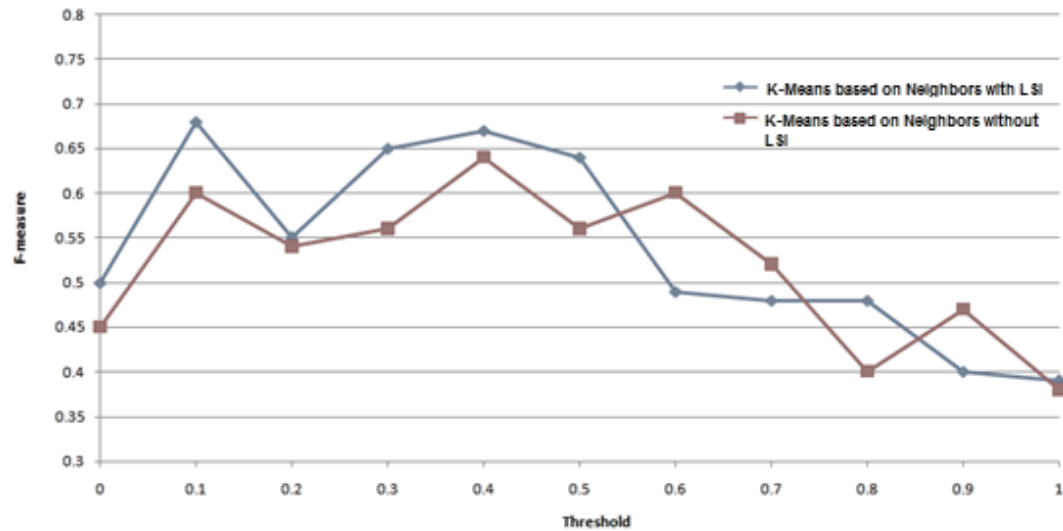
(a)
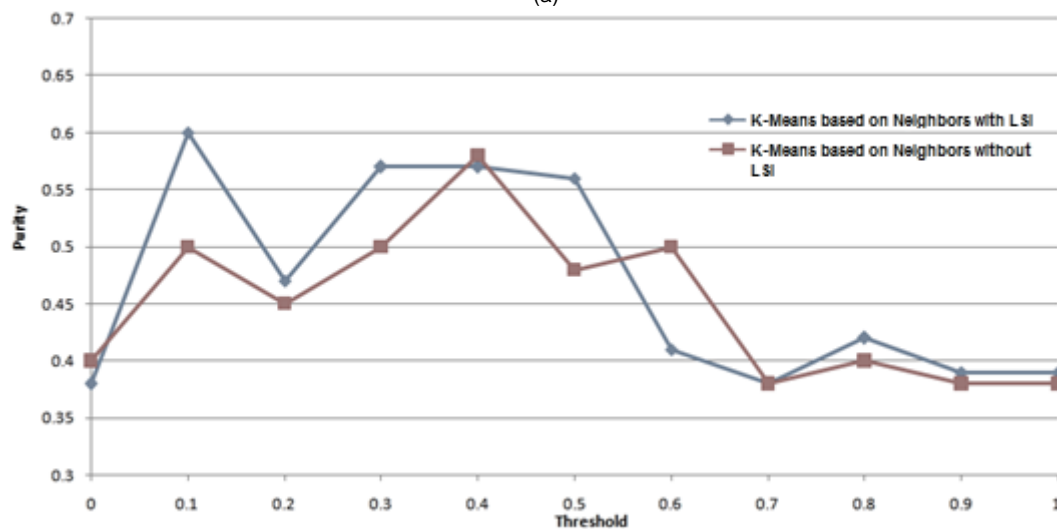
(b)

Figure3. The Effect of Similarity Threshold against (a) F-measurevalueand (b)Purityvalue fromDocument Clustering Proccess

Table 4. Comparison of *F-Measure*, *Purity*, andComputation Time

	F-Measure	Purity	Computation Time (minutes)
K-means	0.53	0.53	12
K-meansbasedneighbors	0.64	0.58	29
K-meansbasedneighborswith LSI	0.68	0.60	36

From the results of tests on Table 4 it can be seen that the F-measure and Purity method of K-means with the initial centroid are determined based on rank, both based neighbors just as well as those based neighbors with LSI, is always better than K-means clustering classic decisive centroid initial random. On the other hand it can be seen that the F-measure and Purity of the method of K-means based neighbors with

LSI (F-measure = 0.68 and Purity = 0.60) better than the method of K-means based neighbors only (F-measure = 0.64 and Purity = 0.58). F-measure value of the proposed clustering method showed higher clustering results better document and indirectly also shows the accuracy of the clustering process better document. From this value can also be proved that the initial centroid produced by methods neighbors with the concept of LSI will produce a more optimal clustering results than methods neighbors with cosine measurements alone. With the use of LSI in the determination of neighbors as well as the link structure of semantic and associative relationships between documents will be taken into account, although among these documents do not have the same words. This is also consistent with the use of the concept of link that find relationships between documents that have the same neighbors, although nothing in common words. Purity of high value reflects the purity of a cluster, the better, which means that the cluster contains most of the documents that are supposed to be part of the cluster. Purity value of the proposed method is directly proportional to the value of the F-measure.

Table 4 also shows that the K-means algorithm based neighbors with LSI requires a relatively long computation time (36 minutes) compared with the K-means algorithm based neighbors (26 minutes) to perform document clustering. This indicates that the application of the LSI method in determining the neighbors will increase the time to do clustering. The use of feature selection method also does not significantly reduce computing time, given that the method applied LSI will also re-shape represents vector features that are to be used in the clustering process.

4. Conclusions

This paper has proposed a new method for clustering documents with the K-means algorithm that uses the concept of neighbors with LSI. By looking at the value of the F-measure and Purity, the use of K-means algorithm that uses the concept of neighbors with LSI for clustering documents proved to be better than the K-means using the concept of neighbors without LSI. These results also indicate that the addition of semantic approach in the process of determining neighbors and links can improve the quality of document clustering results.

For further development, the use of optimization algorithms such as genetic algorithms, ant colony, particle swarm optimization, bee colony, and others, can be applied to accelerate the process of determining the neighbors and also prevents the K-means algorithm to produce local optimal solutions. Optimization of LSI is also expected to improve the quality of document clustering results.

5. References

Abdelmalek A., Zakaria E., Michel S., Mimoun M., (2007). Evaluation and Comparison of Concept Based and N-Grams Based Text Clustering usingSOM. TIMC-IMAG Laboratory IN3S, Joseph Fourier University.

Cui, X., Potok, E., (2005). Document Clustering Analysis Based on Hybrid PSO+K-means Algorithm. *Journal of Computer Sciences (Special Issue)*: 27-33.

Guha, S., Rastogi, R., dan Shim., (2000). ROCK: a robust clustering algorithm for categorical attributes. *Information Systems* 25 (5)345–366

Hartigan, J. A. (1975). Clustering Algorithms. New York: John Wiley and Sons, Inc.

Jain, A. K., Murty, M. N., and Flynn, P. J., (1999). Data Clustering: A Review.*ACM Computing Survey*, Vol. 31, No. 3, pp. 264-323.

Katariya, N.P. Chaudhari, M.S. (2015). Bisecting K-Means Algorithm for Text Clustering. *Internatinal Journal of Advance Research in Computer Science*, Vol. 5, No. 2

Kwale, M.S. (2013). A Critical Review of K-Means Text Clustering Algorithms. *Internatinal Journal of Advance Research in Computer Science*, Vol. 4, No. 9

Luo, C., Yanjun, L., Soon, C., (2009). Text Document Clustering Based On Neighbors. *Journal of Data & Knowledge Engineering*, 68, 1271–1288

Mahendra, I.,(2008).Enhanced Confix Stripping Stemmer And Ants Algorithm For Classifying News Document In Indonesian Language. *The 5th International Conference on Information & Communication Technology and Systems* ISSN2085-1944.

Rachmania, A., Arifin, Z., (2011). Klasifikasi Kategori dan Identifikasi Topik pada Artikel Berita Berbahasa Indonesia. Surabaya: Institut Teknologi Sepuluh Nopember Surabaya, Indonesia.

Shameen, M., dan Ferdous, R. (2009). An Efficient K-means Algorithm Integrated With Jaccard Distance Measure for Document Clustering. *First Asian Himalayas International Conference on Computing & Processing*.

Song ,W., and Park, S., C., (2009). Genetic algorithm for text clustering based on latent semantic indexing. *Computers and Mathematics with Applications* 57, 1901-1907.

Song, W., and Park, S., C., (2007). A novel document clustering model based on latent semantic analysis. *Proceeding of the Third International Conference on Semantics, Knowledge and Grid*, 2007, pp. 539–542.

Steinbach, M., Karypis, G., dan Kumar, V., 2000. "A Comparison of Document Clustering

Techniques". *Proceeding TextMining Workshop, KDD 2000.*

Zhao, Y., Karypis, G.(2004). Empirical and theoretical comparisons of selected criterion functions for document clustering,*Machine Learning 55* (3) 311–331.

Zhu, D., Xiao, J., (2011). R-tfidf, a Variety of tf-idf Term Weighting Strategy in Document Categorization. *Seventh International Conference on Semantics, Knowledge, and Grids*, 83-90

Realtime Cars Counting System for Smart Traffic Light System

Kurniawan A.[1][*], **Zaini A.**[1]**, Wibawa A.D**[1],
I.N Sukajaya[2]**, Purnama I.K.E**[1]**, Akbar A.M.A.M**[1]

Department of Multimedia and Network Engineering,
Institute of Technology Sepuluh Nopember, Surabaya, Indonesia[1][*]

Department of Educational Mathematics,
Universitas Pendidikan Ganesha, Singaraja, Indonesia [2]

arifku@ee.its.ac.id

Abstract

Many cities in the world nowadays are suffering from traffic jam and traffic density due the inevitable growth of vehicles on the street. This phenomenon is not only happening in a modern countries, but also in many developing countries, like Indonesia. Some designs of smart traffic lights systems have been introduced by many researchers and also implemented previously. However, the real condition of each city is unique and need a specific solution for their traffic jam condition. This paper presents a design system and implementation of automatic car counting, as part of smart traffic lights system in an intersection. The system consists of IP camera and computer in a road. Video and Image processing technique were developed to capture and identfying the vehicles and counting them and then stored the information in a server. Two methods of image processing technique in counting the vehicles were implemented to get the best result. They were square pixels ROI (PR) and Countur (CO). The experiment was done during day and night using 3 different video resolution and 4 different frame per second (fps) technique. The result showed that CO method showed a more robust result compared to PR, especially during the night. Highest resolution still showed the best result for counting the vehicles.

Key words: Automatic vehicles counting, vehicle detection, smart traffic light system, intelligent transport system.

1. Introduction

Intelligent transport system is the main issue nowadays among city planners and government [2, 7]. City traffic, is not only a real matter of a city, but also influences many aspects of life such as business, economy, education, health, society and environment [1]. In the modern life like what we have now, especially in Indonesia, since efficient and effective public transportation system are very rare, many people then take private transportation as their solution. This condition, finally makes the burden on the street raising significantly [3; 6]. Based on Indonesian statistics agency, in 2013, there have been 11.484.514 cars alone on the street. Due to this fact, certainly the traffic jam depends greatly on people's activity and their daily schedule.

Managing traffic jam is the biggest issue in Intelligent Transport System (ITS) [4]. One of the main topic is managing the traffic light system. When controlling the traffic light, some variations of problem then raised up such as different number of vehicles from different lane [5], or crowder vehicle's queue facing less crowder lane etc. More over, priority vehicles is also a problem that needed to be solved. Smart traffic light system offers a solution in managing traffic jam, since it can control the traffic light based on the real condition of the street and the vehicle's queue. The main goal of this experiment is simulate a smart traffic light system by using a traffic camera, and Computer as part of smart traffic lights system, so that such a good decision regarding the timing of a smart traffic light then can be made based on the real traffic condition by calculating the number of vehicles passing through the intersection. Some important parameters would be analyzed such as the ideal video frame rate setting for efficient computation technique, different video resolution and different image processing methods.

2. Method

In this paper, we describe realtime cars counting system as a part of the smart traffic

light system as describe in Figure 1. Output of the car counting is used as a parameter of time length calculation of the traffic lights. The block diagram of our proposed car counting is illustrated the dash rectangle in Figure 1 using 1 IP cameras and 1 computer in every road. The IP camera is used for taking video in the road. The Computer is used to detect vehicles in arbitraries region we call the region of interest (ROI) and then counting it. Afterwards, the computer sends the counting data to the Control Unit using TCP/IP protocol via Ethernet.

The proposed system consists of six steps, beginning with the initial of ROI. An every road in the intersection, we can define the 4 ROI s to represent 4 lanes. So that, each IP camera and the computer can detect and counting vehicles in the 4 lanes simultaneously.
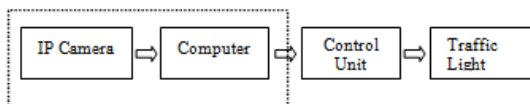

Figure 1. The Scheme of Smart Traffic Light System

Detailed procedures of vehicles detection and counting technique are:

1. Background Reconstruction

Note that we uses the accumulate weight methods in this procedures that calculated periodically. That is used to make the reconstruction of the background in order to the system becomes more robust to detect the vehicles even though the ambient light changes that affect changes in the current background and the previous background. For example, the ambient light changes in day to night or sunny to rainy. Meanwhile, a static background produces false detection when the ambient light is changed. As shown in Figure 3 which gives an illustrative the back-ground reconstruction created from several frames.

Figure 2. Example of input image from IP camera and blue square is the ROI of input image

2. Background Subtraction

Background Subtraction is the process of image segmentation using pixel differences between the current frame and the background image as depicted in figure 4. The background image is the image result of background reconstruction procedure.

3. Otsu Thresholding

Thresholding is used to change the grayscale image of background subtraction into a binary image, grayscale value below threshold value becomes 0 while above threshold value to 1. Otsu thresholding is used to acquire the threshold value automatically based on the histogram intensity. The result of Otsu Thresholding shown in the Figure 5.

4. Erosion and Dilation

Erosion and Dilation are process for eliminating noises in the image thresholding results (see Figure 6).

5. Vehicle Detection and Counting

Two methods were used to detect the vehicles, the first was counting the number of changing pixels in a certain ROI, its called PR (Pixels in ROI). The second method was counting the area of the countur in the ROI, its called CO (the countur of ROI). The CO method uses to eliminate the error detection when two motorcycle through ROI as shown Figure 7.

Figure 3. The result of Background Reconstruction

Figure 4. The result of background substracting in between frames

Figure 5. The binary image of Otsu Thresholding

Figure 6. Erosion and Dilation

3. Experiment and Result

In the experiment, four different frame rates (fps) were tested to find the most efficient method compared to the golden standard, the manual counting, they were: 5, 10, 15, 25 fps and three different video resolution:1280x1024, 640x512, 320x240.

This experiment was done in an intersection road by using 4 lanes. The result was presented in table 1-5.

Algorithm 1 (Algorithm for Vehicle Counting)

Input: $Method, A_P, T_P, A_C, T_C$
Output: V /*V is a number of vehicles.*/
1: if $Method = "PR"$ then
  /*PR method*/
2:   if $A_P > T_P$ then
3:     $FlagNow \leftarrow 1$
4:   else
5:     $FlagNow \leftarrow 0$
6:   end if
7: else
    /*CO method*/
8:   if $A_C > T_C$ then
9:     $FlagNow \leftarrow 1$
10:   else
11:     $FlagNow \leftarrow 0$
12:   end if
13: end if
  /*Vehicle Counting*/
14: if $FlagNow == 0$ then
15:   if $FlagNow != FlagPast$ then
16:     $FlagPast \leftarrow FlagNow$
17:     $V \leftarrow V + 1$
18:   else
19:     $FlagPast \leftarrow FlagNow$
20:   end if
21: else
22:   $FlagPast \leftarrow FlagNow$
23: end if

Figure 7 A Vehicle Counting Algorithm using PR and CO Methods

Table 1: The result of counting vehicles with different frame rate using PR method

Column	FPS							
	5		10		15		25	
	D	N	D	N	D	N	D	N
1	57	74	67	91	68	91	71	97
2	65	75	74	91	78	93	81	104
3	42	28	50	32	54	32	56	35
4	1	10	1	10	1	12	1	14

*D: day; N: night

Table 2: The result of counting vehicles with different frame rate using CO method

Lane	5		10		15		25	
	D	N	D	N	D	N	D	N
1	61	73	71	82	73	88	76	99
2	68	67	77	83	81	87	85	97
3	47	24	55	31	58	34	66	36
4	1	7	1	7	1	7	1	8

*D: day; N: night

Table 3: The result of manual vehicles counting as a validator

Lane	FPS	
	25	
	Day	Night
1	72	84
2	91	89
3	43	27
4	1	9

Table 4: The result of vehicle detection using different resolution using PR method

Lane	Resolution					
	1280 x 1024		640 x 512		320 x 240	
	Day	Night	Day	Night	Day	Night
1	56	89	71	97	92	106
2	73	83	81	104	100	104
3	47	24	56	35	94	98
4	1	5	1	14	10	36

Table 5: The result of vehicle detection using different resolution and CO method

Lane	Resolution					
	1280 x 1024		640 x 512		320 240	
	Day	Night	Day	Night	Day	Night
1	62	90	76	99	101	118
2	73	78	85	97	108	100
3	54	25	66	36	100	73
4	1	5	2	8	13	24

4. Discussion and Conclusion

Manual measurement (tabel. 3) is the golden standard in this experiment. When we compare the error (difference with the golden standard) between the PR and CO method, we can see that during the day measurement (see Figure 8), CO achieved a slightly better result compared to PR (the total error is lower). More over in Figure 9, when we look at the error during the night, CO was slightly better than PR starting from 10 fps. The main reason why during the day the difference was so small is because during the day measurement, both method can work effectively. However, during the night, since there were many obstacles in the video such as fore lamps, upper lamps, back lamps and other vehicle's lamps, PR method was very sensitive and was influenced greatly by those obstacles since it uses some areas for detecting the vehicles. Compared to CO method that used only the ende information of the area (ROI), it has more robust result in detecting the vehicles.
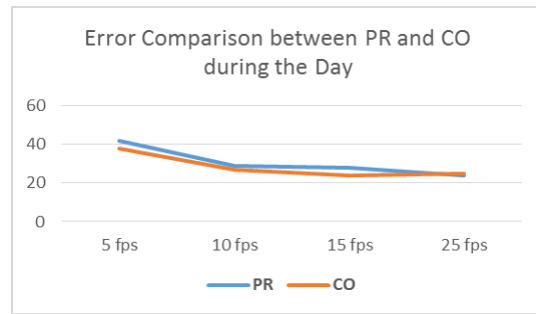

Figure 8. Total error comparison between PR and CO method during the Day in 4 different fps from 4 different lanes
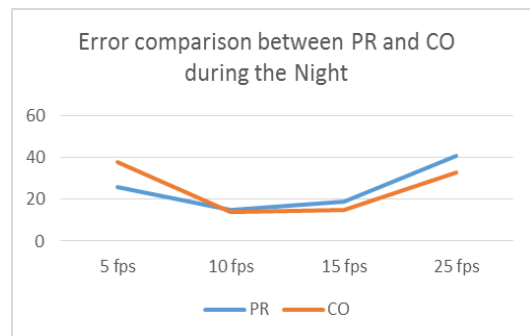

Figure 9. Error comparison between PR and CO method during the Night in 4 different fps from 4 different lanes

In our second experiment, we evaluated the implementation of 3 different frame resolution in detecting the vehicles from 4 different lanes. In Figure 10 and Figure 11, We hypothesized that the difference among three resolution was slight, but the result showed oppositely. The biggest resolution still showed the lowest error in total from 4 different lanes.
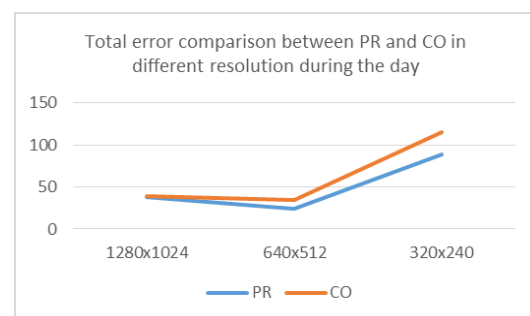

Fig. 10. Error comparison between PR and CO using three different resolution during the day measurement from 4 different lanes
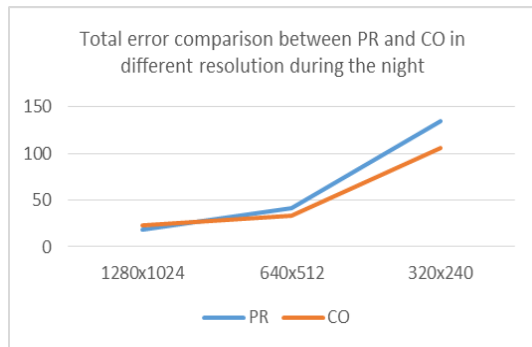
Figure 11. Error comparison between PR and CO using three different reolution during the night measurement from 4 different lanes

In conclusion, CO or countur method showed a robust result even during the night measurement, besides it needs lower memory to calculate. 10 fps seemed to be the best fps for detecting the vehicles. Higher resolution still showed the best result compared to lower resolution, especially during the night measurement.

6. Acknowledgement

7. References

[1] Asri D. U., Hidayat B. "Current transportation issue in Jakarta and its impact on environment". Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, pp. 1792 - 1798, 2005

[2] Chinyere O. U., Francisca O.O., Amano O. E., "Design and simulation of traffic lights control system"., International Journal of Advances in Engineering and Technology, Nov 2011.

[3] Kareem E. I. A., Jantan A., "An Intelligent traffic lights monitoring system using an Adaptif Associative Memory"., International Journal of Information Processing and Management, vol 2, Number 2, April 2011.

[4] Sinhmar P,. "Intelligent traffic light and density control using IR sensors and microcontroler". International Journal of Advance Technology and Engineering Research (IJATER), vol 2, issue 2, 2012.

[5] Srivastava M.D., "Smart traffic control system using PLC and SCADA", International Journal of Innovative Research in Science, Engineering and Technology Vol. 1, Issue 2, December 2012

[6] www.bps.go.id

[7] Yousef K. M., Al Karaki J. N., Shatnawi A. M. "Intelligent traffic light flow control system using wireless sensors networks". Journal of Information Science and Engineering 26, 753-768 (2010).

[8] I.K.E. Purnama , A. Zaini., B.N. Putra, Putra, B.N., M. Hariadi. "Real Time Vehicle Counter System for Intelligent Transportation System", Proceedings of Instrumentation, Communications, Information Technology, and Biomedical Engineering (ICICI-BME), 2009.

[9] Nobuyuki Otsu, "A threshold selection method from gray-level histograms", IEEE Trans. Sys., Man., Cyber, 1979

Strategic application of ICT in improving product innovation
(study of embroidery industry in West Sumatra)

Mirza

Mercubuana University, West Jakarta, Indonesian

Email : piscessmir@yahoo.com

ABSTRACT

The purpose of this paper is to (1) The extent to which the role of ICT in enhancing product innovation in the embroidery industry in West Sumatra; (2) Analyze the most appropriate strategy to increase product innovation in the Embroidery Industry in West Sumatra (3) The Role of Stakeholders (Government , Educational Institutions , Provider in increasing product innovation in the embroidery industry in West Sumatra).Data collection technique used observation , interview and literature study . This paper discusses the SWOT analysis is performed to determine the right strategy in improving product innovation in the embroidery industry in western Sumatra.

The results showed that by using appropriate ICT will improve the quality of products as a model of innovative design , and the product model , and improve new product development in the embroidery industry . The strategy of the application of ICT in improving product innovation was the strategy of cooperation between the embroidery industry , and cooperation with relevant parties such as governments , providers , and educational institutions . Besides, the need to conduct training in the use of ICT for employers and employees in the embroidery industry in West Sumatra.Research conducted in the embroidery industry in western Sumatra , Indonesia

The study's findings have important implications for several parties including : (1) Provide input for the embroidery industry in West Sumatra , that the application of appropriate ICT can increase product innovation and improve performance; (2) For the Regulator and the Government , becomes the input for the improvement of regulations and policies related to the development and improvement of embroidery industry in West Sumatra; (3) Being one of the sources of information and feedback that is useful for all parties concerned with the development and improvement of embroidery industry in West Sumatra , both large businesses ,BUMN, universities , and ICT providers .This study focused on a strategy to increase product innovation by implementing appropriate ICT , so as to improve the performance of the embroidery industry in West Sumatra.

Keywords : Adoption of ICT, product Innovation, alternative strategy, embroidery industry

1. Introduction

As the major source of employment opportunities, development and commercialization of innovation, and improvement of marketing competeveness in a globalised economy, small businesses (SBs) are regarded as the engine of economic development and growth, in particular in developing countries where poverty, uncompetitiveness of economy, and unemployment are still paralysing the society (Cardona et al., 2007;Radas and Bozic, 2009). Similar to large organizations, competitive pressure and the need for globalisation as an impetus to economic growth compel SBs to adopt ICT and do business electronically (Boeck et al., 2009). The sustained success of any small and medium enterprises (SMEs) is not only enabled by the use of information and communication technologies (ICT), but also dependent on the company's ability to constantly adopt and make the best use of emerging ICT for innovation and business competitiveness. Emerging ICT in this context is a broad term to include any new ICT development or improved ICT applications. Examples include web and enterprise 2.0, cloud computing, social network systems, open source applications, and smart phones and digital and mobile devices (Chinedu Eze et all, 2013).

ICT in Electronic commerce presents many opportunities for businesses to improve their performance (Simpson and Docherty, 2004). It can provide the adopters

with cost savings resulting from reduced paper transactions, reduced buyers' search, shorter order cycle time, and the subsequent inventory reduction (Jennex et al., 2004). ICT also increases opportunities for the effective supplier/buyer partnership through establishment of a web of business-to-business communication networks (Grandon and Pearson, 2004; Quayle, 2002). EC can take a variety of forms including Electronic Data Interchange (EDI), mobile telephone, direct link-ups with suppliers, Internet, intranet, extranet, electronic catalogue ordering, and e-mail (Ghobakhloo et al., 2011a; Quayle, 2002). Like wise ICT often function as a catalyst for innovation (Thaens, 2006) in Mustafa (2015). Spiezia (2011) suggested that ICT has the potential to increase innovation by speeding up the diffusion of information, favoring networking among firms, goverment and university (in Research and development), enabling closer links between business and customers, reducing geographic limitations and increasing efficiency in communication. Porter and Millar in Mustafa (2015) argue that ICT affect completion in three distinct ways: (1) ICT may change the industry Structure, and modify the completion rules; (2) ICT may be used to create sustainable competitive advantage and provide new competitive instruments for firms; and (3) ICT may be used to developed new business inside the firm.

This study discusses the handicraft industry in western Sumatra, namely embroidery. As is known embroidery industry including the creative industries which have a substantial contribution to economic growth at western Sumatra in Indonesian.
Based on the results of the survey with the employers, stated that there has been a decline in sales turnover embroidery products, volume / rate of export growth also declined, and the decreasing interest of the community, especially people in western Sumatra region in the use of embroidery products. It can be concluded that there is public discontent in buying and using the product embroidery. Based on the results of a preliminary survey by buyers of products embroidery and surrounding communities claim that western Sumatra embroidery products have not fulfilled their taste, It is seen from the shape of the embroidery design, product model and color of the product. In addition, marketing embroidery products is still limited to the local market only, namely the area of West Sumatra

alone, not reaching the domestic market / nationwide and even to overseas markets. Based on the preliminary results of the survey it can be concluded that the embroidery products not innovating in West Sumatra, causing reduced product growth rate, a decrease in sales, which decreased level of customer satisfaction, all of which are indicators of business performance embroidery in West Sumatra decreased.

The need for employers to take advantage of ICT in enhancing innovation (both product innovation and process innovation), so as to improve the performance embroidery business in West Sumatra. Innovation is the key to competitiveness, and to be able to innovate, companies must be able to prepare skilled manpower, adequate capital, technology, and build networks with other parties, in particular R & D institutes or universities, banks, and government (Tambunan, 2009). Romano (1990) revealed that the internal drivers for SME growth from innovation were technology, R&D, and the ability to generate a competitive edge in the firm's product market. The ability to innovate and adapt new technology (ICT) to make product modifications is likely because of the greater creativity and innovativeness of small-firm employee (Acs and yeung 1999).

In this research has the purpose are to (1) The extent to which the role of ICT in enhancing product innovation in the embroidery industry in West Sumatra; (2) Analyze the most appropriate strategy to increase product innovation in the Embroidery Industry in West Sumatra (3) The Role of Stakeholders (Government , Educational Institutions , Provider in increasing product innovation in the embroidery industry in West Sumatra). The study's findings have important implications for several parties including : (1) Provide input for the embroidery industry in West Sumatra , that the application of appropriate ICT can increase product innovation and improve performance; (2) For the Regulator and the Government , becomes the input for the improvement of regulations and policies related to the development and improvement of embroidery industry in West Sumatra; (3) Being one of the sources of information and feedback that is useful for all parties concerned with the development and improvement of embroidery industry in West Sumatra , both large businesses ,BUMN, universities , and ICT providers . I can be concluded the need for the embroidery industry to use and apply ICT

well as promotional products and selling online as well as a search tool for the development of models and design products that suit the tastes of today's market, so as to improve the performance of the embroidery industry in West Sumatra.

2. Literature review
2.1 Theoretical framework

In this research have used a theoretical perspectives to explain the wide range of ICT impacts on business processes and on the organization as a whole. They are: (1) Resource-based theory (Caldeira and Ward, 2002, 2003; Kyobe, 2004); and (2) The Technology-Organisation-Environment (TOE) framework (Kuan and Chau, 2001;Pan and Jang, 2008; Zhu et al., 2003; Zhu and Kraemer, 2005). According to the RBV firm performance is based on its specific resources and capabilities, which are difficult to imitate and create a sustained competitive advantage. Differences in ICT resource endowment, such as higher investments in ICT and their combination by firms, may enhance organizational capabilities (humanresources skills, experience and other intangible capabilities) and eventually lead to superior firm performance (Bharadwaj, 2000). In ICT context (example Information System and Electronic Commerce) , RBT is usually employed to analyse how organizations can achieve business value from ICT implementation (Ghobakhloo et al., 2011). Thus, RBT provides an appropriate theoretical basis for analysing the third phase of EC/IS adoption, which is the adoption success and performance evaluation.

The technology-organisation-environment framework (TOE) framework investigates three aspects of a Small Busines's context that affect the process by which it adopts and implements a technological innovation (Pan and Jang, 2008). These three aspects are termed technological context, organizational context, and environmental context (Zhu and Kraemer, 2005). Technological context deals with both the internal and external technologies relevant to the SB. Organizational context however addresses descriptive measures regarding the organization, such as SB size and scope, managerial structure, and internal resources. The environmental context refers to the arena in which a firm conducts its business: its industry, competitors, and dealings with government (Ghobakhloo and Tang, 2011).

2.2 Effects of ICT on small business performance

There are several types of performance measures; financial performance, operational performance and other impacts (liang et al, 2010). The links between ICT and financial performance (using accounting measures, such as return on assets (ROA), return on equity (ROE)). The impact on operational performance has been studied mainly using productivity measures and cost reduction (Bharadwaj, 2000; Liang et al., 2010; Das et al., 2011) in (Morinos et al,2013). ICT increases productivity and operational efficiency in specific business processes, not only by reducing costs but also by impacting on intangible assets such as quality improvement in design processes or life-cycle enhancement in inventory management systems (Brynjolfsson et al., 2002; Devaraj and Kohli, 2003; Melville et al., 2004).

Moriones et al (2013) demonstrate that ICT investments have tree impact on firm performance. **First,** ICT resources impact on communication improvement, which includes internal and external communication and coordination of activities. ICT enables a faster and more efficient use of information both within the firm and with external agents, such as customers and suppliers. ICT facilitates interaction and better coordination among workers, departments and firms. **Second**, external and internal communication as well as coordination are expected to lead to better operational performance. Operational goals of creative industry can be classified in four big areas: cost, quality, delivery and flexibility (Ahmad and Schroeder, 2003). Better communication and coordination derived from ICT adoption can help Small Business to better performance in these four dimensions. Increased flow of information improves decision-making processes and allows better resource allocation resulting in higher productivity and efficiency and, therefore, cost reduction. Continuous improvement in processes leading to higher quality also benefit from communication improvements by facilitating the exchange of cross-functional ideas and the dissemination of new methods and procedures throughout the whole company (Ahn and Matsui, 2011). Better communication and coordination also improve speed and punctuality in deliveries. Information-enabled collaboration enhances customer service throughout the supply

chain (Fawcett et al., 2007). With regard to flexibility, better communication with external agents such as customers, help firms to earlier detect environmental changes and respond quickly to changing competitive rules launching new products that satisfy their new needs. **Third,** operational performance has a straightforward effect on overall performance measures, such as market share and profits (Paul and Anantharaman, 2003; Dehning and Richardson, 2002; Dedrick et al., 2003).

2.3 Level of The ICT

The ICTs have been grouped into three different categories: general-use ICT, communication-integrating ICT and market-oriented ICT (Lucchetti and Sterlacchini, 2004 in moriones et al (2013)). First, General-use ICT includes internet access and computers. Both technologies are characterized by a very high rate of adoption among firms and by generally widespread use within firms. Computers and the internet are commonly used within firms in different business processes such as those related to production, communication and design. Second, Communication-integrating ICT includes e-mail, intranet and extranet. These technologies are specifically designed to improve the communication system, either by helping to integrate several internal functions and processes or by enhancing communication among different firms and collaboration amongst work-teams through established networks of firms. Consequently, communication-integrating ICT tools may significantly enhance the efficiency, quality and timeliness of group decision processes (Bajwa et al., 2005). Third, market-oriented ICT includes web pages and e-commerce. These technologies are clearly oriented to the market. On the one hand, this group is identified by the existence of a firm web site. According to Lucchetti and Sterlacchini (2004), web sites are mainly used to improve firm visibility and to provide detailed information about products and services, as well as about the company itself. For example, firm may use web sites to advertise products and to show post-product specification (Daniel et al, 2002).

There are many studies to classify ICT according to its usage. Its relatedness with the organizational innovation.

Table 1. ICT Categories

Main ICT Categories	Technologies - Systems
Enterprise Systems	Enterprise Resource Planning – ERP & ERP II or XRP Customer Relationship Management - CRM Supply Chain Management - SCM
Information Systems	Transaction Processing Systems - TPS Management Information Systems - MIS Decision-Support Systems - DSS Executive Support Systems - ESS
Digital Technologies	E-Commerce (refers to electronic transactions such as procurement and sales over the Internet) – B2B, B2C, B2G E-Business (refers to automated business processes (both intra-and inter-firm) over computer mediated networks – Intranet, Extranet
Telecommunication Systems	Internet, e-mail, voice over IP Local Area Networks Wide Area Networks Virtual Private Networks
Identification and Data Capture Technologies & Telematics Technologies	Portable Data Collection, Hand Held Readers, Magnetic & Smart Card Readers, RFID and so forth.
Source: Papastathopoulos, Anastassopoulos, Beneki (2009)	

Sources : Mustafa (2015)

2.4 Innovation

Lumpkin and Dess (2001) argues that innovation comprises the elements of creativity, research and development (R&D), new processes, new products or services and advance in technologies. To Kuratko and Hodgetts (2004), innovation is the creation of new wealth or the alteration and enhancement of existing resources to create new wealth. Innovation plays an important role not only for large firms, but also for SMEs (Jong and Vermeulen, 2006; Anderson, 2009). Sandvik (2003) argues

that innovation is one of the most important competitive weapons and generally seen as a firm's core value capability. Innovation is also considered as an effective way to improve firm's productivity due to the resource constraint issue facing a firm (Lumpkin and Dess, 1996). Innovation would appear in product, process, market, factor and organisation (Kao, 1989), but the first three dimensions are more familiar in the innovation literature (Johne and Davies, 2000; Otero-Neira et al., 2009).

Product Innovation

Product innovation can be defined as the creation of a new product from new materials totally new product) or the alteration of existing products to meet Innovation in Small Business and Performance customer satisfaction (improved version of existing products) (Gopalakrishnan and Damanpour, 1997; Langley et al., 2005). It also refers to the introduction of new products or services in order to create new markets or customers, or satisfy current markets or customers (Wang and Ahmed, 2004; Wan et al., 2005). Product innovation is one of the important sources of competitive advantage to the firm. With innovation, quality of products could be enhanced, which in turn it contributes to firm performance and ultimately to a firm's competitive advantage (Garvin, 1987; Forker et al. 1996). According to Hult et al. (2004), product innovation offers a potential protection to a firm from market threats and competitors.

Cooper (1999) contend that there are seven actionable critical success factors that apply to product innovation. They are:

1) Solid up-front homework – to define the product and justify the product.
2) Voice of the customer – a slave-like dedication to the market and customer inputs throughout the project.
3) Product advantage – differentiated, unique benefits, superior value for the customer.
4) Sharp, stable and early product definition – before development begins.
5) A well-planned, adequately-resourced and proficiently-executed launch.
6) Tough go/kill decision points or gates – funnels not tunnels.
7) Accountable, dedicated, supported cross-functional teams with strong leaders.

Process Innovation

Process innovation is the process of reengineering and improving internal operation of business process (Cumming, 1998). This process involves many aspects of a firm's functions, including technical design, R&D, manufacturing, management and commercial activities (Freeman, 1982). In a production activity, process innovation can be referred to as new or improved techniques, tools, devices, and knowledge in making a product (Gopalakrishnan and Damanpour, 1997; Langley et al., 2005; Wan et al., 2005; Oke et al., 2007). According to Ar and Baki (2011), the product and process innovation were positively and significant related to firm performance.

Market Innovation

Rodriguez-Cano et al. (2004) argue that market innovation plays a crucial role in fulfilling market needs and responding to market opportunities. In this respect, any market innovation has to be directed at meeting customers' demand and satisfaction (Appiah-Adu and Satyendra, 1998). Sandvik (2003) discovered that market innovation has a positive effect on sales growth of a firm. Similarly, Otero-Neira et al. (2009) found strong evidence that market innovation positively influenced business performance.

in this study was divided into product innovation, process innovation and market innovation. Product innovation included three items, namely the introduction of new product, technological newness in product, and product differentiation. Process innovation comprised three items, that is R&D orientation, the application of new technology and new combination of materials in production. Market innovation consisted of three items, i.e. the application of online transaction, innovative marketing and promotion, and the ability to find new markets. All these items were adapted from Otero-Neira et al. (2009), and Lan and Wu (2010).

2.5 Small Business Performance

Firm performance is the outcomes achieved in meeting internal and external goals of a firm (Lin et al., 2008). As a multi dimensional construct, performance has several names, including Growth, survival, success and competitiveness. Depending on organizational goals, different methods are adopted by different firms to Measure their

performance. The performance indicator can be measured in financial and non-financial terms (Darroch, 2005; Bagorogoza and Waal, 2010; Bakar and Ahmad, 2010) in Rosli and Sidek (2013). Most firms, however, prefer to adopt financial indicators to measure their performance such as Return on assets (ROA), average annual occupancy rate, net profit after tax and return on investment (ROI). Some other common measures are profitability, productivity, growth, stakeholder satisfaction, market share and competitive position (Rosli and Sidek, 2013). Performance indicators in this study were returns on sale, returns on asset, profitability, market share, sales revenue, labour productivity and employment.

2.6 The relationship between innovation and performance

The relationship between innovation and performance has also been extensively examined in a number of studies in the organisational field. Innovation is proving to be an increasingly key factor for survival and expansion in the face of growing competition and environmental uncertainty (Grønhaug and Kaufman, 1988). The main argument for organisational innovation leading to improved performance derives from innovations that effectively respond to the challenges and dangers a firm confronts in its entrepreneurial environment (Han et al., 1998).

3. Research Method

This is the kind of qualitative research, where researchers conducted a literature study and secondary documents in depth. Stages in this study can be described as follows:
1) Formulation of the problem and goal setting.
2) Conduct a preliminary study to related parties, namely: employers embroidery, embroidery traders, buyers (customers), and the local authorities to understand the problems faced.

3) To study the literature and secondary documents appropriate subject matter
4) Identify the study variables with the help of a team of experts from the internal entrepreneurs embroidery.
5) The in-depth interview with a team of experts (businessmen embroidery) in the weighting of priorities and assessment rating for each study variable.
6) Formulation of strategic planning by a factor evaluation matrix EFE, IFE, IE and SWOT.
7) Analysis of the data processing.
8) Conclusions and suggestions

Data Collection

The data collected is the key external factors (opportunities and threats) and key internal (strengths and weaknesses) are considered to affect the business of embroidery based on the results of discussions with employers embroidered with a focus group discussion method. External factors key obtained by reviewing the external environment (economic, demographic, social, cultural, environmental, political and legal, technology, competition, new entrants, substitute products, buyer and supplier), while internal factors key obtained by reviewing the internal environment of the business embroidery (marketing, production, logistics, sales, service, human resources, finance).

Data Analysis

Data processing stages as follows:

Input stage, includes making matrix EFE (external factor evaluation) and IFE (internal factor Evaluation). Before drawing up the matrix, the first priority is determined weight and ratings for each key external and internal factors. Weights priority and rating obtained based on an assessment of the employers embroidery by conducting in-depth interviews with them. EFE Matrix and IFE embroidery business is shown in Table 2. Total value weighted on EF and IFE matrixs showed that the Company Being in a stable condition or better.

Table 2. EFE Matrix

NO	EXTERNAL FACTORS	WEIGHT	RATING	VALUE WEIGHTED
	OPPORTUNITIES			
1	The majority of the number of Islamic Religion	0.08	4	0.32

NO	EXTERNAL FACTORS	WEIGHT	RATING	VALUE WEIGHTED
2	Economic globalization / AFTA	0.045	3	0.135
3	advancement Internet Network	0.025	3	0.075
4	Advancements Hardware / Software ICT	0.015	3	0.045
5	Advancement Program / software / application	0.02	3	0.06
6	the number of suppliers	0.042	3	0.126
7	The quality and quantity of goods suppliers	0.03	3	0.09
8	Prices of Goods Supplier site labor	0.028	3	0.084
9		0.025	3	0.075
	THREATS			
1	The amount of income	0.07	2	0.14
2	Purchasing power	0.04	2	0.08
3	people's lifestyles	0.085	2	0.17
4	Rates rise in fuel and electricity	0.075	2	0.15
5	The availability of ICT infrastructure	0.077	2	0.154
6	Government assistance (skim forms of capital)	0.053	2	0.106
7	Consumer tastes	0.097	2	0.194
8	consumer behavior	0.073	1	0.073
9	number of Competitors	0.038	2	0.076
10	Competitor'advantages	0.027	2	0.054
11	the availability of the number of workers who have the skills and competencies	0.055	2	0.11
		1		**2.317**

Description:
Rating 4: response is excellent
Rating 3: good response
Rating 2: fairly good response
Rating 1: bad response
Weighted value = weight X rating

Table EFI Matrix

NO	INTERNAL FACTORS	WEIGHT	RATING	VALUE WEIGHTED
	Strength			

NO	INTERNAL FACTORS	WEIGHT	RATING	VALUE WEIGHTED
1	product quality (in terms of models / design)	0.067	3	0.201
2	level of customer satisfaction	0.049	3	0.147
3	capital management capabilities	0.034	3	0.102
4	Effectiveness of production (on time)	0.023	3	0.069
5	production efficiency	0.017	3	0.051
6	employees who have the skills and sewing	0.09	3	0.27
7	reward / wage employees	0.043	3	0.129
8	a conducive working culture (kinship)	0.08	4	0.32
	WEAKNESSES			
1	the price of product are not comopetitive	0.042	1	0.042
2	the amount of market share is still locally	0.057	1	0.057
3	Utilization of ICT for promotion activities	0.085	1	0.085
4	Less capital	0.0335	2	0.067
5	Utilization of ICT for e-commerce	0.0225	1	0.0225
6	less entrepreneurial	0.1	2	0.2
7	Ability to use ICT by entrepreneur and employee	0.087	1	0.087
8	Ability to research and development product that not suit market tastes	0.059	2	0.118
9	Less in doing research with universities such as quality and design product	0.053	2	0.106
	Utilization of ICT in product development such as searching tool for design and model product	0.058	1	0.058
		1		**2.1315**

Description:
Rating 4: force major
Rating 3: minor force
Rating 2: minor weakness
Rating 1: major weakness
Weighted value = weight X rating

I. The Matching Stage

Phase adjustments include making external internal matrix (IE) and SWOT (strength-weakness-oportunities-threats). Matrix IE busines can be seen in Figure 2.

Total Value Weighted Matrix (VALUE EFI)

SWOT matrix created by customizing every key internal and external factors to each other in order to obtain different alternative strategies are categorized into four strategies SO, WO, ST and WT. alternative strategy that has the form and the same type are grouped and results are adjusted to IE matrix. Alternative strategies that do not match are ignored and not subsequently tested at the stage of decision. Based on IE matrix above, the embroidery business in West Sumatra are in a position of stability. The most appropriate strategy is the guard and defense strategies; market penetration strategies and product development are two strategies that are commonly used for these positions.

Alternatives strategies in accordance with the matrix IE and tested at the decision stage are:
1) Implement the strategy of cooperation with University in product development, and improving the competence and skills of embroidery business (especially the ability to use applications and ICT equipment).
2) Applying cooperation with the local government to provide facilities such as infrastructure (providing ICT infrastructure, the ease of regulation, and appeals to the public to use embroidery products).
3) cooperation with the Great effort / state and cellular operators in providing ICT applications which can be used for promotional activities, e-commerce and provide information about the taste of the

market, and information embroidery designs and models are up to date.
4) Market penetration to maintain and increase market share by using the application of ICT for promotion and e-commerce.
5) Develop a product by improving the quality of design, model, and the quality of the embroidery stitches that suit the tastes of the market.
6) Development of products by adding product lines such as for shawl embroidery / embroidery scarf, clothes, bags etc.

II. **The Decision Stage**

The last stage in the formulation of business strategy is the preparation QSPM (quantitative Strategic Planning Matrix) will generate a sequence of strategic priorities proposed. QSPM made by giving the US value (attractiveness Score) every internal and external factors key to any strategy is proposed. US judge how the degree of influence a key factor for certain alternative strategies. US values range from 1 to 4, with 1 = no influence, 2 = a little influence, 3 = sufficient effect, and 4 = very effect. US value is then multiplied by the weight of the priority of each key internal and external factors to obtain TAS (total attractiveness score). The last step is adding up the value of each alternative strategy TAS. Alternative strategies that have the highest number of TAS ranks first priority preferred embroidery business. TAS any number of alternative strategies are shown in Figure 3.
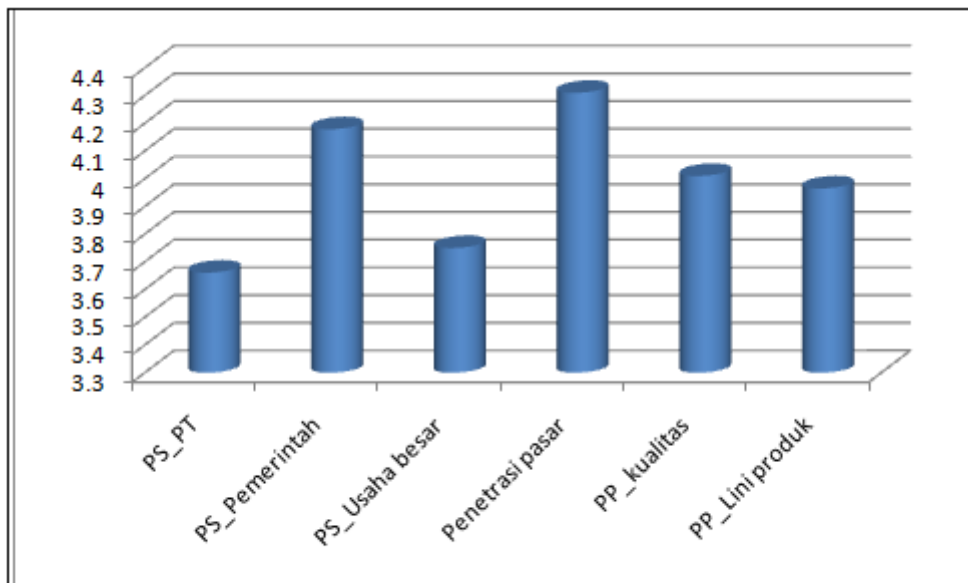
Figure 3. The Value of each alternative strategy

Table 5. Action or Operational Strategic

Alternatif Strategi	Action/ Operational Strategic
Market Penetration	by Using aplication of ICT for promotion and E-Commerce
Partnership Strategic with government	supply ICT infrastructure
	support to regulation
	push and motivate community to buy a embroidery product
Upgrade quality product (model/design, material)	training design and model an embroidery product with University
	searching information in Internet about model and design up to date
Produk Development (varian product)	add to variant/line product
	searching information in Internet about model and design up to date
Partnership Strategic with Privat Company	support aplication of ICT, such as internet, e-commerce, website, SIM
	support financing
	support
	make available informatin for handmade Business such as consumen profile, domestic and international
Partnership Strategic with Universities	course about Management to small business
	training about skill design and Model
	training about how to use ICT

5. Analysis of the results

Based on Figure 3 above , we can conclude that the most important strategy for the run is market penetration, and cooperation with the parties such as government , large enterprises and universities . Action needs to be done for each alternative strategy can be seen in Table 5 .

6. Conclusion and Suggestions

The conclusion that can be drawn from the results of this study are:
1) The role of ICT in enhancing innovation embroidery products in West Sumatra are (1) the provision of facilities and infrastructure ICT infrastructure such as the Internet network , (2) application programs that support for the promotion such as social media (facebook , twiter , histagram , WA , line etc.) , and e - commerce . And the availability of information about consumer tastes both domestically and internationally regarding handicraft products .
2) The right strategy to improve business performance embroidery in West Sumatra is the market penetration, cooperation with external parties , product development and product lines
3) The role of stakeholders in improving product innovation in Sumatra Barat are (1) providing an atmosphere conducive business, (2) supporting regulations , (3) provide the ICT infrastructure (both internet , application programs , social media , website , e-commerce and information needed), (4) provide training and knowledge of design , models and variants of the product , and (5) provide knowledge of how to use ICT for entrepreneurs embroidery .

Some advice that can be given include:
1) he Business of embroidery: (a) start to think, to consider the application of ICT in their activities because of ICT and globalization is a competitive advantage that is vital today. (b) The need to improve the use of ICT's application, (3) the need to improve the quality of designs, models and a variety of products that suit the tastes of both domestic and international markets.
2) The Universities: a reference in training and development that is appropriate to the needs of the embroidery business in West Sumatra .
3) The Government: as a reference in refinement of policies and rules that support the development of embroidery business.
4) The Big Business: as a reference implementation of CSR to small businesses

7. References

Alberto, B.M., Margarita, B.P. and Fernando L.P. (2013), "Performance effects of ICT in manufacturing SMEs, Industrial Management & Data Systems. Vol. 113 No. 1, pp. 117-135

Bakar,L.J.A. dan Ahmad,H. (2010)." Assesing the Relationship between Firm Resources and Product Innovation Performance", Business Process Management Journal, Vol.16 No.3, pp 420-435

Beaver, G. (2002). Small Business, Entrepreneurship and Enterprise Development, Pearson Education Ltd,United Kingdom

Bharadwaj, A. (2000), "A Resources-based perspective on information technology capability and firm performance: an empirical investigation", MIS Quarterly: Management Information System, Vol.24 No.1,pp.169-93

Caldeira,M.M.and Ward, J.M.(2002), "Understanding the successful adoption and use of IS.IT in SMEs: an explanation from Portugues manufacturing industries", Information Systems Journal, Vol.12 No.2,pp121-152

Cooper, R. (1999), "Form Experience: The Invisible success factors in product innovation", Journal of product Innovation Management, Vol. 16 No.2, pp. 115-33

Dinas Perindustri dan Perdagangan Sumbar. (2011), "Renstra-SKPD Dinas Perindustrian dan Perdagangan Provinsi Sumatera Barat Tahun 2011-2015", (Diakses 8 April 2015).

Daniel, E., Wilson, H. and Myers, A. (2002), " Adoption of Ecommerce by SME in UK", International Small Business Journal, Vol.20 No.3, pp 253-70.

Dendrick, J., Gurbaxani, V. and Kraemer, K.L. (2003), "Information Technology and economic Performance: a Critical review of empirical evidence", ACM Computing Surveys, Vol.35 No.1,pp 1-28

Lee, S. and Kim, S.H. (2006), "A leg effect of IT investment on firm performance", Information Resources Management Journal, Vol.19 No.1, pp 43-69

Liang, T., You, B. and liu, C. (2010)," A Resources Based Perspective on Invormation Technology and Firm Performance: a Meta Analysis", Industrial Management and Data System, Vol.110 No.8, pp 1138-58

Luchetti, R. and Sterlacchini, A. (2004), " The adoption of ICT among SMEs:evidence from

an Italian survey", Small Business Economics, Vol.23 No.2, pp.151-68

Dehning, B. and Richardson, V.J. (2002). "Return on Investments in Information Technology: a research synthesis", Jornal of Information System, Vol.16 No.1, pp 7-30

Ghobakhloo, M. and Tang, S.H. (2013). "The role of owner/manager in adoption of electronic commerce in small businesses: The case of developing countries", Journal of Small Business and Enterprise Development, Vol. 20 No. 4, pp. 754-787.

Han, J.M., Kim, N. & Srivastava, R.K. (1998). "Market Orientation and Organizational Performance: Is Innovation a Missing Link?," Journal of Marketing, Vol 62. No 4, pp 30-45.

Jong, J.P.J. dan Vermeulen,P.A.M. (2006). " Determinants of Product Innovation in Small Firms: A Comparison across Industries", International Small Business Journal, Vol. 24 No.6, pp 587-609

Kuratko, D.F. dan hodgetts, R.M.(2004),"Entrepreneurship: Theory, Process and Practices", 6th edition, Smith western, USA

Lin, C.H., Peng, C.H., dan Kao, D.T. (2008)."The Innovation effect of market orientation and learning orientation on Business Performance", International Journal of Manpower, Vol.29 No.8, pp 752-772

Love, L., Priem, R.L., dan Lumpkin, G.T. (2002), " Explicity Articulated strategy and Firm Performance under Alternative Levels of Centralization", Journal of Management, Vol. 28 No 5, pp 611-627

Lumpkin,G.T & Dess, G.G. (2001)."Linking Two Dimensions of Entrepreneurial Orientation to Firm Performance: The Moderating Role Of Environment and Industry Life Cycle," Journal of Business venturing, 16, 429-511

Mohd-Rosli, M. dan Sidek, S. (2013)," The Impact of Innovation on Performance of Small and Medium Manufacturing Enterprises: Evidence from Malaysia", Journal of Innovation Management in Small & Medium Enterprise, Vol.20. No 13

Mustafa, Haseeb Hasan. (2015). "The role of ict management to achieve organizational innovation", The International Journal of Organizational Innovation. Vol 7 No.4, pp 44-56

Oke, Adegeko., Burke, G. dan Myers, A. (2007), "Innovation types and Growing UK SMEs", International Journal of Operation & Production Management, Vol. 27 No. 7, pp 735-753

Otero-Neira, C., Lindman, M.T. dan Fernandez, M.J. (2009), " Innovation and Performance in SME furniture Industries: An international comparative case study", Marketing Intelligence and Planning, Vol.7 No.2, pp 162-167

Pitta, D.A (2008). " Product Innovation and Management in a Small Enterprise", Journal of Product & Brand Management, Vol. 17, No. 6, pp 416-419

Pinho, Carlos J. (2006), "TQM and Performance in small medium Enterprises: The mediating effect of customer orientation and innovation", International Journal of Quality & Reliability Management, Vol.25 No.3, PP 256-275

Pitta, D.A.(2008),"Product Innovation and Management in a small enterprise", Journal of Product & Brand Management, Vol. 17 No.6, pp 416-419

Romano, C.A. (1990). "Identifying factors Which Influence Product Innovation: A Case Study Approach," Journal of Management Studies, Vol. 27 No. 1, pp 75-79

Sandvik, I.L., dan Sandvik,K. (2003), " The Impact of Market orientation on product Innovativeness and Business Performance", International journal of Research in Marketing, Vol. 20 No. 4, pp 255- 376

Spiezia, V.(2011). Are ICT users more innovative? An analysis of ICT- enabled innovation in OECD firms. OECD Journal, p.99

Sunday, C.E., Yanqing, Duan. and Hsin Chen. (2014). "Examining emerging ICT's adoption in SMEs from a dynamic process approach", Information Technology & People Vol. 27 No. 1, pp. 63-82

Thornhill, S. (2006), " Knowledge, innovation and firm Performance in high and low Technology Regimes", Journal of Business Venturing, Vol.21, pp 687-703

Wolff, James. A dan Pett, Timothy. L. (2006), "Small-firm Performance: Modeling the role of Product and Process Improvement", Journal of small Business Management, Vol. 44 No. 2, pp 268-284

Zahra, S.A & Das, S.R. (1993). "Innovation Strategy and Financial Performance in Manufacturing Companies: An Emprical Study." Product and Operation Management, Vol 2 No.1, pp 90-101

The Identification of Potential Local Natural Fiber as Alternative Materials for Tourism Product in the Context of the Empowerment of Small and Medium Entreprises (SMEs) in the Area of Northern Bali: The Case Study in Musi Village, Gerokgak District, Buleleng Regency

Kadek Rihendra Dantes

Department of Mechanical Engineering of Education
Faculty of Technology and Vocational, Ganesha University of Education

Email: *rihendra79@gmail.com*

Abstract

The research objective is to improve people's welfare and the economic development of suburban / rural areas, particularly the economic condition of the villagers. In details, the purpose of this study can be described as follows: (1) identification of natural fibers which have not been optimally used, (2) creating an environmentally friendly natural fiber as a replacement for Fiber Glass. The proposed research is to produce alternative materials in order to identify potential local natural fibers as the materials of the products in the field of tourism industry. The methodology used in the development of products (natural fibers) is Prototyping, while the needs analysis and data collection will be done through interviews, observation of documents and court, as well as literature reviews.

Key words: potential natural fiber, fiber glass, tourism products, prototyping.

1. Introduction

Along with the development of more advanced era, people's needs will increase as well. Therefore, society should be able to take advantages of nature to support their economic condition. One of the ways is by creating new materials derived from nature. It is because the need for materials tends to increase from years to years hence new materials of a higher quality with a relatively low cost are needed. At this time, a variety of industries have used composite strengthened with a fiber glass that is not environmentally friendly in the housing industry (panels, chairs, tables), chemical industry (pipelines, tanks, hoses), sport equipments, parts of automobiles, power tools until the aircraft industry (airframe, landing gear, wings, and helicopter blade). One aspect that should be considered in generating the new materials is the use of materials that are cheaper and environmentally friendly, and producing a product with a higher quality.

In creating new, high-quality materials, a merging or combination of two or more different basic elements is required, which is so-called composite. One of which serves as a matrix and the other serves as a filler or filler / amplifier. The matrix is generally made from soft materials. Polymers (plastics) is a material used as a matrix, although the applications require high temperature resistance, instead of the plastic, which is commonly used as a matrix, some metals can be used such as aluminum, copper, magnesium and even titanium.

The matrix polymer is a strong, lightweight and semi crystalline thermoplastic polyethylene that is widely used as a basic material by plastic packaging industries. One of the physical properties of the polyethylene is determined by the density that is influenced by the chain branching in polyethylene. Based on the difference in branching of polyethylene, the polyethylene can be divided into High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE) and Linear Low Density Polyethylene (LLDPE) (Deswita, dkk.2008). In this study, High Density Polyethylene (HDPE) is used. HDPE that contains no more than 5 short branches so that further practical linear can be conducted. In addition, HDPE is more rigid, strong, with a crystallization degree of 85%, it has a melting point which can be

measured more certainly if compared to LDPE. It is because of the choice of catalyst in the production (Ziegler-Natta catalysts) and reaction conditions. Thus, High Density Polytilene (HDFE) has the properties of materials that are stronger, harder, more opaque, and resistant to high temperatures. Hydrogen bonds between molecules also play a role in determining the melting point of the plastic. Besides, HDPE can be recycled and marked with the number 2 on the recycle symbol. HDPE is usually dark colored, opaque, and may appear in a variety of colors, although it is usually white. HDPE is noticeably softer than PET and the characteristics are not easily dented as on a water bottle with a code number 1 behind the pack.

While Filler is an amplifier that is commonly used in the fiber and becomes the main part that determines the characteristics of composite materials. The materials used as fillers are divided into two parts, namely natural materials and artificial materials. The natural reinforcing materials derived from plants such as water hyacinth fiber, palm fiber, palm fiber, fern fiber, bamboo fiber, banana fiber, straw fiber, fiber sanseviera trifasciata leaves, coir fiber palm fruit and others. While, the natural ingredients that derive from animals are like wool and silk. The coir fiber of palm fruits is one among the other natural fibers that can be used in the production of composites. The increased use of natural fiber-based material that can be renewed is one of the important issues to reduce the use of synthetic fiber-based composite material that can damage the environment and bring on global climate change. As a reason, the component with the natural fiber-reinforced material can be decomposed by bacteria (biodegradability), in order to save the environment from pollution. Based on that, efforts are continued to be made as a way to develop a composite material that can be decomposed naturally (biocomposites). Another consideration underlying this study is the natural fibers in Bali, especially in Buleleng, are very abundant in numbers, more particularly the availability of natural fibers of Lontar fruits and Lidah Mertua, identified in the area of North Bali. The availability of the fibers is extremely abundant and they have not been used optimally. The other things that reinforce the use of Lontar fruit fiber and Lidah Mertua as an alternative to natural fibers as well as the potential to replace the glass are, low cost, low density, specific strength and high modulus. The use of natural fibers as composite materials is continue to be developed by the researchers.

2. Literature Reviews

2.1 Composites

The definition of composite is a material formed when two or more discrete components are combined (Kroschwitz, 1987). K. Van Rijswijk et.al in his book Natural Fibre Composites (2001) describes that composite is a hybrid material made from polymer resin reinforced with fibers that combine the mechanical and physical properties.

Composite material is a macro combination of materials, which is defined as a material system composed of a mixture or combination of two or more main element, which are different in shapes and material compositions that can not be separated (Schwartz, 1984).

2.2 Classification of Composites

Based on the matrix composites used, it can be grouped into:

a. MMC: Metal Matrix Composite (using metal matrix). Metal Matrix Composite is a type of composite that has metal matrix. MMC has been developed since 1996. In the beginning, the studied one was Continuous Filament MMC, which is used in the aviation industry

b. CMC: Ceramic Matrix Composite (using a ceramic matrix). CMC is a two- phase material where a single phase serves as an amplifier and another phase as a matrix in which the matrix is made of ceramic. The amplifier, which is commonly used in CMC is; oxide, carbide, nitride. One cypress-making process of the CMC is through DIMOX process, that is the process of forming a composite oxidation reaction of molten metal to ceramic matrix growth in the area around the filler.

3. PMC: Polymer Matrix Composite (using a polymer matrix)

A polymer matrix is mostly used in composite materials. It is because a polymer matrix has properties that are more resistant to corrosion and lighter. The polymer matrix is divided into two, namely thermosets and thermoplastics. The difference is that thermoset polymers can not be recycled

while the thermoplastic can be recycled so that thermoplastics are more widely used lately. The types of commonly used thermoplastic are polypropylene (PP), polystryrene (PS), polyethylene (PE), and others.

Based on the fibers used in fiber composites (fiber-matrix composites) it can be divided into:

a. Fibre composites (fiber composite) is a combination of fiber matrixes.
b. Flake composites are the combination of matrix with flat flakes.
c. Particulate composites are the combination of matrix with particles
d. Filled composites are the combination of skeletal continuous matrix.
e. Laminar composites are the combination between composite layers or constituent lamina.

Based on the placement, there are several types of fibers in the composite, they are:

a. Continuous Fibre Composite. This type of fiber has a long and straight arrangement, forming a matrix between the lamina. This type has a weakness that is the separation between the layers.
b. Woven Fibre Composite (bi-directional). This composite is not easily influenced by the separation between the layers due to the fiber arrangement binds the layers. The composition of the fibers is not so straight resulting in the weakened strength and stiffness.
c. Fibre Composite discontinuous. Discontinuous Fibre Composite is a type of composites with short fibers. This type is further distinguished into three: a) Aligned discontinuous fiber, b) Off-axis aligned discontinuous fiber, c) Randomly oriented discontinuous fiber.

Meanwhile, based on the composite structure, it can be divided into several types, namely:

a. Particulate Composite Materials (composite particles) are composites that use particles / granules as filler (filler). Particles in the form of metal or non-metal can be used as filler.
b. Fibrous Composite Materials (composite fiber) consists of two components of that matrix and fiber.
c. Structural Composite Materials (composite layered) consists of at least two different materials are glued together.

2.3 Natural Fibers (Biocomposites)

Fiber is a type of material in the form of pieces of components that are lightweight elongated in shape. The example of the most common fiber people usually know is the fiber of the fabric. Fiber can be classified into two types, they are natural fibers and synthetic fibers (man-made fibers). Synthetic fibers can be produced inexpensively in large quantities. However, natural fiber has many advantages, especially in terms of its comfort.

Currently, experts of composite material begin to give serious attention to natural fiber because:

a. Natural fibers have high specific strength because it has a low specific weight.
b. Natural fibers are easy to obtain and are a natural resource that can be reprocessed, the price is relatively inexpensive and non-toxic (environmentally friendly).
c. Natural fibers as a real solution in the industry to solve global warming.

Natural fibers are the fibers produced by plants, animals, and geological processes. Natural fibers can be classified as follows:

a. Fiber plants / food fiber, usually composed of cellulose, hemicellulose, and sometimes also containing lignin. Plant fibers are used as materials for paper and textiles.
b. Commodities fiber and leather. Animal fiber is generally composed of a certain protein. The examples of animal fibers, utilized by humans, are silk and wool fibers (wool).
c. Mineral fiber, generally made of asbestos. Nowadays asbestos is the only mineral that is naturally present in the form of long fibers.

3. Research Methodology
3.1 Types of Research

In line with the identification of new materials from bio fiber composite, this research is categorized as a research development to find new materials made from potential natural fibers (biocomposites).

The bases of the selection of the design of this study are: (a). The identification of new materials from natural fibers is a kind of activities to discover a certain new material which can replace glass fiber. (b). in

designing this product, researchers use some theories of natural fibers which then result in a finding a new fiber based on the results of the identification by which existence is often found in the village of Musi, Gerokgak, Buleleng, North Bali and not used optimally by the surrounding community.

Stages of this research as a whole can be described as follows: (a). Literature study, to look for theories that support the research. (B). conduct a survey of natural materials that will be used as biocomposites, where what the researchers identified is a staple fiber from palm fruit and Lidah mertua leaves. (c). The development of some theories and apply them to the natural fibers with a treatment in accordance with the theory. (d) Verify and validate the identification resulted, (e). evaluate the identification of potential natural fibers, (f). make improvements to the identification of natural fibers that are found.

3.2 Procedures of Data Collection and Processing
The data collection instruments used in this study, consisting of: (1). Guidelines theories of natural fibers, (2). The analysis of natural materials that will be used as biocomposites. Overall the data obtained will be used in the identification of potential natural fibers.

3.3 Data Analysis
Data analysis was performed at the time when the assessment was conducted to identify potential Natural Fibers in the village of Musi, Gerokgak, Buleleng. The data collected in this study are in the form of quantitative and qualitative data. Based on that, for the sake of the importance of data processing, non-statistical and statistical analysis will be used. Non-statistical analysis is used to give meaning to the description of the data related to the content, inference logic, processes, and products (output). As for the quantitative data, descriptive statistical analysis is used to describe the quantitative data, so it can be formulated into a qualitative purport to make the analysis easy to do including the revision of the identification. On the other hand, the overall results of the analysis of research data, both qualitative and quantitative serve as the basis / footing by the research team in conducting broadly seminary and dissemination of the results generated with the identification.

4. Discussion of Results

From the results of the identification done by the Conductors Team, it was found that three (3) types of plants can produce fiber and the fiber can be used to manufacture a product. The fibers are fibers from the stem of gebang plants, the fiber of the leaves of sisal plants, and the fiber from the fruit of palm fruits.

4.1 The Fiber of Gebang Trunk
Gebang tree (Corypha Utan Lamarck) is a type of palm that is very useful in supporting hu'ans' life. Even though it belongs to wild plants for public and grows into forest areas, but the potential is large enough unwittingly used by Indonesian people like; building materials, food, beverages, household appliances, handicrafts, and herbs. Because of that, one of the efforts to increase the usefulness of gebang trees is through this research that is by utilizing the fiber of gebang midrib as a composite raw material, which is expected to be used in various fields of application. The reasons, for the selection gebang frond fibers as composite raw materials, are they are economically valuable, easily obtained in large quantities and are unutilized materials, high-quality, environmentally friendly, and they can minimize the chances of utilization of raw materials that may cause corrosion. From a couple of tests performed by the conductors team, the results can be presented as follows.

4.1.1 The Tensile Strength of Composites
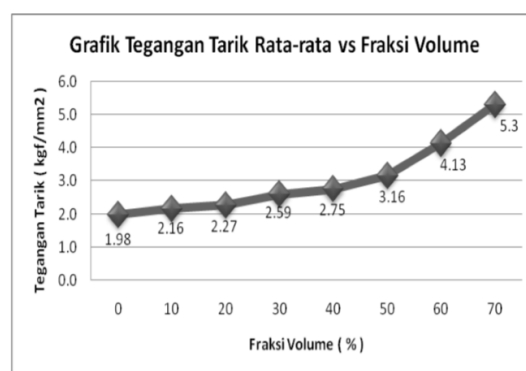Based on the data, the obtained composite tensile strength is as follows:

Figure 1. The Chart of the Relation between The Average Pulling Voltage and Fiber Volume Fraction.
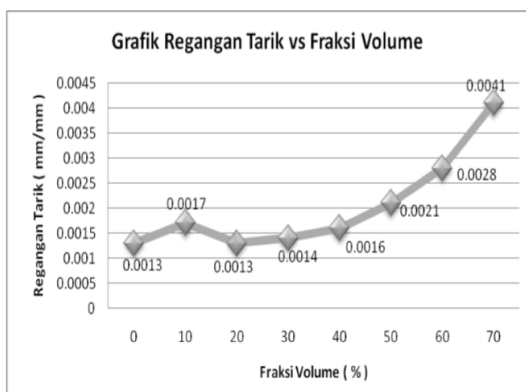
Figure 2. The Chart of the Relation between the Strain Drag and the Fiber Volume Fraction.

Figure 1 shows a graph of tensile strength and fiber volume fraction. In which an increase in the composite tensile stress with increased fiber volume fraction can be seen that is the higher the fiber volume fraction, the tensile stress is also increased. The highest tensile stress is on the fiber volume fraction composite of 70% at 5.3 kgf / mm2. Up to the highest fiber volume fraction, the composite is not decreased in terms of the tensile strength. This indicates that the matrix is still working well to accept and to be passed the burden of the fiber. Figure 2 shows a relationship graph between the tensile strain and the fiber volume fraction. Where the tensile strain is also experiencing an increasing trend in line with the increasing in fiber volume fraction, thus the highest strain is in composites with high fiber volume fraction that is 0.0041 mm / mm. The increasing of the strain is due to the resistance of the composite response against a tensile load received so that the composite is stressed at the same strain as the effects occur at the atomic level when the internal shift the particles that make up the composite, so that the composite have added length or elongation. This situation greatly affects the composite tensile strain value when compared to the length of the measuring area (gauge length) or (L0). The greater the value of the length (ΔL), the tensile strain will increase.

4.1.2 The Impact Strength of Composites

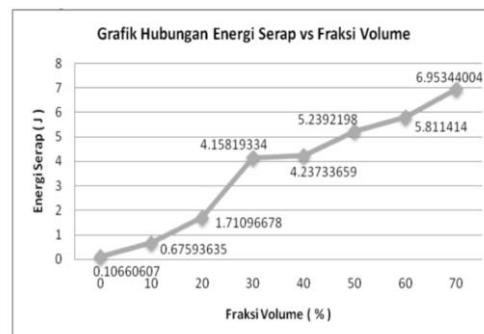Based on test data, it is obtained that composite tensile strength is as follows:

Figure 3. The Relationship Chart between the Absorbed Energy in Average and the Volume Fraction of Fiber.
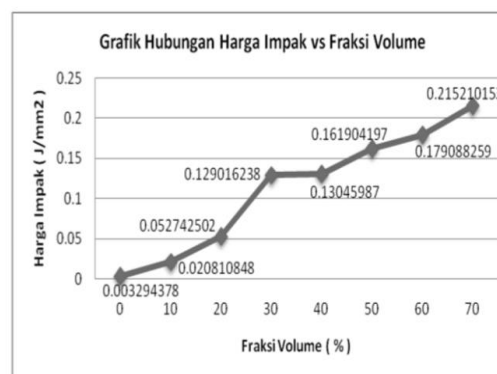

Figure 4. The Relationship Chart between Average Impact Price and Volume Fraction of Fiber.

Based on the results shown in Figure (3) and (4) the impact energy absorption and prices increased as the fiber volume fraction increases. Where, the impact energy absorption and highest prices are in composites with high fiber volume fraction of 70% ie (0.215210153 6.95344004 J and J / mm2). Meanwhile, the value of energy absorption and the lowest impact price are on the composite volume fraction of 0% ie (0.003294378 0.10660607 J and J / mm2). This result proves that the variation of fiber volume fraction influences on the value of energy absorption and impact the price of the composite. Besides, the power interface between fiber and matrix also strongly supports an increase in impact strength.

4.2 Sisal Leaves Fiber

Sisal is a natural fiber that is most widely used and most easily cultivated. Sisal grows wild as a fence and along the railway tracks in India (Murherjee and Satyanarayana, 1984). Sisal production in the worldwide reaches nearly 4.5 million tonnes annually. Tanzania and Brazil are countries with the largest productionof sisal (Chand et al

1988). Sisal fiber is a hard fiber resulting from the extraction process leaves the plant sisal (Agave sisalana). Although this plant comes from North and South America, sisal can grow well up in Africa, the West Indies, and the Far East. Sisal plant can produce 200- 250 leaves, each of which consists of the leaf 1000-1200 fiber bundle containing 4% fiber, 0.75% cuticle, 8% dry material and 87.25% water (Murherjee and Satyanarayana, 1984).

4.2.1 Tensile Strength of Composites

In a test, it is obtained the tensile and strain strength of composite. From Figure 5.6. it can be seen the relationship of long reinforcing composite fiber towards the strength of composite. The tensile strength of composites with untreated fibers (natural), the fiber length is 1 cm by 20.16 MPa, fiber length of 3 cm by 13.97 MPa and for a fiber length of 5 cm by 23.51 MPa. While on the treated fiber NaOH, the tensile strength of the fiber length of 1 cm, 3 cm and 5 cm are respectively 32.30 MPa, 29.50 MPa and 30.68 MPa.
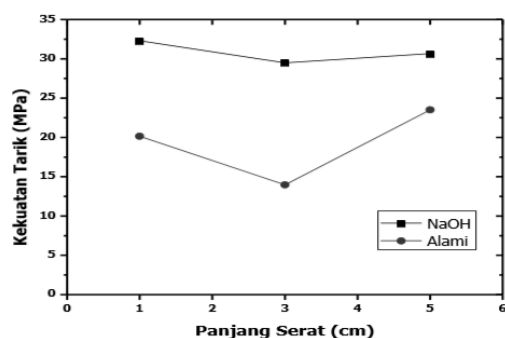

Figure 5. The Relationship between agave fiber composite's tensile strength and to the length of the fiber.

The fluctuations in the tensile strength of the fiber length are seen in the untreated fibers (natural) on the composite. This is affected by the placement of fiber randomly in the composite so that the orientation of fibers in the composite becomes irregular, whereas the soaking treatment NaOH, the tensile strength tends to be the same for all three sizes of fiber and higher than natural one, this is due to treatment of NaOH that allows the bonding interface the fiber and the matrix stronger.
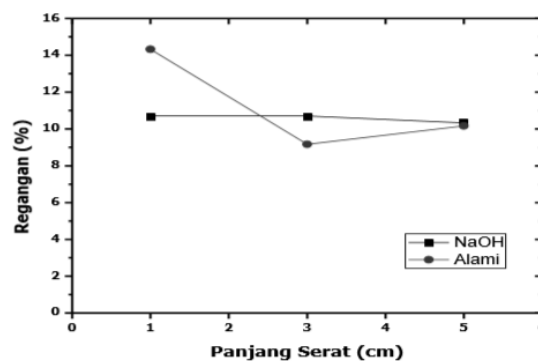

Figure 6. The Relationship between the strain agave fiber composite against the length of the fiber

From Figure 6. The Relationship between the strain agave fiber composite against the length of the fiber can be seen. Natural fibers as reinforcement for composites, the fiber length of 1 cm, 3 cm and 5 cm the strain are respectively 14.33%, 9.17% and 10.17%. While for the strain of soaking treatment of NaOH for specimens with a length of fiber 1 and 3 cm have the same great strain that is equal to 10.70%, and the strain obtained from a length of 5 cm is by 10.33%. From Figure 6, the untreated fibers (natural), the tendency to decrease the value of strain with the increase in the length of the fiber composite can be seen. While the soaking with NaOH the strain has not changed significantly, this is in a line with the results Kongkeaw, et al (2011).

4.2.2 Bending Strength of Composites
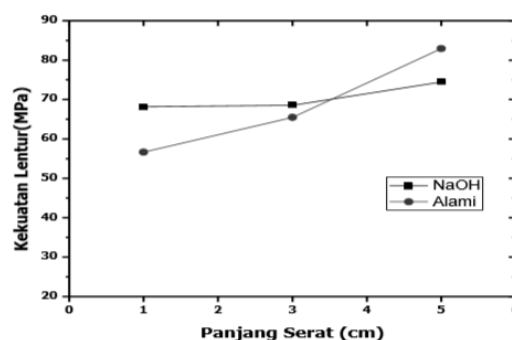
Figure 7. Agave fiber composite flexural strength towards the fiber length.

From Figure 7, it is shown that the composite with a fiber length of 5 cm has higher flexural strength in natural fibers and fibers with NaOH immersion compared to Composite fibers with a fiber length of 1 cm and 3 cm. This is because the fiber length of 5 cm occurring better bond strength to the matrix compared to shorter fibers. The maximum flexural strength value, to fibers

without treatment (natural) is 82.91 MPa and for fibers with NaOH immersion is 74.46 MPa.

4.3 Fiber Lontar

Palm fruit is the result of nature, which fruit has nearly 30% - 40% fiber from the seeds. The spreading of this Lontar fruit is extended to other areas, such as tropical Africa, Myanmar, Thailand, and Malaysia. In Indonesia, palm plants are often found in dry areas, especially around the coast, and getting to the eastern region of Indonesia, then the greater number of the population. The fiber content in a palm fruit can certainly be used as an amplifier in a non-metal composites, which is in the future it could replace metal composites that are much more expensive. The advantages of composites compared to metals are having good mechanical properties, easy to obtain, inexpensive lightweight corrosion-resistant and environmentally friendly so it can become an alternative material other than metal.

4.3.1 The Strength of Tensile Composites

Before the palm fruit fibers was used as a reinforcement in composites, it is necessary to pull test a single fiber first, single fiber tensile test is done on physical testing laboratory with the results graph in Figure 8.
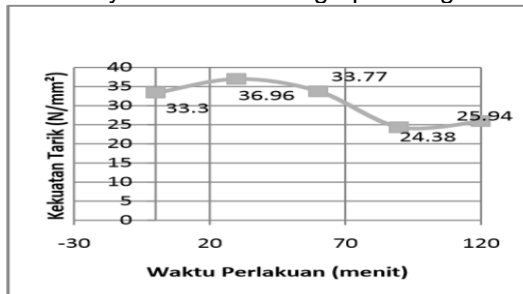

Figure 8. The relationship between time and pull strengths with 5% NaOH.

Figure 9. The relationship between the volume fraction and the Tensile Strength Composites

After testing the tensile, the testing data based on the tensile strength of the composite can be seen in Figure 9 above. Patterns of fracture in tensile testing showed that the composite polyester fiber with 0% palm fruit occurs in the measuring area (gauge length) is a pull-out fractured mechanisms.

5. Conclusion

From the identification and testing of potential local natural fibers that dilakukaan this showed the following results:

5.1 Impact Strength Composites

Data impact test results set forth in Figure 10, the volume fraction vs. relations impact energy as follows:
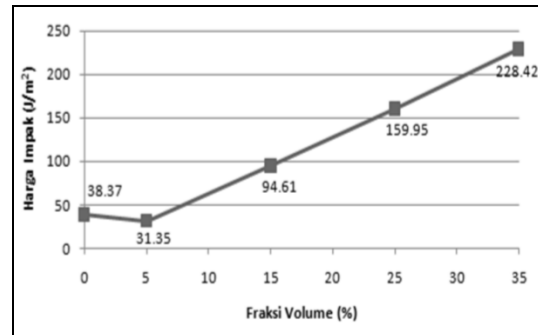

Figure 10. The Relationship between Fraction vs. Volume Impact Energy.

The impact test is seen from the macro fracture generally resulting show fracture patterns tend to be good once you get a load of impact but cause cracks in some as if the impact loads suddenly on the beat in the sample, within the meaning of the specimens received a great shock loads. In the composite tensile test with variations of volume fraction of 0% and it is still high maximum tensile strength values of the volume fraction Among other volume fraction of 5%, 25% and 35% in addition to the volume fraction of 15%. This indicates that polyester matrix is stronger. Composite impact test, tensile strength test data, the breaking load strength and maximum tensile strength occurring at the highest or best volume fraction of 15% with F = 4318 N and σt = 47.7 N / mm2. Testing the impact energy absorption (E absorption) and the impact (HI) is the best or the highest volume fraction of 35% of E Absorption = 30.1519179 (J) and σt = 228.42 J / m2. So that the composite impact testing for palm fruit fiber polyester based testing with matrix explained that the increasing volume fraction the higher the absorbed energy value and the value the impact.

6. Acknowledgements

Expressions of thanks can be written, addressing some parties whom the authors think they are indebted to during the

accomplishment of the study and/or manuscript.

7. References

Alcides at. Al., 1998. Applications of Natural Fibers in automotive industry in Brazil. Plenum Press, New York.

Ansoff, and E. McDonnell. 1990. Implanting Strategic Management, 2nd Ed. Prentice Hall International UK.

ASTM. 1990. *Standards and Literature References for Composite Materials,*2nd.American Society for Testing and Materials, Philadelphia: PA.

Budinsky, Kenneth. 2000. *Engineering Materials Properties and Selection*, sixth ed, New Jersey: Prentice Hall.

Faulkner, J. P. 1995. The Essence of Competitive Strategy. Prentice Hall International UK Masy Robert. R. Franck.2005. Bast and Other Plant Fiber.Woodhead Publishing Limited. UK

George, J., Weyenberg, I.V.D. Ivens, J dan Verpoest, I, 1999,'' *Mechanical Properties o Flax Fibre Reinforced Epoxy Composites*'', Department MTM, Katholieke Universiteit Leuven Belgium.

Gibson, Ronald F.1994. *Principles of Composite Material Mechanics*. New York: Mc Graw Hill Inc.

Gomes, A, Goda, K. dan Ohgi J, 2004,'' *Effect of Alkali Treatment to Reinforcement on Tensile Properties of Curaua Fiber Green Composites* '', JSME International Journal, Series A, Vol 47, No. 4. hal 541 -546.

Himawan, T., 2008, "*Target Penjualan Sepeda Motor Terlampui*", Otomotif, Koran harian, Kamis 22 Desember 2008, On line Http:/:www.Republika.co.id.

Khan, M.A., Mina F. dan Drzal, L.T.,*"Influence of Silane Coupling Agent of Different Functionalities on the Performance of Jute-Polycarbonate Composite"*,

Roseno, Seto. 2003. *Karakteristik dan Model Mekanis Material Komposit Berpenguat Serat Alam*. Jakarta: BPPT.

Preparation of a Silicon Porous Biosensor for Determination of Cholesterol Based on Entrapment of Cholesterol Oxidase

I Nyoman Tika[1], I.Gusti Ayu Tri Agustiana[2], and I.D.Raka Rasana[2]

[1])Chemistry Education of Department , [2] Elementary School Education of Department
Universitas Pendidikan Ganesha , Singaraja Bali Indonesia
Jl. Udayana No.12 Singaraja Bali

Email : nyoman.tika.@pasca.undiksha.ac.id

Abstract

In this paper, a novel amperometric cholesterol biosensor with immobilization of cholesterol oxidase on silicon porous has been accomplished via the entrapment technique on the surface of a platinum electrode. Immobilized enzyms of silicon porous on the Pt surface was carried out by cyclic voltammetry between −1.0 and +2.0 V (vs. Ag/AgCl) at a scan rate of 100 mV upon the Pt electrode with an electrochemical cell containing silicon porous . The amperometric determination is based on the electrochemical detection of H_2O_2 generated in the enzymatic reaction of cholesterol. Determination of cholesterol was carried out by the oxidation of enzymatically produced H_2O_2 at 0.4 V vs. Ag/AgCl. The effects of pH and temperature were investigated and optimum parameters were found to be 7.25 and 37 °C, respectively. The storage stability and operational stability of the enzyme electrode were also studied. The results show that 36% of the response current was retained after 19 activity assays. The prepared cholesterol biosensor retained 44% of initial activity after 35 days when stored in 0.1 M phosphate buffer solution at 4 °C.

Keywords: cholesterol biosensor, amperometry, porous silicon, entrapment, interference effect.
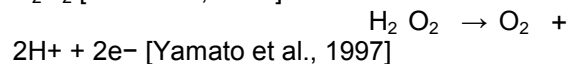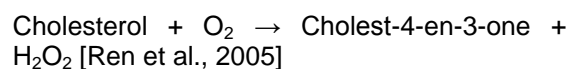
1. Introduction

Cholesterol in the blood is very important to know the levels. Although cholesterol is essential and important for humans, higher levels of cholesterol in blood have been linked to damage to arteries and potentially linked to disease such as those associated with the cardiovascular system (Tsai Siao et al., 2008) . Development of cholesterol detection system to quickly and accurately continue to be pursued. The system used is a biosensor. Biosensor are analytical tools that are generally used to detect or recognize specific elements. Development of cholesterol biosensors in therapeutic diagnostics has gained much attention in health care and biomedical fields. With the different experimental parameters, detection of cholesterol in blood sample has considered incredibly significant since its enhancement is related with diabetes, heart diseases, nephrosis, and obstructive a undice, whereas reduced level of cholesterol is due to mal absorption wasting syndrome, hypothyroidism, and anemia etc. Among the various detection techniques of cholesterol, voltammogramic and amperometric biosensing method had been recently developed as an extremely significant technique. Development of a cholesterol biosensor, immobilization of an enzyme onto self assembled monolayer fabricated micro-device or bio-chip is usually the primary step in the fabrication of selected biosensor. The selection of an immobilization method is essential for the performance of a biosensor and the future development for fabrication in biosensor design will inevitable focus upon the equipment of innovative devices or chips that recommend assures to resolve the bio-compatibility and bio-fouling problems. Generally, enzymes are biological catalysts that promote the transformation of chemical species in living systems. These biological molecules,as function for enzymes electrode.

In recently oxido-reductase enzyme electrodes was intensively to research biosensor, because its constitute a large group of biosensors, accounting for over 90% of the existing amperometric enzyme-based biosensors. The side product of the flavin-oxidase enzymes reactions is usually hydrogen peroxide, formed by the enzyme-catalyzed oxidation of the analyte by dissolved molecular oxygen. Enzyme immobilization onto the electrode surface is a crucial step in assembling amperometric biosensors (Ancient, et al., 1996) . In recent years, mediators and conducting polymers have been used as a matrix for immobilizing the enzymes [Cete el al., 2007) . Intrinsically, conducting polymers with conjugated double bonds have been regarded as attractive advanced materials for electronic devices, electrochromic displays, chemical and biochemical sensors, drug release systems, rechargeable batteries and for modifying electrode surfaces for electrical wiring of biomolecules. Biomolecule as enzymes immobilized by solid support for stabilized enzymes for biosensor. PVC was very stabil to lipase biosensor (Tika, et al.,2012)

The determination of cholesterol levels is of importance in clinical diagnosis [Karube , et al., 1982) of diseases such as coronary heart disease, myocardial infarction and arteriosclerosis [Nauck et al., 1997).. Cholesterol is a sterolfound in eggs, meats, yellow cheese, and derivatives [Brahmin, et al., 2001). Biosensors for cholesterol have been used in biochemical analysis owing to their good selectivity, fast response, low cost, small size and long term stability [Ram et al., 2001. Most of the literature on cholesterol biosensors has focused on diagnosing disorders [Vidal et al., 2003). The enzymatic reactions in the use of cholesterol oxidase (COx) as a receptor are as follows:

Cholesterol + O_2 → Cholest-4-en-3-one + H_2O_2 [Ren et al., 2005]

$$H_2O_2 \rightarrow O_2 + 2H+ + 2e- \text{ [Yamato et al., 1997]}$$

The cholesterol is oxidized by ChOx in the presence of oxygen and hydrogen peroxide is produced at the same time. The electro oxidation current of hydrogen peroxide is detected after applying an appropriate potential to the system. The major problem for amperometric detection is the overestimation of the response current due to interferences. Recently, many researchers have mentioned the inclusion of metal nanoparticles with a catalytic effect in polymer modified electrodes to develop biosensor sensibility and to reduce the over potential applied to the amperometric biosensors [Huang et al., 2004).

Pt is a well-known catalyst that has a high catalytic activity for hydrogen peroxide electro oxidation. The amperometric detection of hydrogen peroxide is normally performed anodically (e.g., oxidation at +700 mV with a Pt working electrode), but is drastically influenced by many simply oxidizable interferents typically present in real samples [Hall *et al.*, 2000)

In this paper we report the immobilization of cholesterol oxidase onto porousSi- Cholesterol oxidase via an

entrapment procedure for determination of free cholesterol. Effects of the immobilization process on kinetic parameters, storage and reuse capability of the enzyme were investigated. The optimum working conditions with respect to the substrate concentrations, the pH and temperature were investigated.

2. Methods

2.1 Instrumentation and Reagents

Cholesterol oxidase (EC 1.7.3.3 from *Bacilus* BYW2 (Islate Banyuwedang hot spring) purified from the microorganism and with an activity of 10 unit mL^{-1}) and cholesterol purchase from Sigma . Silicon prous was supplied by Fluka. All other chemicals were obtained from Sigma. All the solutions were prepared using distilled water. All electrochemical experiments carried out using an Epsilon EC electrochemical analyzer A conventional three-electrode system was equipped with a Pt plate (0.5 cm2) as the working electrode, an Ag/AgCl electrode (3 M KCl) as the reference electrode, and a platinum wire (diameter and length, 1 mm, 4 cm respectively) for the counter electrode. The pH values of the buffer solutions are measured with an ORION Model 720A pH-ionmeter. Temperature control was accomplished with a Grant W14 thermostat..

2.2 Preparation of Cholesterol Solution

Preparation of cholesterol solution, namely cholesterol is soluble in alcohol and also in water in the presence of surfactants. Solutions were prepared daily by dissolving cholesterol in isopropanol, Triton X-100, and the phosphate buffer (pH 7.0). The isopropanol, Triton X-100, phosphate buffer ratio is 10:4:86 by weight.

2.3 Preparation Immobilized ChOx in Silicon porous

Preparation of porous silicon to Barillaro et al., (2002) methods. The starting material was an n-doped silicon wafer, (1 0 0) oriented, 2.4–4 O cm resistivity, 550 mm thick. A silicon dioxide layer (5000 A ° thick) was thermally grown on the sample. A standard photolithographic process was used to define the pattern of the initial seeds for electrochemical etching. A BHF etch was then used to transfer the pattern to the silicon dioxide Initial seeds were formed by KOH anisotropic etching through the patterned silicon dioxide. When not explicitly full pyramidal notches. On the same sample, several different patterns (straight lines,

square dots and holes, spirals, meander-shaped lines, and others), with different dimensions and pitches were defined. Electrochemical etching in HF was then used to fabricate regular structures in the patterned substrate. The samples were rinsed in deionized water and then dried in a convection oven at 95 8C for 10 min. The samples were finally cleaved to allow scanning electron microscope (SEM) observation of the cross-sections.*After that, using immobilized Cholesterol oxidase from Bacillus BYW2 (bacteria thermophilic isolate at Banyuwedang hot spring)*

2.4 Preparation of Pt/ChO-Si- Electrode

The surface of the Pt plate electrode cleaned according to [Yapar et al., 2009) was covered by Immobilized Cholseterol Oxidase in silicon porous (Pacholsiski, 2013). The electrode was immersed in a
10 mL solution of 0.1 M pyrrole and 0.1 M polyvinylsulphonate. The solution was purged with nitrogen in order to remove the oxygen. The electropolymerization of pyrrole upon the electrode surface was performed by the cyclic voltammetric scans between -1.0 and +2.0 V at a scan rate of 100 mV/s. The electrode was washed with buffer solution after the coating process.

2.5 Immobilizaton of Cholesterol oxidase on Pt/Si- Electrode

Pt/Si-Cholesterol oxidase electrode was used against the Pt electrode, which was used as the counter electrode. The reference electrode was composed of Ag/AgCl. Immobilization of cholesterol oxidase was carried out by the physical entrapment approach. The concentrations ChoX was 1 mL of (10 U/mL) is added into solution. The solution was then purged by nitrogen for the removal of oxygen before immobilized enzymes. Electropolymerization was performed in the mode of cyclic voltammetry to immobilize cholesterol oxidase onto the electrode. The scanned voltage range was from -1.0 to +2.0 V. with a scanning rate of 100 mV/s. After the fabrication of cholesterol oxidase entrapped polypyrrole film onto the Si-ChOx working electrode was finished, the electrode was rinsed with deionized water to remove the unreacted pyrrole monomer and free cholesterol oxidase. Immobilized enzyme electrode was kept in a refrigerator at the 4°C in phosphate buffer when it was not in use (Tsai Siao etal., 2008)

2.6 Amperometric Biosensor Measurements

Amperometric response studies carried out in phosphate buffer. Operational stability, storage stability, pH and temperature were determined via application of +0.4 V with respect to Ag/AgCl electrode to detect oxidation current of H2O2. After the background current reached a stable value, cholesterol solution was added to the cell using a micropipette and stirred for 10 min then the resulting current difference was recorded. Researches on operational and storage stability as well as effects of pH and temperature were carried out using 4×10^{-5} M concentration of cholesterol.

3. Result and Discussion

In this study, we prepared a new cholesterol biosensor with the entrapment of cholesterol oxidase (ChOx) on silicon porous. The parameters effecting to the performance of the biosensor were examined.

The porous silicon in SEM and applied current densty versus time wafeform and corresponding SEM Image silicon layer. This is homogenously.

SEM Image etched a porous silicon layer

Schematic of porous silicon formation by electrochemical etching (adapted from Huimim & Fauchet, (2008)

Applied current density versus time waveform

Figure 1. current densty versus time wafeform and corresponding SEM Image silicon layer.

3.1 *The Working Potential*
Current differences of H2O2 (0.1 mM) in different potentials (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 V) were measured by using Pt/Si-ChOx electrode and plotted against potential in Figure 2.

It is shown that the current of H_2O_2 increases until a potential of 0.4 V. At higher potential,interferences caused by exogenous substances present in body fluids (e.g., ascorbic acid) . Therefore 0.4 V was used as working potential.

3.2. Effects of pH and Temperature

Effects of pH and temperature most important to stabilized of enzymes. The enzyme activity drastically depends on temperature and pH since too high or low values may inactivate the enzyme. The pH value depends on the charge of the enzyme and/or of the matrix. The pH change is useful in understanding the association between the structure and functional group of the enzyme. Extreme pH values cause enzyme denaturation. Therefore, the optimum pH values should be defined. The effect of the pH and temperature on response current of the biosensor was determined. Cholesterol oxidase is optimally efficient at 37 °C and pH 7.0 . To determine the optimum pH, an assay was applied by changing the pH between 5 and 9.0 at a constant temperature. The biosensor response was increased as the pH was increased up to pH 7.25 after which it starts decreasing (Figure 3). Immobilized cholesterol oxidase enzyme showed maximum activity at pH 7.25. This value was possible. At extreme pH values the enzyme was denaturated.

Figure 2. The effect of working potential on the response of the biosensor (in the phosphate buffer (pH 7.0) containing 4×10^{-5} M cholesterol)
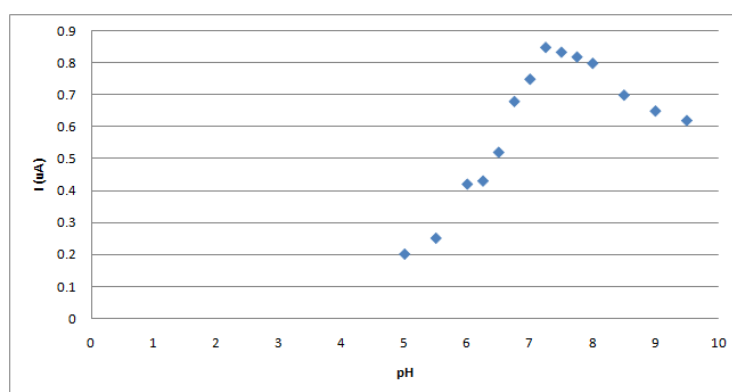
Figure 3. The effect of pH on the response of the biosensor (in the phosphate buffer(pH 7.0) containing 4×10^{-5} M cholesterol operating potential is +0.4 V).
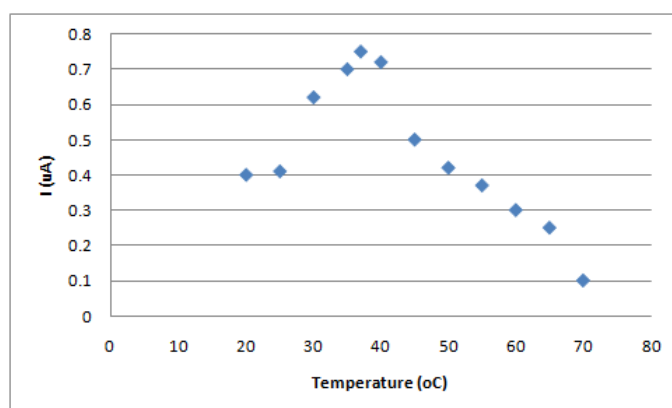
Figure 4 The effect of temperature on the response of the biosensor (in the phosphate buffer (pH 7.25) containing 4×10^{-5} M cholesterol operating potential is +0.4 V).
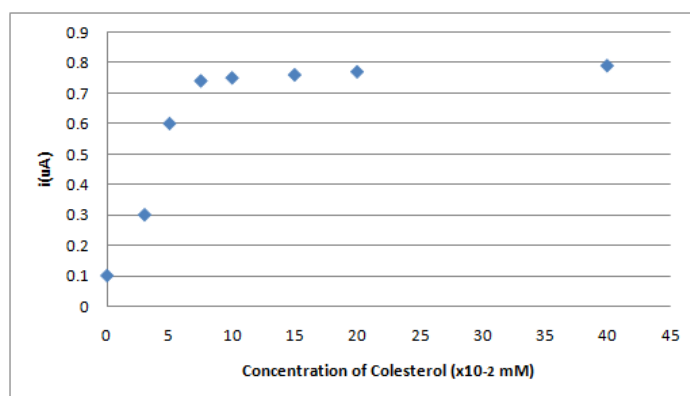
Figure 5. The effect of cholesterol concentration upon the amperometric response of thebiosenso (Michealis-Menten plot, in the phosphate buffer (pH 7.25), operating potential is +0.4 V, 37 °C).

Stability of enzymes depended of temperature. Temperature is an important factor which has a significant effect on enzyme activity. The biosensor response was evaluated at different incubation temperature from 20 to 70 °C. The biosensor response increased up to 25 °C (Figure 3). As illustrated in Figure 4, the current response gradually increased with increasing temperature and reached a maximum at 35 °C. Enzyme can be denaturated after a long incubation period at a temperature of 37 °C. Therefore, the temperature of 25 °C was chosen as working temperature to all further experiments.

3.3. Effect of Substrate Concentration on Biosensor

In this research, I was studying of the value of the Michaelis–Menten kinetic parameter (Km), which shows the enzyme–substrate kinetics, was determined by the analysis of the slope of enzymatic reaction. Vmax is the maximum rate for enzymatic reaction. The effect of the substrate concentration on the reaction rate, catalyzed by immobilized ChOx, was studied using varying initial concentration (5 × 10-6–4 × 10^{-4} M) of cholesterol substrate (Figure 5). Imax and Km (app) were calculated from Lineweaver–Burk plots. With the increase in substrate concentration, there was an increase in amperometric current signal. Kinetic parameters Km (app) and Imax for the enzyme biosensor were detected at constant temperature (37 °C) and pH (pH 7.25) while varying the substrate concentration. Km (app) and Imax were calculated as 40 mM, 1.17 μM/min respectively. Km values for immobilized

ChOx presented in the literature are 9.8, 0.41, 2.72 mM [Wang et al., 1999). The Km value of the system determines the affinity of enzyme for its substrate, with a smaller value of Km indicating increased affinity of enzyme for its substrate. For the fabrication of biosensors, different matrices and methods of immobilization of enzymes were employed, and these could result in different conformational changes in the enzyme structures given that the enzyme kinetics is environment sensitive. Hence, the variation in value of Km could be attributed to these facts [Arya et al., 2007].

3.4. Operational Stability and Storage Stability

The biosensor was used at optimum activity conditions for 19 activity assays in one day to determine the operational stability. Storage stability of the biosensor was determined by performing activity assays within 45 days. The operational stability was studied by applying activity assay (under optimum conditions) for 19 times in the same day at constant temperature, pH and substrate concentration. At the end of the 19 measurements, the biosensor lost 68 % of its initial activity (Figure 6). The activity assay was applied within 45 days to display the storage stability of immobilized enzyme. As shown in an activity loss of 57% was observed on the 45th day (Figure 6). In general, an enzyme is not stable in aqueous solution during storage and the activity is gradually reduced. The reusability was tested because of its importance for repeated applications in a batch reactor. The main advantage of reusability is to reduce the cost of the treatment.
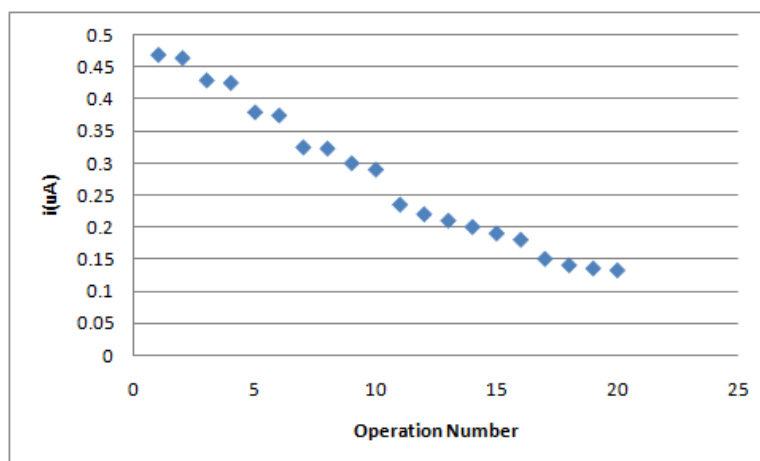
Figure 6. Measure number of the biosensor (in the phosphate buffer (pH 7.25), operating potential is +0.4 V, 37 °C)
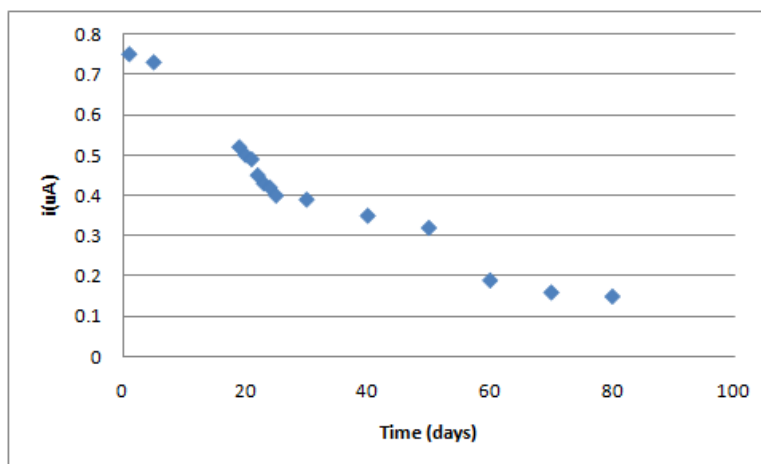
Figure 6. Storage stabilization of the biosensor (in the phosphate buffer (pH 7.25), operating potential is +0.4 V, 37°C).

Table 1. Interfering substances on the amperometric response of the biosensor

Interfering substances	Concentration	Response current of interfering substances (µA)
Ascorbic acid	1×10^{-4}(blood)	0.181
Bilirubin	1×10^{-4}(blood)	0.054
Paracetamol	1×10^{-4}(blood)	0.512
Uric acid	1×10^{-4}(blood)	0.021
Glucose	5×10^{-3}(blood)	0.063

Interference Effect

Interference effect were *a* few common substances found in serum or urine were studied for any interfering effect on the analysis of cholesterol. Known concentrations of ascorbic acid, glucose and paracetamol were added and the results are shown in Table 1. It has been observed that uric acid has been very little interfering effects on the analysis of cholesterol. But interfering effects of ascorbic acid,billirubin, paracetamol and glucose on the analysis of cholesterol were observed. These interferences were almost removed by dilution of solution in cell.

4.Conclusion

In this work, cholesterol oxidase was successfully immobilized on silicon porous. The experimental results showed clearly that the biosensor exhibited good performance in the determination of cholesterol. The cholesterol biosensor has high sensitivity and good selectivity. Operational stability and long term storage stability are good. In addition, Si-porous–ChOx can provide a biocompatible and electrochemical microenvironment for immobilization of enzyme, making this material a good candidate for the fabrication of highly sensitive and selective cholesterol biosensors.

6. References

Anicet, N.; Bourdillon, C.; Demaille, C.; Moiroux, J.; Save´ant, J.M. (**1996**,) Catalysis of the electrochemical oxidation of glucose by glucose oxidase and a single electron cosubstrate: kinetics in viscous solutions. *J. Electroanal. Chem. 410*, 199–202.

Arya, S.K.; Prusty, A.K.; Singh, S.P.; Solanki, P.R.; Pandey, M.K.; Datta, M.; Malhotra, B.D.(**2007**) Cholesterol biosensor based on N-(2-aminoethyl)-3-aminopropyl-trimethoxysilane self-assembledmonolayer. *Analyt. Biochem. 363*, 210–218.

Barillaro A. Nannini , M. Piotto (2002) Electrochemical etching in HF solution for silicon micromachining, Sensors and Actuators A 102 (2002) 195–201

Brahim, S.; Narinesing, D.; Guiseppi-Elie, A. (**2001**) Amperometric determination of cholesterol in serum using a biosensor of cholesterol oxidase contained within apolypyrrole–hydrogel membrane. *Analyt. Chim. Acta.*, *448*, 27–36.

Çete, S.; Yaşar A.; Arslan, F. (**2006**) An amperometric biosensor for uric acid determination prepared from uricase ımmobilized in polypyrrole film. *Artif. Cells Blood Substit. Biotechnol.*, *34*, 367–380.

Hall, S.B.; Khudaish, E.A.; Hart, A.L. (2000) Electrochemical oxidation of hydrogen peroxide at platinum electrodes. Part V: inhibition by chloride. *Electrochim. Acta* , *45*, 3573–3579.

Karube, I.; Hara, K.; Matsuoka, H.; Suzuki, S.(**1982**) Amperometric determination of total cholesterol in serum with use of immobilized cholesterol esterase and cholesterol oxidase. *Anal. Chim. Acta*, *139*, 127–132.

Nauck, M.; Marz, M.; Jarausch, J.; Cobbaert, C.; Sagers, A.; Bernard, D.; Delanghe, J.; Honauer, G.; Lehmann, P.; Oestrich, E.; Eckardstein, A.; Walch, S.; Wieland, H.; Assmann, G.;(**1997**) Multicenter evaluation of a homogeneous assay for HDL-cholesterol without sample pretreatment. *Clin. Chem.*, *43*, 1622-1629.

Pachoski, C.2003. Photonic Crystal Sensor based On Porous Silicon, Sensor ,13.4694-4713

Ram, M.K.; Bertoncello, P.; Ding, H.; Paddeu, S.; Nicolini, C.(**2001**) Cholesterol biosensors prepared by layer-by-layer technique. *Biosens. Bioelectron. 16*, 849–856.

Ren, X.; Meng, X.; Tang, F.(**2005**) Preparation of Ag–Au nanoparticle and its application to glucose biosensor. *Sens. Actuat. B*, *110*, 358–363.

Tsai Siao, Y.C.; Chen, Y.; Lee, C.A(2008). Amperometric cholesterol biosensors based on carbon nanotube–chitosan–platinum–cholesterol oxidase nanobiocomposite. *Sens. Actuat. B 135*, 96–101.

Tika. I N, (2011). Pengaruh faktor ekstrinsik terhadap respon optimum pada biosensor lipase termostabil isolat Banyuwedang pada penentuan gliserida pada serum darah, Proseding, Senaki, Unesha, 2011

Tika. I N, I Gusti A,Tri Agustiana, I D.R.Rasana, 2014). Optimasi Penentuan Digliserida Secara Enzimatis Menggunakan Silikon Berpori Dalam Sistem *Disposable* Biosensor. Proseding Seminar Nasional Kimia Analitik dan Instumentasi, Jakarta 2014.

Tika. I N, I Gusti A,Tri Agustiana, I D.R.Rasana (2014). Modifikasi ElektrodaBiosensor – Enzim Lipase Termostabil Dengan Silikon Berpori Untuk Penentuan Digliserida Pada Serum Darah. Proseding Proseding ISBN : 978-602-0951-00-3 Seminar Nasional Kimia UNESA, Surabaya, 20 September 2014.

Tika. I N, I Gusti A,Tri Agustiana, I D.R.Rasana,(2014). Artikel dengan judul :Penentuan Gliserida Secara Enzimatis Dengan Sistem *Disposable* Biosensor . Dalam Seminar Nasional MIPA Undiksha Singaraja, 11 Oktober 2014

Vidal, J.C.; Garcia-Ruiz, E.; Espuelas, J.; Aramendia, T.; Castillo, J.R. (**2003**) Comparison of biosensors based on entrapment of cholesterol oxidase and cholesterol esterase in electropolymerized films of polypyrrole and diaminonaphthalene derivatives for amperometric determination of cholesterol. *Anal. Bioanal. Chem. 377*, 273–280.

Wang, H.; Mu, S.(**1999**) Bioelectrochemical characteristics of cholesterol oxidase immobilized in a polyaniline film. *Sens. Actuat. B 56*, 22–30

Yamato, H.; Koshiba, T.; Ohwa, M.; Wernet, W.; Matsumura, M.(**1997**) A new method for dispersing palladium microparticles in conducting polymer films and its application to biosensors. *Synth. Met.*, *87*, 231–236.

The optimisation of labeling methods for the tracking of BCG antigen into the exosome pathway

Tobing, Jessica N.[1*], Holder, Beth S.[2]

Department of Pediatric, Imperial College, London[1]*

jessica.tobing14@imperial.ac.uk

Abstract

Background – Exosomes are small vesicles released from all cell types. Antigens in the exosomes of infected cells are able to sensitize immune response. Advanced technology of microscopy and fluorescence facilitate antigens tracking in exosomes and optimisation of dyes has to be conducted.

Methods – BCG strain FO was cultured and labeled with two different dyes: PKH and FITC. The labeling was assessed using confocal microscopy and FACS. Exosome isolation of uninfected THP-1 cells and BCG-infected THP-1 cells was then performed. The mean difference of size and concentration of both groups were then analysed using Mann-Whitney test.

Results – The images brightness of labeled BCG are the same in the FITC concentration of 50, 100, and 500 ug/mL. The mean size of exosomes of control and treated groups are 127.5 nm and 112.4 nm, respectively (p=0.4857). The exosome concentration of BCG-infected THP-1 cells is 0.5375×10^{11} particles/ml and the one of the control is 1.444×10^{11} and particles/ml THP-1 cells (p=0.0286).

Conclusion – The brightness of the BCG labeling does not always increase along the given FITC concentration. The size of macrophage-secreted exosomes is a little higher than the range of normal exosome, and exosomes concentration of infected cells is not necessarily higher than uninfected cells.

Key words: BCG, FITC, confocal, exosomes

1. Introduction

Exosomes are the secreted form of intraluminal vesicles after fusion of multivesicular bodies with plasma membrane. The size of exosomes is 30-150 nm in diameter (Schorey JS, 2015). Exosomes are known to be involved in antigen transfer and antigen presentation (Testa JS, 2010). Previous studies have shown that infected macrophages secrete exosomes containing BCG pathogen-associated-molecular-patterns (PAMPs), with the ability to modulate naïve macrophages (Singh PP L. C., 2011) and T cells and alter the following antigen-specific responses (Singh PP, 2012). This has shown that BCG-infected macrophagesrelease BCG antigen-containing exosomes that may be presented to other immune cells and stimulate their responses.

To quickly identify the presence of BCG antigens inside the exosomes of THP-1 cells, the BCG has to first be labeled. The interaction of bacteria or their properties to host cells has been studied using various methods, and the technology of microscopy and fluorescent probes have had a big contribution in elucidating the interaction of pathogens and host cells. There are various types of microscopy to track bacteria, with one of the most widely used techniques is confocal microscopy. Fluorescent tracking dyes are powerful tools to study and track cells. Available cell tracking dyes nowadays are variable in chemistries and fluorescence properties, but basically they fall into two classes based on the mechanism of labeling. Membrane dyes, such as PKH26, are lipophilic dyes that stably partition cell membrane. Protein dyes, such as FITC, are dyes that covalently bond with cell proteins. PKH26 (BoseDasgupta S, 2014)and FITC (Uehori J, 2003)have been used to track BCG, but there have been no previous studies that optimize these dyes for BCG.

The aim of this study was to explore this further by culturing BCG and optimizing labeling methods to enable the tracking of BCG antigens into the exosome pathway.

2. Methods

2.1 BCG *lux FO* culture and assessment

Genetically modified BCG was grown in 15 mL of medium (Middlebrook 7H9 broth with albumin-dextrose-catalase (ADC) and 20 mg/mL kanamycin, mixed with 20% Tween 80 and glycerol) and 40 uL 20% Tween 80, and was kept in shaking incubator at 30 rev/min for up to 96 hours.

Assessment of the growth of BCG was monitored by measuring cell density using 600 nm Ultrospec 10 Cell Density Meter and Berthold luminometer (RLU/ml). Readings were performed daily in duplicates.

Serial dilutions were performed on BCG culture and the diluted BCG culture samples were plated for 2-3 weeks for colony count and recorded as colony forming unit (CFU). The RLU and CFU measurement at 72 hours timepoint was used to calculate the ratio of growth for the feasibility of calculating the multiplicity of infection (MOI).

2.2 Cell culture and infection

THP-1 cells were maintained in RPMI-1640 with Glutamax, supplemented with 10% decomplemented FBS and 1% Penicillin/Streptomycin, and plated at 1×10^6 cells/mL. PMA, in the working concentration of 50 ug/ml, was used to differentiate THP-1 cells into macrophage-like phenotype cells. The cells were infected for 4 hours after 24 hours differentiation with PMA. The media was subsequently replaced with fresh media for 36 hours rest.

2.3 Fluorescence labeling

PKH26 and PKH67 were used to label the BCG and the labelling was performed according to the manufacturer protocol with some modifications. For the MOI of 10, 20×10^7 CFU of BCG was first centrifuged at 2,200xG in 21^0C. The bacteria suspension was then added into the dye solution, creating the final concentration of 2×10^{-6} M PKH. Equal volume of FBS was added to stop the staining reaction. RPMI-1640 was used to wash the solution. FITC labeling was also performed on the BCG and the BCG-infected THP-1 cells. Different concentrations of FITC treatment was performed on the BCG (2 ug/mL, 50 ug/mL, 100 ug/mL, and 500 ug/mL). For the infected cells, the cells were plated in 24-wells plate (1×10^6 cells/well) for two MOI (NT, MOI 1, MOI 10).

2.4 Flow cytometry

Following the PKH labelling procedure, flow cytometry was performed after fixation of the BCG with 2% PFA. The labelling was assessed using Becton Dickinson Fortessa FACS analyser 2, coupled to BD DIVA software 8.0, with excitation lasers of 405 nm, 488 nm, 561 nm, and 633 nm.
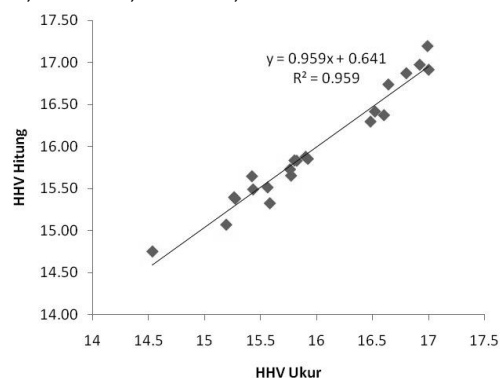
Figure1.Correlation between HHV of CalculationResults and that of Measurement Results

2.5 Confocal microscopy

Following the FITC labelling, BCG and BCG infected THP-1 cells were fixed with 2% and 4% PFA, respectively, and subsequently washed with PBS. Samples were then mounted on microscopic slides in a drop of Prolong gold. Digital confocal microscopy LSM-5 PASCAL with Axioplan 2 Imaging was then performed, and images were recorded at 10x, 20x, and 40x magnification using digital camera, coupled to Zeiss software.

2.4 Exosome isolation

Serial centrifugation was performed on the supernatant of the THP-1 cells after 36 hours of differentiation. After the final 100,000 x G ultracentrifugation, the exosome pellet was resuspended in PBS and filtered with 0.2 uM filter. Nanosight Tracking Analysis (NTA) LM10 was performed to analyse the size distribution and total concentration of exosomes.

2.4 Statistical analysis

Graphpad Prism version 6 software for Mac was performed for the statistical analysis. Mann-Whitney test was used to compare the size and concentration of the exosomes. Statistical significance was set at $p \leq 0.05$. Error bars represent standard deviation.

3. Results
3.1 Monitoring the growth of BCG FO strain using colony count, luminescence, and optical density measurement

Colony count was performed after 3 weeks incubation of BCG FO. The CFU count on the 1:10000 dilution plate was performed, as this dilution had the clearest spread of colonies. The growth trend was then compared to the associated RLU in 1:10000 dilution. The 72-hour time point of BCG FO RLU measurement and CFU count were then used to calculate the RLU and CFU ratio because it was the time point of infection. The ratio was calculated by dividing the average RLU value per milimeter to average CFU number per milimeter, and the ratio is 0.12 (Table 1).

Time of culture (FO)	Average CFU count	Average CFU/ml	Average RLU/ml	Ratio
24	74.5	7450	445	0.06
48	6.5	650	318.5	0.49
72	22.5	2250	276	0.12

Table 1.The RLU and CFU ratio in 24, 48, and 72 hours of culture
72 hours RLU:CFU was used to count the multiplicity of infection because it was the time point of infection

The BCG FO was cultured and measured up to 96 hours to see the viability. The time point of measurement was at 0, 72, and 96 hour of culture. Both luminescence and optical density measurement show a similar trend of growth (Figure 1), where slow rises are seen in the first 72 hours, followed by a sharp increase in the next 24 hours.
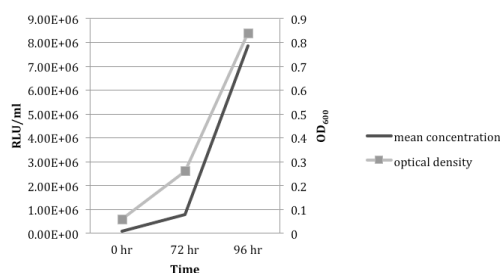
Figure1.Luminescence and optical density of BCG FO strain. The graphs show similar trend of growth, where significant increases in the value of RLU and OD reading take place after 72 hours time point

3.2 Confocal microscopy analysis
The FITC labeling of BCG FO was assessed using confocal microscopy. Several magnifications were tested to gain the best visualization: 10x, 20x, and 40x. The results are shown on the magnification of 40x on Figure 2. The image in the FITC staining of 2 ug/ml shows less brightness than the following images in higher concentration (Figure 2B). The images in FITC staining of 50 ug/ml, 100 ug/ml, and 500 ug/ml show similar brightness (Figure 2C-E).
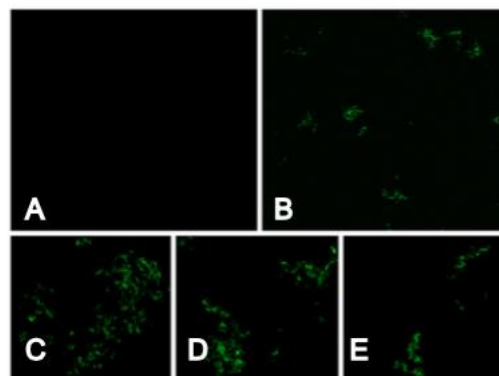
Figure2.BCG labeling in different concentration of FITC; The FITC concentration of 50, 100, and 500 ug/ml produce the most optimal image brightness
A: NT; B: 2 ug/ml; C: 50 ug/ml; D: 100 ug/ml; E: 500 u/ml [magnification of 40x]

The FITC-labeled BCG was then used to infect the THP-1 cells. Several magnifications were tested to gain the best visualization: 10x, 20x, 40x. The results were shown with the magnification of 20x on figure 3. There are less than 10 CFU brightly seen at the MOI of 1 (Figure 3B). Less than 15 CFU are brightly seen at the MOI of 10 (Figure 3C).
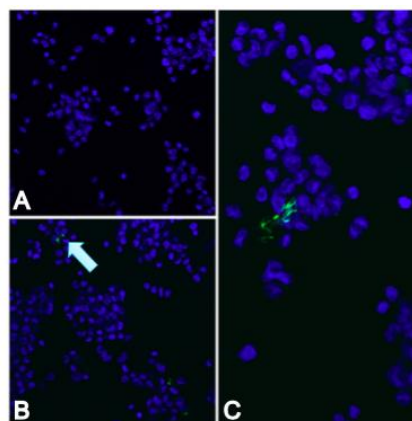
Figure3.THP-1 cells infected with FITC-labeled BCG; Neither the MOI 1 or MOI 10 shows expected internalisation of BCG into the THP-1 cells A: NT; B: MOI 1; C: MOI 10

3.3 Identification of exosomes

The exosome isolation was performed on non-infected THP-1 cells (control) and the BCG-infected THP-1 cells. For both control and treated cells, the THP-1 cells were plated at 1x106 cells/ml in 20 mL of media overnight with PMA, and theBCG was added at an MOI of 10. The exosome analysis was performed using Nanosight Tracking Analysis (NTA).

The Nanosight calculated the size distribution the particles. The results of the mean size of uninfected THP-1 cells exosomes (nT) and BCG-infected THP-1 cells exosomes (nB) were then analyzed using Graphpad Prism software, and the results were 127.5 nm and 124.0 nm, respectively (nT = nB = 4). The result of two-tailed P value of Mann-Whitney test between the two groups was not significantly different (p=0.4857)*.
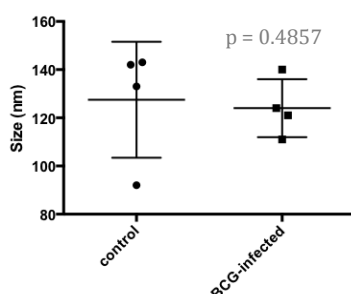
Figure 4.The scattered plot of mean size of uninfected and BCG-infected exosomes. The plots of each group show similar range of exosomes size
Significance was analysed by Mann-Whitney U test (p=0.4857)* Size unit is nanometer (nm)

The Nanosight also measured the total concentration of exosomes. The mean concentration of uninfected THP-1 cells exosomes (c_T) and BCG-infected exosomes (c_B) are 1.444×10^{11} particles/ml and 0.5375×10^{11} ($c_T = c_B = 4$). The result of one-tailed p value of Mann-Whitney test between the two groups was significantly different (p=0.0286)*.
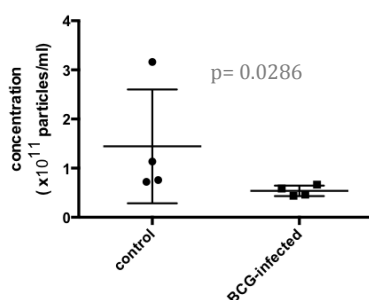
Figure 4.The scattered plot of the concentration of uninfected and BCG-infected exosomes. Both groups show no significant difference of

concentration, although the one-tailed p value provide significant difference of concentration
Significance was analysed by Mann-Whitney Test (p=0.0286)*. The actual for each representative number times by 1011 ; unit: particles/ml)

4. Discussion

Thisstudyhasthree main findings. First, it was shown that the brightness of mycobacterium BCG labeling does not improve along the increasingdose of FITC. Second, the exosomessize of macrophage-like THP-1 cells is largerthan the standardsize of exosomes. Third, the concentration of exosomes of BCG-infected THP-1 cells is lowerthan the uninfected THP-1 cells.

For the labeling, PKH wasfirstused to label the BCG. FACS wasperformed to assess the labeling, and the percentage of parentcellsmembranes. Thiswillbe the challenge of labelingusinglipophilicdyes (i.e. PKH) designed for mammalian cells, becausethesemycobacteriallipidswouldbediff icult to penetrate. FITC has a main advantageover PKH thatitlabelsbothsurfaceproteins and outermembrane of the BCG. Thus, during BCG and THP-1 cellcontact, despite the disruptedlabeled-membrane, the BCG labelingwouldstillbemaintained in the surfaceproteins. Somestudieshaveused FITC to label BCG with the concentration of 1 mg/ml (Kuehnel MP, 2001) (de Boer EC, 1992), onestudyusedit at 0.1 mg/ml (Schuller S, 2001).However, none of themcompared the quality of the confocalmicroscopyimages of BCG labeling of differentconcentration of FITC. The 2 ug/ml FITC concentrationwas at firstshowed no image of BCG labeling, yet with increasedscreengain, thelabeled BCG areseen (Figure 2B). The maximum FITC concentrationtested for the BCG labeling is 500 ug/ml (Figure 2E). However, the brightness of the BCG labeling image in thisconcentration is similar to that in 50 ug/ml and 100 ug/ml of FITC (Figure 2C and 2D).

To expandthisworkfurther, the labeled BCG wasprepared to infect the THP-1 cells. The concept of multiplicity of infection (MOI) wasused, whereonecellwasexpected to beinfectedbymultiplemicroorganisms. At the MOI of 1, onelabeled BCG wasexpected to beseen in each of the THP-1 cells. Instead, onlytwolabeled BCG wereseen to beinternalizedby the THP-1 cells (shownby the arrow on Figure 3B), with a verylownumber of observed BCG (<10). The BCG number at the MOI of 10

wasunexpectedlylow (<15), while a higherconcentration of BCG wasused to infect the THP-1 cells, but the image shows no greatdifferences in the number of BCG compared to the one at the MOI of 1. Theoretically, itsupposed to show at least the average of 1-3 bacilli in eachcell (Anand PK, 2010). Thisresult is in accordance to a study, whereconfocalmicroscopy image at MOI of 10 resembles to that at MOI of 1 (Bettencourt P, 2010), however the co-cultureperiod of macrophages and bacteria, namelypulsephase, is 1 hour, butwhen the pulsephasewasincreased to 3 hours, 5-10 bacilli per macrophageareseen. My studyapplied 4-hours pulsephase, whichsupposed to gainabout 5-10 bacilli per macrophage. Therefore, in the futurestudy, differentpulsephaseshouldbeapplied to optimize the concept of MOI for BCG FO.

The nextaim of thisstudywas to compare the exosomes of uninfected and BCG-infected THP-1 cells. NanosightTracking Analysis (NTA) wasused to determine the size and concentration of exosomesbecauseithasadvantagesoverothermethods. The averagesize of the exosomes of uninfected and BCG-infected THP-1 cellsare 127.5 nm and 124 nm (p=0.4857), respectively, whicharesimilar. Moreover, the size of macrophage-secretedexosomes in thisstudy is in accordance with otherstudies (Singh PP, 2012) (Cheng Y, 2013), which is between 50-150 nm, above the upperrange of standardexosomes. Furtherstudy is suggested to explain the possiblecauses of thissizedifference.

Thisstudyalsoshowsthat the concentration of exosomes in uninfected THP-1 cells is higherthanBCG-infected THP-1 cells. A studyshows a contradictoryresult, whereuninfectedcellsdidnot release manyexosomescompared to infectedcells (Anand PK, 2010). The multiplicity of infection may contribute to this result. A study shows that infected THP-1 cells at the concentration of 5×10^5 cells/ml were dying at the MOI of 5 to 10 (Riendeau CJ, 2003). The MOI of 10 may be apopotosising in this study, suggesting less number of BCG-infected THP-1 cells that were able to release exosomes. Therefore, lower MOI could be tested in the future research.

Another factor is the resting period of THP-1 cells after BCG infection. Many studies perform the exosomes isolation after 48-72 hours resting period (Bhatnagar S, 2007) (Walters SB, 2013), while this project only ran 36 hours resting period for cell culture prior to exosomes isolation. Future studies should compare the results of different resting period to optimise the quality of exosomes.

5. Conclusion

In thisstudy, someoptimisationof BCG labelinghavebeenachieved, whichwas the mainobjective. Thisreport has providedevidence for the mostefficient FITC concentrationtolabel the BCG. Thisstudy has shownthat the sizeofmacrophage-secretedexosomes is largerthan the upperrangeof normal exosome, and that the exosomesconcentrationofinfected cells is not necessarilyhigherthanuninfected cells.

7. References

Anand PK, Anand E, Bleck CK, Anes E, Griffiths G. Exosomal Hsp70 induces a pro-inflammatory response to foreign particles including mycobacteria. PloS one. 2010;5(4):e10136. PubMed PMID: 20405033. Pubmed Central PMCID: PMC2853569. Epub 2010/04/21. eng.

Bettencourt P, Pires D, N. C, Anes E. Application of Confocal Microscopy for Quantification of IntracellularMycobacteria in Macrophages. 2010. In: Microscopy: Science, Technology, Applications and Education [Internet]. Formatex; [614-21].

Bhatnagar S, Shinagawa K, Castellino FJ, Schorey JS. Exosomes released from macrophages infected with intracellular pathogens stimulate a proinflammatory response in vitro and in vivo. Blood. 2007 Nov 1;110(9):3234-44. PubMed PMID: 17666571. Pubmed Central PMCID: Pmc2200902. Epub 2007/08/02. eng.

BoseDasgupta S, Pieters J. Inflammatory Stimuli Reprogram MacrophagePhagocytosis to Macropinocytosis for the Rapid Elimination of Pathogens. PLoS Pathogens. 2014 01/3006/11/received 11/18/accepted;10(1):e1003879. PubMed PMID: PMC3907376.

Cheng Y, Schorey JS. Exosomes carrying mycobacterial antigens can protect mice against Mycobacterium tuberculosis infection. European journal of immunology. 2013;43(12):3279-90.

Kuehnel MP, Goethe R, Habermann A, Mueller E, Rohde M, Griffiths G, et al. Characterization of the intracellular survival of Mycobacterium avium ssp. paratuberculosis: phagosomal pH and fusogenicity in J774 macrophages compared with other mycobacteria. Cellular microbiology. 2001 Aug;3(8):551-66. PubMed PMID: 11488816. Epub 2001/08/08. eng.

Riendeau CJ, Kornfeld H. THP-1 Cell Apoptosis in Response to Mycobacterial Infection. Infection and immunity. 2003 Jan;71(1):254-9. PubMed PMID: 12496173.

Schorey JS, Cheng Y, Singh PP, Smith VL. Exosomes and other extracellular vesicles in host–pathogen interactions. EMBO reports. 2015;16(1):24-43.

Singh PP, LeMaire C, Tan JC, Zeng E, Schorey JS. Exosomes Released from M.tuberculosis Infected Cells Can Suppress IFN-γ Mediated Activation of Naïve Macrophages. PloS one. 2011;6(4). PubMed PMID: 21533172.

Singh PP, Smith VL, Karakousis PC, Schorey JS. Exosomes isolated from mycobacteria-infected mice or cultured macrophages can recruit and activate immune cells in vitro and in vivo. Journal of immunology (Baltimore, Md : 1950). 2012 Jul 15;189(2):777-85. PubMed PMID: 22723519. Pubmed Central PMCID: PMC3685416. Epub 2012/06/23. eng.

Testa JS, Apcher GS, Comber JD, Eisenlohr LC.Exosome-Driven Antigen Transfer for MHC Class II Presentation Facilitated by the Receptor Binding Activity of Influenza Hemagglutinin.The Journal of Immunology. 2010 December 1, 2010;185(11):6608-16.

Uehori J, Matsumoto M, Tsuji S, Akazawa T, Takeuchi O, Akira S, et al. Simultaneous blocking of human Toll-like receptors 2 and 4 suppresses myeloid dendritic cell activation induced by Mycobacterium bovis bacillus Calmette-Guerin peptidoglycan. Infection and immunity. 2003 Aug;71(8):4238-49. PubMed PMID: 12874299. Pubmed Central PMCID: PMC165983. Epub 2003/07/23. eng.

Walters SB, Kieckbusch J, Nagalingam G, Swain A, Latham SL, Grau GE, et al. Microparticles from mycobacteria-infected macrophages promote inflammation and cellular migration. Journal of immunology (Baltimore, Md : 1950). 2013 Jan 15;190(2):669-77. PubMed PMID: 23241892. Epub 2012/12/18. eng.

de Boer EC, Bevers RFM, Kurth K-H, Schamhart DHJ. Double fluorescent flow cytometric assessment of bacterial internalization and binding by epithelial cells.Cytometry. 1996;25(4):381-7.

ANALYSIS OFECONOMIC GROWTHANDDEVELOPMENT OFLEADINGSECTORSIN SUPPORTINGPOVERTYALLEVIATION INBULELENG REGENCY

Ged ePutu Agus Jana Susila[1], I Nengah Suarmanayasa[2]

Ganesha Singaraja University of Education

janos_undiksha@yahoo.com

Abstract

Buleleng GDP at current prices in 2013 the amount of 10,022,368.42 million and 4,170,206.98 million at constant prices. In nominal value of GDP in 2012 both at constant prices and current prices show an increase over the previous year. From year to year, the agricultural sector is still the most dominant sector in its contribution to the GDP formation in Buleleng. But in 2013 no longer, the contribution of this sector reached 21.79%. Trade, hotels and restaurants become the highest contribution to the sector reached 31.29%. Tourism activities have an important role in the development of this sector. Sectors that have contributed the GDP formation in Buleleng Regency is a mining excavation, which is only 0.66%. GDP growth rate recorded in 2013 in Buleleng amounted to 6.71%. This figure is higher than the GDP growth rate of the previous year which reached 6.52%. In general, the increase in the rate of economic growth in Buleleng is strongly influenced by the increase in the performance of the agricultural sector; especially the sector has the greatest contribution in the GDP formation in Buleleng. Participated also contributed to the increase in the rate of economic growth is the growth of value-added trade, hotels and restaurants as well as services sectors.

Analysis tools usedinthese studiesare generallycomposed ofthreemethods:analysis ofgrowth patternsof economicsectors(KlassenTypologi), Location Quotient, andschallogram analysis. The data processingof all three methods/toolsof analysis usedin this studywere processed usingMicrosoftExcelprogram.

The result of the analysis KlassenTypologi with sectoral approach, pointing out that the agricultural sector occupied the first quadrant is advanced and rapidly growing sector. Followed by the manufacturing sector in quadrant II is advanced but depressed sector. A side from these two sectors, the sector of Trade, Hotels & Restaurants, Electricity, Gas, and Water are in quadrant III, potential or sector can still thrive. Economic sectors in Buleleng are still much to be in quadrant IV are sectors that are lagging behind.The results of the calculation of the value of LQ all sectors of the economy based on indicators of local revenue that GDP at constant prices in 2000, there are three sectors which are the economic base of Buleleng that can be prioritized into leading sectors in 2010-2013 are agricultural, manufacturing, and services, is shown from the results of the calculation of the value of the sector LQ more than one.The results of the analysis schallogram District of Buleleng holds the first rank in the availability of support facilities leading sectors that are 2,610. This is because the District is the capital of Buleleng Regency so spread development facilities conducted in these districts.

Keywords: GDP, KlassenTypologi, LQ, Schallogram

1. Background

The main objective of Indonesia's economic development is the creation of a just and prosperoussociety. Development conducted in Indonesiain clude thedevelopmentof allaspects of lifewhich is basicallyaimed at creatinga strong development foundation for Indonesia to grow and evolve toward a just and prosperoussocietythat isequitablematerial andspiritual, based on Pancasilainthe Unitary State ofthe Republic ofIndonesia. National developmentneeds topay attention toregional development, asregional developmentis part of the national development that aims to reduce poverty in the area.

One aspect that changes in the development process is the physical aspect of the region. Regional development is economic development by considering the variables place and time. Physical and social characteristics of the regions in Indonesia range provide a wide range of potential different regions. Differences in potential areas in Indonesia led to a gap that is: the gap between regions, the gap between rural and urban income gap between groups (Nindyantoro, 2004).

One measurethat can be usedto measure theeconomic performanceinthe

regionis theGross Domestic Product(GDP). GDPcan be divided intotwo, namely GDPsectoralanadded valuecreatedineachsectorina regionata certain time periodandGDPuse orconsumptionwhich isspendingthe end ofa variety ofgoods and servicesfor final consumption, physical investmentand net exportsinthe regionata certain time period.

Buleleng GDP at current prices in 2013 the amount of 10,022,368.42 million and 4,170,206.98 million at constant prices. In nominal value of GDP in 2012 both at constant prices and current prices show an increase over the previous year. From year to year, the agricultural sector is still the most dominant sector in its contribution to the GDP formation in Buleleng. But in 2013 no longer, the contribution of this sector reached 21.79%. Trade, hotels and restaurants become the highest contribution to the sector reached 31.29%. Tourism activities have an important role in the development of this sector. Sectors that have contributed the GDP formation in Buleleng Regency is a mining excavation, which is only 0.66%. GDP growth rate recorded in 2013 in Buleleng amounted to 6.71%. This figure is higher than the GDP growth rate of the previous year which reached 6.52%. In general, the increase in the rate of economic growth in Buleleng is strongly influenced by the increase in the performance of the agricultural sector; especially the sector has the greatest contribution in the GDP formation in Buleleng. Participated also contributed to the increase in the rate of economic growth is the growth of value-added trade, hotels and restaurants as well as services sectors.

PROBLEM FORMULATION

Based on the background described above, which becomes the subject matter of this research, are:

1. What is the pattern of sectoral economic growth in Buleleng?
2. How did the leading sectors in Buleleng that can boost the economy in the area of poverty alleviation?
3. How is the development of the region in terms of infrastructure (infrastructure) which supports the economy in poverty alleviation in Buleleng?

RESEARCH OBJECTIVES

Based on the backgroundand theformulation of the problem, the objectives of thisstudyare:

1. Identify thesectoralpatternof economicgrowthinBuleleng.
2. Analyze the seed sectorin Buleleng thatcanboost the economyin thearea ofpoverty alleviation.
3. Analyzing the development of the regionin terms of infrastructure development(infrastructure) ineachdistrict that supportsthe economy in poverty alleviation inBuleleng.

2. Data Analysis Method

Analysis tools used in these studies are generally composed ofthreemethods: analysis of growth patternsof economic sectors (KlassenTypologi), Location Quotient, andschallogram analysis. The data processingof all three methods/toolsof analysis usedin this studywere processed usingMicrosoftExcelprogram.

SectoralAnalysis ofEconomic GrowthPattern

The growth pattern of economic sectorsin theregion can be determined by analysis Klassen Typologi the sectoral approach by combining systematically observed against the growth rate of GDP and GDP contribution by sector, and then classified into groups/characteristics according to Klassen Typologi. With Typologi Klassen analysis can be seen four classificationsgrowthsectors of the economy, namely the advance dan growing fast, but pressed forwardsector, potential sectorsorstillcangrow rapidly(growing), andsectorsthat are lagging behind.

Table1.ClassificationKlassenTypologiSectoralApproach:

	si> s	*si< s*
gi> g	*FORWARDANDGROWINGFAST SECTOR*	*GROWINGFAST SECTOR(POTENTIAL)*
gi< g	*MOVINGSECTOR BUT DEPRESSED*	*RELATIVE BACKWARD SECTOR*

Description:
gi = GDP growth rateof sectoraldistricti
si = SectoralGDPcontribution ofthe districti
g = SectoralGDPgrowth rateof Bali Province
s = SectoralGDPcontributionof Bali Province

Analysis *Location Quotient*

LQis an indexto comparethe share ofsub-regions in certain activitieswith atotalshare ofthese activitiesin total.LQis

definedasthe ratio ofthe percentageoftotalactivityin the subregiontoito the percentage ofthe totalactivityof theregionobserved(Budiharsono, 2001). The assumptions usedin the analysis ofLQare: (1) the geographical conditionsare relativelyuniform, (2) is the samepattern ofactivity, (3) anyactivityproducea uniform product.

LQanalysisin this studyis usedto find theleading sectors inBuleleng. As fortheLQformulais:

$$LQ \frac{S_i/N_i}{S/N}$$

Description:

LQ = the amount oflocationquotientsan economic sector

S_i = isector of GDPin Bali Province

S = isector of GDPinBuleleng Regency

N_i = TotalGDPin Bali Province

N = TotalGDPinBuleleng Regency

AnalysisSchallogram

According to theHanafi(1988) methodschallogramadvantagesare:(1) shows the basic relationshipbetweenthe populationandthe availabilityof facilities and infrastructuredevelopment; (2) quicklycanorganizedataon theregion; (3) Comparingbetweendevelopment centersthat arebased onthe development ofinfrastructure and facilitiesowned; (4) describethe hierarchy ofdevelopment centers; and(5) can potentially beusedto designnewdevelopment centersandthe allocation ofinfrastructuredevelopment.

Identification Patterns Ofeconomic Growth By Sector Buleleng

KlassenTypologigrowth patternbasedsectors of the economythat can be categorizedas anadvancedand rapidly growingsectoristhe agriculturalsector. This sectorshouldreceivemore attentionfrom the local governmentBulelengto be developed. The agricultural sectorhas theperformanceand contribution toeconomicgrowth ratethat is greater thanthe Province of Balinamely: an average2.40 percentand23.13percentgrowth ratefor theagricultural sector contribution toGDPBuleleng. Classification ofthe patternof economicgrowth inBulelengaccording toKlassenTypologican be seenin Table2.

Table2. Economic Sector Growth of Buleleng Regency According to Klassen Typologi

		si> s	si< s
gi> g		FORWARD ANDGRO WINGFAST SECTOR: Agriculture	GROWING FAST SECTOR(POTENTI AL): Trade, Hotels &Restaurants,
gi< g		MOVINGS ECTOR BUT DEPRESS ED: Manufacturi ng	RELATIVE BACKWARD SECTOR: Mining& Quarrying, Transportation &Communications, Finance, Leasing&Financial Services, Electricity, Gas, &Water, andServices

Source: BPS (processed)

Analysis Of Sector Leading In Buleleng Regency

LQ value calculation results across sectors of the economy based on indicators of local revenue that GDP at constant prices in 2000, there are seven sectors which are the economic base of Buleleng that can be prioritized into leading sectors in 2010-2013 are agricultural, manufacturing, and services, is shown from the results of the calculation of the value of the sector LQ more than one. This suggests that these sectors have a major contribution in the economy and regional development in Buleleng.

The agricultural, manufacturing, and services is a sector that could be a sector basis in Buleleng from 2010-2013. This shows that the three sectors have a competitive advantage and value a great contribution in the economy of Buleleng. Due to three this sector is able to compete with local districts / cities in the province of Bali by exporting the products of the sector base outside the domestic market, as a result of the industrial subsector of food, beverages and tobacco as well as the results of industrial wood, bamboo, rattan, grass, and the like, including household furniture which is exported outside the region to be reprocessed.

Sector analysis of the calculation results of the economic base in Buleleng Regency period 2010-2013 can be seen in Table 3.

Table3.LQValue Sectorsof Economy in Buleleng Based on Constant 2000 Prices Period 2012-2013

Business field	LQ Average (2010-2013)
Agriculture	1.23
Mining and Excavation	0.94
Processing industry	1.02
Electricity, GasandWater	0.66
Building	0.66
Trade, Hotels and Restaurants	0.92
Transportation and Communication	0.32
Finance, Real EstateandBusiness Services	0.57
Services	1.74

Source: BPSBuleleng(dataprocessing)

Table4.Hierarchy of Growth and Service Center in Bulelengin 2013 by schallogram (unit)

No	District	population	number ofVillages	Amount ofTypeFacilities	Number of UnitsFacilities	Ranked
1.	Buleleng	132,640	29	32	3,251	1
2.	Sawan	59,540	14	24	1,580	2
3.	Seririt	71,040	21	26	1,562	3
4.	Gerokgak	81,220	14	23	1,548	4
5.	Kubutambahan	54,640	13	25	1,512	5
6.	Tejakula	53,980	10	21	1,443	6
7.	Banjar	70,540	17	24	1,435	7
8.	Sukasada	74,430	15	24	1,205	8
9.	Busungbiu	40,270	15	22	801	9

Based on Table4 that only theDistrict ofBulelengthathasthe most completefacilities. Buleleng District has 32types offacilities. Buleleng Districtis a district thatthe most number of people,so thecompleteness ofthe facility is necessary,thus allowing this district has a facilitythat is not owned byother districts. Followed by the Districtof Seriritwith26 types offacilities.Results of analysisschallogramthe Districtof Bulelengholdsthe firstrankin the availability offacilitiesconstructionunitsas many as3,251, it is because the districtis the capital of Buleleng Regencys ospread developmentfacilities conducted in these districts. Lowest hierarchyheld by District of Tejakulaiethe number of 21 facilities

Policy Implications
Sectoral Development Policy

Analysis Schallogram

Infrastructurein an are agreatly influenced the development of the region.Good infrastructure areas willbe furtherdeveloped,whileregionslackinggoodinfrastructureis relativelyunderdeveloped. Leading sectorsthat will beprioritized toimprove household incomesand thedevelopment of the regionwill be supportedbythe availability offacilities and infrastructuresufficientto supporteconomic activity inthe region.

KlassenTypologi growth pattern based sectors of the economy that can be categorized as an advanced and rapidly growing sector is the agricultural sector is in quadrant I. this sector should receive more attention from the local government Buleleng to be developed, sectors of Manufacturing and Services are in quadrant II is advanced but depressed sector. The manufacturing sector has the performance of the economic contribution that is greater than the province of Bali.

Meanwhile, if seen from the results of the analysis of the sector TypologiKlassen Trade, Hotels & Restaurants, are in quadrant III, potential or sector can still thrive.Having analyzed the pattern of growth of economic sectors, it is known classification of economic sectors in Buleleng, required for deeper analysis of the

sector basis LQ method for searching for a base that can be prioritized sectors into leading sectors. LQ value calculation results across sectors of the economy based on indicators of local revenue that GDP at constant prices in 2000, there are three sectors which are the economic base of Buleleng that can be prioritized into leading sectors in 2010-2013 are agricultural, manufacturing, and services, is shown from the results of the calculation of the value of the sector LQ more than one.

Thus, from the second analysis TypologiKlassen and LQ can be concluded that the economic sector in Buleleng that must be developed and can be prioritized into a dominant sector is agricultural sector and manufacturing sector

Policy According to the Deploymentand Support Sector Facility Featured

Based on the analysis ofschallogram methods, distribution facilities and infrastructure development of the region and support the economy can be said Buleleng has not undergone equalization. This can be seen in some areas of Buleleng people's income levels are still low and the mindsets of the people are still traditional. Policy implications can be recommended in the policy of supporting facilities and infrastructure leading sectors are as follows:

1. In the preparation of development planning in the future should sound development of the region based on the integrated development planning across sectors.
2. A policy to improve the construction and maintenance of public facilities and infrastructure/community to promote equitable development, and accelerating regional economic growth is done in the presence of spatial planning.
3. Sustainable development also should receive serious attention in memgembangkan excellent scores.
4. The existence of local autonomy requires the regions to be able to enlarge the PAD that will be used as a source of regional development funds.

CONCLUSION

1. The result of the analysis KlassenTypologi with sectoral approach, pointing out that the agricultural sector occupied the first quadrant is advanced and rapidly growing sector. Followed by the manufacturing sector in quadrant II is advanced but depressed sector. Aside from this sector, the sector of Trade, Hotels & Restaurants, in quadrant III, potential or sector can still thrive. Economic sectors in Buleleng are still much to be in quadrant IV are sectors that are lagging behind.
2. The results of the calculation of the value of LQ all sectors of the economy based on indicators of local revenue that GDP at constant prices in 2000, there are three sectors which are the economic base of Buleleng that can be prioritized into leading sectors in 2010-2013 are agricultural, manufacturing, and services, is shown from the results of the calculation of the value of the sector LQ more than one.
3. The results of the analysis schallogram District of Buleleng holds the first rank in the availability of support facilities leading sectors that are 2,610. This is because the District is the capital of Buleleng Regency so spread development facilities conducted in these districts. Although in the District of Buleleng only three food processing industry, beverages and tobacco is not as much when compared to District of Banjar, which has four food processing industry, beverages and tobacco, while the District ofSukasada which has the food processing industry, beverages and tobacco largest in Bulelengregency as many as five indusries but District ofBuleleng has a number of processing industries of paper and wood processing industry is the largest in Buleleng each five processing industry. In addition to ownership of the processing industry in every district in Buleleng, District ofBuleleng has the highest number of state-owned banks compared with other districts. Lowest hierarchy held by the District ofTejakula that the number of facilities as many as nine. District ofTejakula did not have either the processing industry in the food, beverage, and tobacco as well as other sectors such as the textile industry, wood industry, paper industry or metal industry. However, District ofTejakula still ranks sixth,

and this is because the number of units other supporting facilities owned still more in comparesDistrict ofBanjar District, District ofSukasada, and the District ofBusungbiu such as the number of units of market facilities, shops, kiosks and stalls.

REFERENCES

BAPPENAS.2004.Reduction ofInequalityInter-Regional Development.http://www.bappenas.go.id/index.php?module=Filemanager&func=download&pathext=ContentExpress/RPJMN2004/&view=Bab%2024%20(Pembangunan%20Daerah).doc.

Budiharsono, Sugeng. 2001.MechanicalAnalysis ofRegional Developmentof Coastal and Marine. PTPradnyaParamita. Jakarta.

Central Bureau ofStatisticsBuleleng.2014Bulelengin2014.BPSBuleleng in figures

_____. 2014Gross Domestic Product2012-2013Buleleng. BPSBuleleng.

Central Bureau ofStatistics of Bali Province.2014Bali Provincein2014.BPSBali Province in figures.

Hanafi, T.1988.GrowthCentresDevelopmentand SmallServiceinRuralArea DevelopmentFramework. Department of Social EconomicsFaculty of AgricultureAgriculturalUniversity.Bogor.

Nindyantoro.2004.RegionalDevelopment Policy: FromSpatialUntilAutonomy.Department of Social EconomicsFaculty of Agriculture. IPB.Bogor.

Regional Development Planning BoardBuleleng.2014.

Determinants of Employee's Knowledge Sharing Behavior: A Social Cognitive Theory Perspective

Satrio Baskoro Yudhoatmojo, Michael Wicaksana, Larastri Kumaralalita,
Achmad Nizar Hidayanto, Kongkiti Phusavat

[1]*Faculty of Computer Science, Universitas Indonesia*
[2]*Department of Industrial Engineering, Kasetsart Universty*

nizar@cs.ui.ac.id

Abstract

This research is conducted to identify factors that affect the employee's knowledge sharing behavior based on Social Cognitive Theory perspective. Data used on this study are derived from distributing questionnaires to 112 employees on Jakarta R&D division of Telecom Business Unit at PT XYZ. Those data are then analyzed using Partial Least Square method with the help of SmartPLS 2.0 M3 tool. The result shows that knowledge sharing self-efficacy, enjoyment in helping others, and reward have significant influences towards knowledge sharing behavior. The knowledge contributing behavior and knowledge collecting behavior also shows a positive influence towards knowledge sharing behavior.

Keywords : knowledge sharing, knowledge collecting, knowledge contributing, knowledge utilization, social cognitive theory

1. Introduction

Knowledge sharing is one of the major activities of knowledge management (Hendriks, 1999). Knowledge sharing can be defined as a process of explicit or tacit knowledge transfer from one individual to another (Becerra-Fernandez & Sabherwal, 2010). Knowledge sharing can also be regarded as a process of communication that exists between two or more parties involved in a transfer of knowledge (Lin, Hung, & Chen, 2009). In the context of the organization, knowledge sharing can be interpreted as an action to make knowledge available to others in the organization (Shih & Lou, 2011).

Knowledge sharing is a relationship between at least two parties, namely those who have knowledge and those who need such knowledge (Hendriks, 1999). Kankanhalli et al. (2005) states that the two sides could be also referred to as knowledge contributors and knowledge seeker. With the involvement of both sides, we can conclude that there are 2 subprocesses in a knowledge sharing process, namely knowledge collecting and knowledge donating (Lin, 2007).

One of the problems often faced by organizations is the lack of knowledge sharing among employees, although knowledge sharing provides benefits for individuals and organizations. This study tries to analyze barriers to knowledge sharing through the perspective of Social Cognitive Theory (SCT), which is a model that is often used to validate the behavior of individuals. In the model of SCT, cognitive and other personal factors, the influence of the external environment, and behavior act as determinants that interact and influence each other (Wood & Bandura, 1989). SCT argued that a person's behavior partly formed and controlled by the influence of contextual factors and cognitive individual (Chen & Hung, 2010; Haron, Wan Jaafar, & Baba, 2010).

This research was conducted at PT XYZ, which is engaged in the field of card-based digital security (or better known as smart cards). XYZ has made an information system as a platform for knowledge sharing activity, which has 2 main features, namely the forums and search engines. Although the system has been made with good intentions employees to use the system is still low, so it needs to be analyzed factors that encourage employees to perform knowledge sharing in the system.

2. Hypotheses Development

The theoretical framework used in this study are based on SCT model consisting of 2 factors: individual factors and contextual

factors. Contextual factors used in this study consisted of organizational aspects and social aspects. Figure 1 shows the model of our research.

2.1 Individual Factors

In the organization, most of the knowledge stored in the individuals in the organization (Becerra-Fernandez & Sabherwal, 2010). It was revealed that the individual is a source of knowledge that is needed for knowledge sharing. Two individual factors considered important in influencing the behavior of knowledge sharing are knowledge sharing self-efficacy (Chen & Hung, 2010; Lin, 2007; Hsu, Ju, Yen, & Chang, 2007) and outcome expectation (Papadopoulus et al., 2013). In addition to these two factors, enjoyment in helping others is also a fairly strong determinants in influencing the behavior of knowlege sharing (Lin, 2007).Therefore, the following hypotheses are proposed:

H1a: Knowledge sharing self-efficacy is positively related to knowledge contributing behavior

H1b: Knowledge sharing self-efficacy is positively related to knowledge collecting behavior

H2a: Outcome expectation is positively related to knowledge contributing behavior
H2b: Outcome expectation is positively related to knowledge collecting behavior

H3a: Enjoyment in helping others is positively related to knowledge contributing behavior
H3b: Enjoyment in helping others positively related to knowledge collecting behavior

2.2 Contextual Factors

According to SCT, one of the factors that influence individual behavior is contextual factors. Contextual factors can be interpreted as the environment around the individual. In the context of the individual, the two most significant contextual factors in influencing knowledge sharing are interpersonal trust and norm of reciprocity (Chen & Hung, 2010). In the context of the organization, the factors that are considered quite influential on knowledge sharing is a reward and time (Seba, Rowley, & Lambert, 2012). Therefore, the following hypotheses are proposed:

H4a: Interpersonal trust is positively related to knowledge contributing behavior
H4b: Interpersonal trust is positively related to knowledge collecting behavior

H5a: Norm of reciprocity is positively related to knowledge contributing behavior
H5B: Norm of reciprocity is positively related to knowledge collecting behavior

H6a: Reward is positively related to knowledge contributing behavior
H6b: Reward is positively related to knowledge collecting behavior

H7a: Time is positively related to knowledge contributing behavior
H7b: Time is positively related to knowledge collecting behavior

2.3 Knowledge Sharing

Chen and Hung (2010) argues that the value of the knowledge contained within the community will be limited if there is no attempt to renew, enrich, and add to the diversity of such knowledge. For that there needs to be knowledge contributors who are willing to donate their knowledge and also knowledge seekers who want to reuse the knowledge. Thus, if a community is able to form ideal knowledge collecting and knowledge contributing process, its members will be more likely to use existing knowledge in the community. This is consistent with the results of Chen and Hung (2010) which states that knowledge contributing and collecting behavior are positively related to knowledge utilization behavior. Thus we proposed the following hypotheses:

H8a: Knowledge contributing behavior is positively related to knowledge utilization behavior

H8b: Knowledge collecting behavior is positively related to knowledge utilization behavior
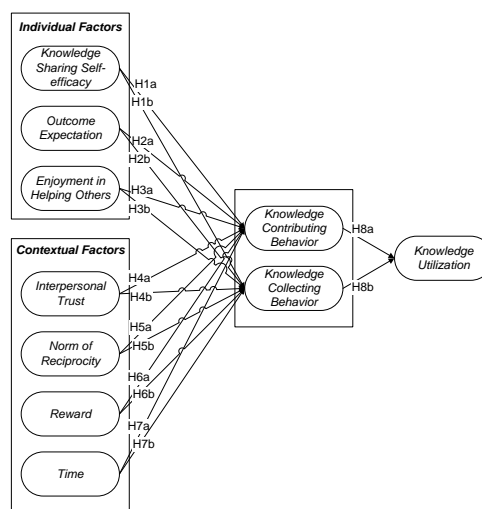

Figure1. Research model

3. Methodology

Data was collected by distributing questionnaires directly in hardcopy to the employees in R&D division of XYZ company. Questionnaire is prepared by using a 5-points Likert scale which indicate "strongly disagree" (1), "disagree" (2), "neutral" (3), "agree" (4), and "strongly agree" (5). On some indicators, the scale will be used in reverse. Table 1 shows the summary of instrument used in this research. In total, there are 34 statements in the questionnaire.

Table 1: Summary of Research Instruments

Variable	#Items	References
Knowledge Sharing Self-efficacy (KSS)	5	Chen and Hung, 2010; Lin, 2007
Outcome Expectation (OE)	4	Bock et al., 2005; Papadopoulos et al., 2013
Enjoyment in Helping Others (EHO)	3	Kankanhalli et al., 2005; Wasko and Faraj, 2005; Lin, 2007
Interpersonal Trust (IT)	3	Hsu and Lin, 2008; Kankanhalli et al., 2005; Hung et al., 2010
Norm of Reciprocity (NR)	3	Chen and Hung, 2010; Wasko and Faraj, 2005
Reward (RE)	3	Seba et al., 2012; Lee et al., 2010
Time (TI)	3	Seba et al., 2012
Knowledge Contributing Behavior (KCB)	4	Lin, 2007; Kim and Lee, 2013; Chen and Hung, 2010
Knowledge Collecting Behavior (KCL)	3	Kim and Lee, 2013; Chen and Hung, 2010
Knowledge Utilization (KU)	3	Cheng and Hung, 2010

In this study, we obtained 112 respondents. The collected data were analyzed by using the Partial Least Square (PLS) with the help of SmartPLS 2.0 M3.

4. Results and Discussions

4.1 Measurement Model Testing

The validity test of the instrument consisted of the evaluation of convergent validity (loading factor and the AVE) and discriminant validity (cross-loadings and Fornell-Larcker criteria). On the evaluation of convergent validity, there are four indicators that have a value of loading factor < 0.6 that

should be dropped (Hair et al., 2010). The four indicators are KSS4, KSS5, NR1, and RE3. After these four indicators are discarded, the entire value of loading factor ≥ 0.6. For AVE values, all variables already meet the lowest-bound threshold, which is 0.5 (Fornell & Larcker, 1981). On the evaluation of discriminant validity, the results of cross-loadings and Fornell-Larcker criteria indicate that all the indicators and variables have a higher degree of correlation with their respective spouses compared with other variables.

Reliability test in this study consisted of the evaluation of composite reliability (CR) and Cronbach's Alpha (CA). The threshold value for the composite reliability is 0.7 (Latan & Ghozali, 2012) as well as Cronbach's Alpha value which also 0.7 (Wang and Yang, 2008). Results of the evaluation of composite reliability and Cronbach's Alpha showed that all variables are reliable, although there are two variables that had a Cronbach's Alpha value of less than 0.7. Both of these variables are still considered reliable because it has a Cronbach's Alpha value approaching 0.7 and also has a composite reliability value approaching 0.8. Table 2 summarizes the entire evaluation values of measurement model that consists of loading factor, AVE, composite reliability, and Cronbach's Alpha after dropping 4 invalid indicators.

Table 2: Summary of Loading Factor, AVE, Composite Reliability (CR), and Cronbach's Alpha (CA)

Item	Loading Factor	AVE	CR	CA
Knowledge Sharing Self-efficacy (KSS)				
KSS1	0.903			
KSS2	0.841	0.767	0.908	0.853
KSS3	0.881			
Outcome Expectation (OE)				
OE1	0.667			
OE2	0.604	0.549	0.827	0.727
OE3	0.832			
OE4	0.833			
Enjoyment in Helping Others (EHO)				
EHO1	0.898			
EHO2	0.929	0.838	0.939	0.903
EHO3	0.919			
Interpersonal Trust (IT)				
IT1	0.842			
IT2	0.874	0.632	0.835	0.711
IT3	0.650			
Norm of Reciprocity (NR)				
NR2	0.933	0.831	0.907	0.799
NR3	0.889			
Reward (RE)				
RE1	0.877	0.762	0.865	0.687
RE2	0.869			

Time (TI)

TI1	0.848			
TI2	0.631	0.662	0.852	0.752
TI3	0.932			

Knowledge Contributing Behavior (KCB)

KCB1	0.751			
KCB2	0.798	0.568	0.840	0.744
KCB3	0.669			
KCB4	0.791			

Knowledge Collecting Behavior (KCL)

KCL1	0.885			
KCL2	0.870	0.699	0.874	0.785
KCL3	0.746			

Knowledge Utilization (KU)

KU1	0.887			
KU2	0.746	0.605	0.820	0.673
KU3	0.687			

4.2 Structural Model Evaluation

Evaluation of the structural model in this study is done by looking at the value of R-Square and T-Statistics of the dependent variables in the research model. The dependent variables in this study are KCB, KCL, and KU. R-square values of the three variables in a row are 0.579864, 0.236733 and 0.283754. For the evaluation of the T-Statistics value, the threshold value is 1.96 to be an acceptable hypothesis (Latan & Ghozali, 2012). Table 3 shows the value of T-Statistics of each hypothesis. As can be seen in Table 3, of 16 hypotheses, 6 hypotheses are accepted and 10 hypotheses are rejected. The individual factors KSS and EHO are proved to affect significantly to the KCB, but not to KCL. For contextual factors, only the RE (organizational aspects) that significantly affects the KCB and KCL. In addition, KCB and KCL are also proved to significantly affect KU.

Table 3: Structural Testing Results

Hyp.	Path	Original Sample	T-Statistics	Res
H1a	KSS -> KCB	0.2144	3.0585	+
H1b	KSS -> KCL	0.0219	0.3766	-
H2a	OE -> KCB	0.0450	0.6500	-
H2b	OE -> KCL	0.1168	1.1452	-
H3a	EHO -> KCB	0.3319	3.8593	+
H3b	EHO -> KCL	0.0820	0.9787	-
H4a	IT -> KCB	0.1650	1.5427	-
H4b	IT -> KCL	0.1949	1.8006	-
H5a	NR -> KCB	0.0828	1.3494	-
H5b	NR -> KCL	0.0163	0.2106	-
H6a	RE -> KCB	0.1679	2.3233	+
H6b	RE -> KCL	0.1952	2.1563	+
H7a	TI -> KCB	-0.2769	3.1918	-
H7b	TI -> KCL	-0.0976	1.1285	-
H8a	KCB -> KU	0.2196	2.2333	+
H8b	KCL -> KU	0.4011	4.4138	+

"+" means "Accepted" and "-" means "Rejected"

4.3 Discussion

From the results of hypothesis testing only 3 variables of 7 variables proposed in the initial model, which proved to influence the behavior of knowledge sharing. These three variables are knowledge sharing self-efficacy and enjoyment in helping others, both of which belong to the individual aspects; and reward, which belong to the organization aspect. These three variables affect knowledge contributing behavior. Knowledge collecting behavior is only affected by reward.

This study found that employees are willing to share their knowledge with their co-workers because they believe they are able to provide valuable knowledge for their colleagues and also because they enjoy helping others by sharing their knowledge to them. This result also confirmed the results of previous studies (Lin, 2007; Hsu and Lin, 2008; Kankanhalli et al., 2005; Chen and Hung, 2010; Kankanhalli et al., 2005; Limupa, 2013). From both individual factors, factors that most affect employees' knowledge contributing behavior is enjoyment in helping others. This is indicated by the value parameter enjoyment in helping others in the amount of 0.332 in Table 3.

In terms of contextual factors, hypothesis testing results showed that only one of the factors that has a significant effect, both to knowledge contributing and knowledge collecting behavior, which is reward. This suggests that employees seek for reward from organization from their knowledge sharing behavior. This result confirms the results of research conducted by Alam et al. (2009), Lee et al. (2010) and Ma et al. (2011).

This study also reveals that employees will undertake knowledge sharing activities even though there is no trust between individuals. In addition, they also need assurance that their deeds will be rewarded in the future and also does not require the allocation of time given specifically by the organization to undertake knowledge sharing.

This study also found that knowledge contributing and collecting behavior positively influence behavior towards knowledge utilization (use of knowledge). This indicates that the knowledge sharing behavior of the employees, both knowledge contributing behavior and knowledge collecting behavior, will increase the use of knowledge in the organization.

5. Research Implications
5.1 Practical implications
The results showed that the reward has a significant impact on knowledge sharing behavior. Therefore, the reward mechanisms such as a plaque, certificate, promotion and salaries, or bonuses are necessary to motivate employees in knowledge sharing. In addition, management must also enhance intrinsic motivation of their employees by increasing their satisfaction level when they help others through knowledge sharing. One of the things that can be done is to create a comfortable atmosphere in the works. In addition, management needs to cultivate helping attitude as part of organization's culture. Such culture will encourage employees to share their knowledge in their daily activities. At last, knowledge self-efficacy also proved to be a determinant of knowledge sharing behavior. Some of the ways that can be done to improve knowledge sharing self-efficacy is to provide useful feedback to individuals and training.

5.2 Theoretical Implications
The results obtained this study is that the knowledge sharing self-efficacy, enjoyment in helping others, and reward shown to affect the behavior of knowledge sharing. From these results, it can be said that this study confirmed the SCT, namely knowledge sharing behavior of individuals affected by cognitive factors such as knowledge sharing self-efficacy and enjoyment in helping others, and contextual factors, such as reward.

6. Conclusion
The conclusion from this study is that the individual factors that influence employees' behavior to knowledge sharing is knowledge sharing self-efficacy and enjoyment in helping others, with enjoyment in helping others to have a greater influence. Both these factors only affect knowledge contributing behavior. The results showed no individual factors that influence knowledge collecting behavior. While the contextual factors that significantly influence the behavior of employees knowledge sharing is reward, which represents a factor the organization aspect. Reward proves to have a significant impact both on knowledge contributing and collecting behavior. The results also show that there is no social aspect having a significant effect on knowledge sharing behavior. Furthermore, we also reveal that both knowledge sharing behaviors have positive effect on the utilization of such knowledge.

7. References
Alam, S. S., Abdullah, Z., Ishak, N. A., & Zain, Z. M. (2009). Assessing Knowledge Sharing Behaviour among Employees in SMEs: An Empirical Study. International Business Research , 2 (2), 115-122.

Becerra-Fernandez, I., & Sabherwal, R. (2010). Knowledge Management: Systems and Processes. New York: M. E. Sharpe, Inc.

Bock, G. W., & Kim, Y.-G. (2002). Breaking the myths of rewards: an exploratory study of attitudes about knowledge sharing. Information Resources Management Journal , 15 (2), 14-21.

Bock, G.-W., Zmud, R. W., Kim, Y.-G., & Lee, J.-N. (2005). Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate. MIS Quarterly , 29 (1), 87-111.

Chen, C.-J., & Hung, S.-W. (2010). To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. Information & Management , 47 (4), 226-236.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research , 18 (1), 39-50.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis (7 ed.). Prentice Hall.

Haron, S., Wan Jaafar, W. M., & Baba, M. (2010). The influence of school climate towards counselor's self-efficacy. Procedia Social and Behavioral Sciences , 5, 445-448.

Hendriks, P. (1999). Why Share Knowledge? The Influence of ICT on the Motivation for Knowledge Sharing. Knowledge and Process Management , 6 (2), 91-100.

Hsu, C.-L., & Lin, J. C.-C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. Information & Management , 45, 65-74.

Hsu, M.-H., Ju, T. L., Yen, C.-H., & Chang, C.-M. (2007). Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations. International Journal of Human-Computer Studies , 65, 153-169.

Hung, S.-Y., Lai, H.-M., & Chou, Y.-C. (2010). The Determinants of Knowledge Sharing Intention in Professional Virtual Communities: An Integrative Model. Pacific Asia Conference on Information Systems (PACIS).

Kankanhalli, A., Tan, B. C., & Wei, K.-K. (2005). Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation. MIS Quarterly , 29 (1), 113-143.

Kim, T. T., & Lee, G. (2013). Hospitality employee knowledge-sharing behaviors in the relationship between goal orientations and service innovative behavior. International Journal of Hospitality Management , 34, 324-337.

Latan, H., & Ghozali, I. (2012). Partial Least Squares: Konsep, Teknik dan Aplikasi SmartPLS 2.0. Semarang: Badan Penerbit Universitas Diponegoro.

Lee, J., Kim, J., & Han, Y. (2010). A Study on Factors Influencing Knowledge-Sharing Activity for the Innovation Activity of Team. IEEE , 270-274.

Limupa, A. (2013). Analisis Faktor-faktor yang Mempengaruhi Anggota Komunitas Virtual Melakukan Knowledge Sharing: Studi Kasus Komunitas Online Teknologi Informasi di Indonesia. Depok: Universitas Indonesia.

Lin, H.-F. (2007). Knowledge sharing and firm innovation capability: an empirical study. International Journal of Manpower , 28 (3/4), 315-332.

Lin, M.-J. J., Hung, S.-W., & Chen, C.-J. (2009). Fostering the determinants of knowledge sharing in professional. Computers in Human Behavior , 25, 929-939.

Ma, Y., Diao, L., Luo, C., & Huang, Q. (2011). The study on influence factors of knowledge sharing among members in electronic community. Multimedia Technology (ICMT), 2011 International Conference on (pp. 5204 - 5206). Hangzhou: IEEE.

Papadopoulos, T., Stamati, T., & Nopparuch, P. (2013). Exploring the determinants of knowledge sharing via employee weblogs. International Journal of Information Management , 33, 133-146.

Seba, I., Rowley, J., & Lambert, S. (2012). Factors affecting attitudes and intentions towards knowledge sharing in the Dubai Police Force. International Journal of Information Management , 32 (4), 372-380.

Shih, R.-C., & Lou, S.-J. (2011). The development and application of a knowledge sharing behavior model for Taiwanese junior high school English teachers. African Journal of Business Management , 5 (30), 12066-12075.

Wang, J.-R., & Yang, J. (2008). Study on knowledge sharing behavior in software development team. Wireless Communications, Networking and Mobile Computing, 2008. WiCOM '08. 4th International Conference on (pp. 1 - 4). Dalian: IEEE.

Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. MIS Quarterly , 29 (1), 35-57.

Wood, R., & Bandura, A. (1989). Social Cognitive Theory of Organizational Management. Academy of Management Review , 14 (3), 361-384.

Cultural Values of the story of Ki Lapidin, Ki Asmidi, and Ki Samidin as Character Education Tools In Subang, West Java

Ani Rachmat, Lina Meilinawati R, Nani Darmayanti, Eni Karlieni,
Nandang Rahmat, Muhamad Adji

Faculty of Humanities, Padjadjaran University, Bandung, Indonesia

anirachmat@gmail.com

Abstract

This work is devoted to the analysis of the legends of *Ki Lapidin, Ki Asmidi, and Ki Samidin* in Subang, West Java. Recently, the term called character education has become a rising issue in schools, and it has slowly but surely begun to show its importance in the curriculum. The character of *Ki Lapidin* is regarded as a personal role model of kindness, responsibility, dignity, fairness and honesty to the society. Even thoug he was a heroic outlaw in Subang, he is always portrayed as "robbing from the rich and giving to the poor", he was a freedom fighter opposing oppressive of the Dutch. In our research we were guided by a set of theoretical and empirical methods of research. To obtain interpretive glosses of the communicative material we used ethnographic methods. The result shows that Ki Lapidin Ki Asmidi, and Ki Samidin are representation of fighter, who fought for the right in their own way. They are symbol of integrity of people.

Key words : legend, cultural value, character education

3. Background

The study of folklore is the study of the cultural behavior of the people who live collectively in a community, for folklore is a documentation of the cultural wealth and diversity of a people. Bascom (1965:3-20) proposes four functions which folklore serves: (a) folklore as a system of projection that reflects the collective imagination of the people who created it; (2) folklore as a system that validates the cultural institutions of a people; (3) folklore as a means of education; (4) folklore as a means control to ensure that the social norms are observed by members of a community. Thus, the study of folklore and myth is also the study of the cultural behavior of the people among whom folklore and myth circulate.

The notion is seconded by Dundes (1965), who argues that basically, folklore is closely related to a collective tradition from which traditional knowledge is derived. In it is embedded traditional knowledge on which the life of a people's ancestors was based. At present, however, as Sims (2011) asserts, there is much more to folklore than mere traditional knowledge. Folklore is also an informal resource of learning about the world, faith, culture, and tradition. All these are uniquely and creatively expressed through the various elements of folklore, namely music, customs, practices, behavior, and materials.

A tradition results from people's perception about their natural, social, and environment. As Sedyawati (1995) underlines, from oral tradition (oral literature), one can learn about cultural facts: genealogy, cosmology, history, philosophy, ethics, morals, system of knowledge, and linguistic features. This kind of holistic expression of cultural facts that makes tradition (i.e. myth and folklore) remain significant even at the present time.

Folklore is part of oral literature. Hutomo (1991) explains that oral tradition includes (1) oral literature, (2) traditional technology, (3) knowledge circulating outside a kingdom's center or metropolis, (4) elements of religion and belief beyond the formal boundaries of major religions, (5) forms of art developing outside a kingdom's center or metropolis, and (6) customary law. The study focuses on non-metropolitan regencies, where traditional values are still strongly adhered to.

West Java is a unique province where two contrasting identities co-exist: the identity of urban communities living in the Jabodetabek area (around Jakarta) and the identity of the traditional village communities. The study takes traditional village communities as its object on the grounds that they still adhere to folklore.

Each village usually has its own folklore. The study focuses on the villages in Subang Regency, West Java, where a number of

folktales are still circulating. Certain proverbs and figurative expressions originating from these folktales are still used to educate the younger generation. Such a practice is exemplified in the way the three folkltales, namely *Ki* Lapidin, *Ki* Asmidi, and *Ki* Samidin, circulate among the people. Not only are these folktales very popular among the Subang people, but they are also sources of some proverbs or figurative expressions that are widely used in the everyday life of the people.

The paper is an attempt to inventory and document folklore from which proverbs or figurative expressions originate. The results of the inventory are analyzed by using a lingua-cultural approach to examine the interconnection between the folklores and the daily practices of the people.

4. Theoretical Background
2.1 Lingua-culturology

Lingua-culturology is an important approach in linguistics. Developing within the anthropocentric paradigm and attempting to interpret linguistic phenomena from cultural perspectives, lingua-culturology is concerned with how language and culture are interrelated. As Kartushina (2003) argues, the cultural background structured by a certain mindset and cultural formulation is a basis for lingua-cultural perception and cognition.

Because of its focus on the culture and mentality of a nation, lingua-culturology contributes to the nurturing of mutual understanding and respect in cross-cultural communication processes (Vasileva, 2002).

A study on worldview through the use of language in general and proverbs in particular enhances the scope of linguistics. Through cognitive approaches, language is seen not only as a system of lexical, grammatical, and phonological units, but also as a system of norms of communicative behavior within a certain social and ethno-cultural sphere and as a "verbal system of knowledge about the world" (Susov, 2007).

2.2 Folklore as a Foundation of Character Education

One of the functions of folklore is to educate (Bascom, 1965). When adopted in the processes of formal, non-formal, and informal education, folklore as a medium of education can nurture the character of the younger generation towards a better future (Sibarani, 2013).

Folklore can also be used to facilitate learning and teaching process. Based on the propaganda theory, folklore is also an effective medium of propaganda (Sibarani, 2013: 8).

Sibarani (2013) further argues that folklore enables ideas to be communicated within the entire scope of human life. The propaganda theory has placed folklore as a tool, means, or medium. Folklore is a vehicle to attain the goal of the many aspects of life. Provided that proper selection or adjustment is in place, folklore as a means of education can be used in the teaching of all disciplines of knowledge.

Value system is at the center of the cultural structure of a society. Value system is both a basic phenomenon and problem in human life. The value system represented in folklore is an important resource for improving a learner's knowledge.

3. Results and Analysis

Proverbs or figurative expressions are commonly used not only in literary texts, but also in conversations among native speakers of a language. Verbalization of character education through the use of proverbs is a practice common to all languages. Centuries-old proverbs reflect how the speakers of a language perceive human nature in general and specific realities in particular. Proverbs are "a collection of a nation's wisdom, constituting a part of the organized phraseology of a language" (Kunin, 2005). Therefore, paremiology, the study of proverbs/sayings/figurative expressions, is useful not only within the cognitive and cross-cultural framework, but also within an axiological framework, for paremia always includes moral, a guide to what is perceived as good or bad. In other words, while paremia constructs worldview, it also constructs an important part of a phenomenon which Alefirenko calls the value-semantic space of a language (Alefirenko, 2009).

As Danandjaja (1983) exemplifies, the part of a culture called folklore can include folk language, traditional sayings, riddles, folk poetry, folk prose such as myths, legends and folktales (jokes and anecdotes), folk songs, folk theater, folk games, beliefs, folk fine arts, folk music, and sign language. Similarly, Iskandar et al. (2004) also include folk riddle and poetry as types of folklore. The analysis of the three folktales circulating in Subang Regency focuses on "traditional proverbs" that remain in use among the local people.

3.1 The Plot
d. *Ki* Lapidin Folktale

During the Dutch occupation period, the people of Subang lived in poverty. They could not eat as they wanted. People were starving. Yet, there were some who lived in luxury. Those who lived an extravagant life were the Dutch or those who worked for them. However, those who were more fortunate did not care about those who were not. An old man called *Ki* Lapidin—*'ki'*: literally grandpa, a form of address for an elderly man—felt sympathy for the suffering of the people. Being a brave man, *Ki* Lapidin helped his neighbors by stealing. He stole from the rich and gave what he stole to the poor.

Many a times had *Ki* Lapidin been arrested and was brought to a trial. However, thanks to his sharp wit, he was always able to get away from punishment. It was his skill of arguing that made him famous. However, one day he was once again caught, but this time, his eloquence failed him. *Ki* Lapidin was sentenced to death by hanging. He accepted his fate. Yet, he had one condition. Before he was hanged, he wanted to hear his favorite song "Kembang Gadung" sung for him.

The story is the source of the figurative phrase "*tampik Lapidin*", an expression used to refer to a person who is skilled in evading blame by arguing.

e. *Ki* Asmidi Folktale

Once there was an old man called *Ki* Asmidi. He was a greedy man who never shared anything equally. He always found a way to get a bigger share. One day he was going to divide his crop. He found a place where he could share his crop his way. He found a spot on the ground that had been stepped on by a water buffalo. He divided to crops on the ground, but made sure that his was put exactly on the spot where the buffalo had made a deep impression on the ground. Perhaps the ground was still wet when the buffalo stepped on it. Thus, the crop piles looked the same, but actually *Ki* Asmidi got a bigger share, thanks to the buffalo's footstep.

This folktale gave birth to the figurative phrase "*babagi* Asmadi" (literally sharing à la Asmadi) to refer to a situation where a person shares something unequally.

f. *Ki* Samidin Folktale

Ki Samidin was a lucky man. He broke wind very often. Every time he did it, it always made a loud sound. In the village where *Ki* Samidin lived, an empty house had long been abandoned by its owner. The head of the village planned to allow someone to live in it and take care of the house. He made a public announcement that whoever could break wind and made the loudest sound would get the house. The winner was predictable. *Ki* Samidin made sure that he made the loudest sound.

Until today, when one gets a fortune out of luck, the expression "*ladang hitut meunang balé*" (owning a house by farting) is still used.

3.2 Character Education in *Ki* Lapidin, *Ki* Asmidi and *Ki* Samidin Folktales

As Sibarani (2013) argues, folklore is a strategic medium to express important ideas in all aspects of life. In other words, folklore is an effective medium of education. Bascom (1965:3-20) proposes four functions which folklore serves: (a) folklore as a system of projection that reflects the collective imagination of the people who created it; (2) folklore as a system that validates the cultural institutions of a people; (3) folklore as a means of education; (4) folklore as a means control to ensure that the social norms are observed collectively by members of a community. The following paragraphs will discuss how the four functions of folklore are fulfilled by the three folktales from Subang above.

d. Ki Lapidin, Ki Asmidi, & Ki Samidin: Projection of Collective Imagination

The three folktales are a projection of the collective imagination of the people among whom they circulate. Members of a community generally share a notion of an ideal life. This is what is called a collective imagination. The three folktales represent the collective imagination of the Subang people.

In the tale of *Ki* Lapidin, there are two aspects of collective imagination. The first is related to the notion that social gap normally exists in any society. There are people who live in poverty and starvation, and there are those who live in abundance. The second is related to a longing for a leader who can lift people out of such a deplorable life. Yet, this ideal is not fulfilled. The absence of such a character is compensated by the presence of a hero. The hero is represented by the character *Ki* Lapidin, a brave man who gives food to the poor by stealing from the rich. Based on the interview with some informants, what *Ki* Lapidin does comes from "a good intention; the means may be

bad, yet the end is good". This trait is comparable to that of Robin Hood, who robs the rich to help the poor. In this case, the people who adhere to the folktale may not be wrong in judging *Ki* Lapidin's character for in their perspective, the good value exceeds the wrong.

The story of *Ki* Asmidi reflects a didactic collective notion that a greedy person will not get honor out of their greed. All the versions of the story, which were gathered through interviews with informants, have no closure. Without an end, it is difficult to draw any conclusion about the collective imagination reflected in the folktale. However, the didactic value against *Ki* Lapidin's trait is so strongly reflected in the story that it finally ended up as a figurative expression still used today.

Ki Samidin's story presents another aspect of collective imagination. Being rich without any effort is a wish many people may have despite the opposite reality. However, luck could happen to anyone, and *Ki* Samidin is luck to win a house only by "farting loudly". Thus, until today, people allude to *Ki* Samidin's story to express their envy of or criticize someone who gets luck without hard work.

e. Ki Lapidin, Ki Asmidi, and Ki Samidin: Validation of Cultural Institutions

Soerjono Soekanto defines social institutions as a collection of norms related to the activities to fulfill basic needs in the life of a community. Generally, social institutions function:

d. to provide a guidance of conduct to overcome social problems;
e. to maintain social integrity;
f. as a means to control the social behavior of community members.

The three stories discussed in this paper attempt to serve all the functions of social institutions above. The end of the story, when *Ki* Lapidin finally meets his death by hanging, serves as a guidance that despite the figurative expression "*niatna sae-lampahna awon-hasilna sae*" (good intention, bad means, yet good end), what *Ki* Lapidin does is still wrong.

Similarly, people allude to *Ki* Asmidi's story to refer to a greedy person. Despite the absence of an end, the story is a lesson for people to avoid greed. The story is perpetuated in the form of a saying that becomes a guide of conduct.

The story of *Ki* Samidin exemplifies how the third function of social institutions work as a means of social control. Luck befalls anyone. Those who are unlucky should accept other people's luck with an open heart. The story of *Ki* Samidin serves as a reminder that a one's life is unpredictable and that one should not envy someone else's luck.

f. Ki Lapidin, Ki Asmidi, and Ki Samidin: Means of Education

People are constantly bombarded with information, including stories (folktales) and myths. From generation to generation, both folktales and myths even serve as a set of "rules" for their adherents. Thus, folktales have been used as a means of indirect education. Folktales contain noble individual, social, religious moral values.

As the following table illustrates, the three folktales studied contain these three values.

Table 1: Moral value of the folktales

Moral Values in the Three Folktales			
Means of Education	**Individual Moral Value**	**Social Moral Value**	**Religious Moral Value**
Ki Lapidin	Willing to sacrifice himself and help others.	People should help one another. The have should help the have not.	A crime is a crime, even if the intention is noble.
Ki Asmidi	Untrustworthy; self-deceiving	Unfair, greedy, causing others loss	There is no blessing in gaining fortune by deceiving others
Ki Samidin	Steadfast. Life is often unpredictable.	Do not envy other people's fortune.	One should be thankful for all the fortune he/she has.

b. Ki Lapidin, Ki Asmidi, and Ki Samidin: Means to Control Social Norms

Social norms are unwritten rules that regulate the way people should conduct their life in society. Social norms imply moral sanction as an important element of social control. According to David Berry (1982), the main element of a norm is the social pressure on individuals to observe norms. Norms as a non-material element of culture can prevent one from acts of vice or negative influences from others. Norms or social codes of conduct basically provide guidelines on how one should behave in social life. Soedjono Dirdjosisworo (1985) defines social codes of conduct as a set of

written or unwritten rules on what is socially considered as a good or decent and bad or indecent conduct.

The social norms taught in the three stories are documented as figurative expressions, of which meaning is presented in the following table.

Table 2: Figurative expression

	Figurative Expression	Social Norm
Ki Lapidin	**"*Tampik Lapidin*"** (Arguing à la Lapidin)	**One who is skilled in evading blame will one day fail to do so.**
Ki Asmidi	**"Babagi Asmidi"** (Sharing à la Asmadi)	**One must be fair in all trades.**
Ki Samidin	**"*Ladang Hitut Menang Bale*"** (Owning a house by farting)	**Life is sometimes full of luck and surprises. One should not envy other people's fortune. One should be thankful for what he/she has.**

4. Conclusion

The oral tradition that has been passed down to many generations is still worth preserving, as it is still relevant until today. Adjustment must be made as time changes. Folklore contains values and norms that are still relevant for the collective life of people. Folklore can serve as a filter against the negative effects of the progress of science and technology in this globalized world. The three folktales that circulate in Subang Regency reflect the values and norms that still characterize the people of Subang. People can still adhere to the folktales in their collective life.

5. References

Alefirenko, N.F. (2009). Frazeologija i Paremiologija. Mosccow: Flinta.Nauka

Bascom, William. (1965). Four Functions of Folklore. Englewood Cliffts. NJ Pretice.

Danandjaja, James. (1984). Folklor Indonesia: Ilmu Gosip, Dongeng, dan Lain-Lain. Jakarta: Grafiti.

Danandjaja, James. (1988). "Pendekatan Folklor dalam Penelitian Bahan-bahan Tradisi Lisan". Dalam Pudentia (ed.). *Metodologi Kajian Sastra Lisan*. Jakarta Yayasan Obor Indonesia dan Yayasan Asosiasi Tradisi Lisan.

Dundes, Alan (ed). (1965). The Study of Folklore. New Jersey. Prentice-Hall, Inc.

Dundes, Alan. (2007). Meaning of Folklore . Utah: Utah State University.

Hutomo, Suripan Sadi. 1991. Mutiara yang Terlupakan; Pengantar Studi Sastra Lisan. Surabaya: Hiski Jatim.

Kartushina, E.A. (2003). Gendernye aspekty frazeologii v massovoj kommunikatsii. Izhevsk. Russia.

Kunin, A.V. (2005). Kurs frazeologii sovremennogo anglijskogo iazyka. Dubna. Russia.

Sibarani, Robert. 2013. Folklor Sebagai Media Dan Sumber Pendidikan: Sebuah Ancangan Kurikulum Dalam Pembentukan Karakter Siswa Berbasis Nilai Budaya Batak Toba in *Folklor Nusantara: Hakikat, Bantuk, dan Fungsi, /Suwardi Endraswara, ed.*

Sedyawati, Edi. 1995. "Kedudukan Tradisi Lisan dan Ilmu-Ilmu Sosial dan Budaya". Makalah Semiloka Tradisi Lisan Nusantara 1-21 Juni di Malang.

Sims, C. Martha. 2011. Living Folklore. Utah: Ohio State University.

Susov, I.P. (2006). Istoriya iazykoznaniia: [uchebnik] federalynoe agenstvo po obrazovaniiu, Tver. Russia.

Vasileva, G.M. (2001)Lingvokulturologicheskie aspekty russkoj neologii. SPb. Russia

AGRICULTURAL EXTENSION INSTITUTION IN THE COLONIAL PERIOD OF NETHERLANDS INDIES (A Study of History)

Effendi Wahyono[1], Nurul Huda[2]

[1]Indonesia Open University, Tangerang Selatan, Indonesia
[2]Indonesia Open University, Tangerang Selatan, Indonesia

email : effendi@ut.ac.id

Abstract

As an agricultural country, the role of agricultural extension institution in Indonesia is very important for agricultural development. The institution has existed since the colonial period. However, to what extend is the historical development and the main tasks of agricultural extension institutions in the colonial period in Indonesia? This study was intended to determine: (1) the birth history of agricultural extension institutions, and (2) the duties and functions of agricultural extension institutions.This study was conducted using the historical research method. There were four stages to be carried out in the study of history, those are heuristic, criticism, interpretation, and historiography. Sources used in this study was the colonial archives, articles, and news in contemporary magazines or newspapers.The findings indicated that a functional, agricultural extension institution was formed in 1911 under the name of Landbouw voolichtingsdienst or agricultural extension department under the Ministry of Agriculture (Departement van Landbouw). However, after going through various changes, the structure of the institution was newly formed in 1920, under the Agriculture Section, Department of Agriculture, Craft and Trade, based in Bogor. At the local level, agricultural extension institutions were divided into seven agricultural areas in Java and five agricultural areas outside Java, each headed by a senior instructor. After the formation of provinces in Java, agricultural extension authorities handed over to the provinces, in this case the agricultural extension services of provincial and local government institutions underneath. The main task of the department of agricultural extension was to develop indigenous agriculture.

Keywords: agricultural, extension institution, colonial period, Netherlands Indies

1. Introduction

The development of the agricultural sector was the dominant factor in the development of Indonesian society. Agricultural development interpreted as a conscious effort to transform traditional agriculture into a developed agriculture, which its productivity continuously increase (Sinar Tani, 2001). The success of agricultural development was inseparable from the role and function of extension activities. Experience in many countries showed agricultural extension workers have an important role in agricultural development. Agricultural extension was a spearheading which directly related to farmers. Is a government agricultural extension officers who are associated with farmers. It can be said that agricultural extension is a farmer partners that its duties and functions was to empower farmers in order to improve the quality of their life.

Agricultural extension institution in Indonesia has existed since the Dutch colonial dministration. The existence of agricultural extension institutions in Indonesia have ups and downs in a significant change, since the colonial period, the new order, until today. Changes and developments occur in accordance with the needs of government for agricultural development.

In some respects the institutional changes not evolve in a linear extension towards the better, but it happens setback. The result was a discontinuity development of agricultural extension programs. This happened because of the low understanding of the history of agricultural extension. Many policy makers did not know what has been done in the past so that they are unaware of the direction to be done to achieve perfection.

Viewed from the standpoint of the history of science approach, the institutional development of agricultural extension in Indonesia in the colonial period as a whole is not yet known. Data, facts, and detailed

information is still very little, of a general nature, not exhaustive, and are not comprehensive. Experts counseling even still disagree about when institutional agricultural extension during the period of the Dutch colonial was formed and what was their duties. Thus, the road map is not yet known about the history of institutional development of agricultural extension in Indonesia from the colonial era.

Information on the history of institutional development of agricultural extension in colonial period is very important in order to be used as input and lessons for stakeholders in improving and developing the institutional quality of agricultural extension today and in the future. To that end, a study of the historical development of agricultural extension in Indonesia is very important and urgent.

Related to these problems, this paper aims to provide an explanation and understanding the birth history of agricultural extension, and to find out the duties and functions of agricultural extension institutions.

2. Literature

The term extension is widely known and accepted by those working in organizations providing extension services (van den Ban and Hawkins, 1999), while Slamet (2003) defines agricultural extension as a non-formal educational services provided by the government or private counseling organizations to farmers and their families to enable them to help themselves in order to achieve a more prosperous life.

In the early days, education is seen as a transfer of technology from research to farmers. Now the role of extension is seen as the process of helping farmers to make their own decisions by adding an option for them and help them develop insights about the consequences of each of these options. Thus, the most important goal is to change the behavior of the farmer (van den Ban and Hawkins, 1999).

On the other hand, according to Law No. 16 of 2006 on the extension system for agriculture, livestock and fisheries, theextension institution is a government agency or community which has the duty and the function in organizing the extension.

Extension institution is essential that contribute to the success of agricultural extension activities in Indonesia. The extension institution has various levels of the

region, from the village level, village, district, provincial and national level. Each level support each other in order to achieve the target of agricultural development. In its development, agricultural extension institutions in Indonesia since the colonial period until now have ups and downs and are quite dynamic. In the new era government, extension institutionwas successful in achieving self-sufficiency in Indonesia. During this period, extension institution achieve a glory. However, this condition does not last long and then undergo changes that are less profitable.

In the history of its development, Indonesia's agricultural extension has been implemented since the Dutch colonial era. The historical record showed that agricultural extension in Indonesia started in the Dutch colonial era by establishing a department called Landbow Voorlichtings Dienst (LVD), which was established in 1910 (Sinar Tani, 2001; Harijati, 2005).

Meanwhile, Mardikanto stated that institutional agricultural extension was developed by the Dutch colonial administration under the Ministry of Agriculture (Departement van Landbouw) which was formed in 1905, while the implementation was carried out by officials of the district civil servant(Pangreh Praja or PP). Agricultural extension itself was formed in 1910 under the name Voorlichtings Dienst Landbouw. The new office function as an independent institution of agricultural extension regardless of the PP since it changed to Department of Agriculture Province in 1918 (Mardikanto, 2009: 169).

3. Research methods

This research was conducted using the historical method, which consists of four stages that must be done, those were heuristic, criticism, interpretation, and historiography. Heuristics is the process of collecting historical data source or form of documents/files, articles, news magazine or newspaper contemporary, and the like.

The historical sources were traced from the repertoire of archives stored in the National Archives (Arsip Nasional or ANRI), and contemporary newspapers or magazines that are stored in the National Library (Perpustakaan Nasional), and the Pustaka Library of the Ministry of Agriculture in Bogor. Beside the archives, there were also the news about agricultural extension from various magazines and newspapers in the colonial period between 1905 to 1940, which presented information about agricultural extension during the period of the Dutch colonial. The newspapers and magazines were *Soerabajasch Handelsblad, Bataviaasch Nieuwsblad, Het nieuws van den dag voor Nederlandsch Indie, De Sumatra Post, De Indische Courant, de Ingenieur, de Telegraaf, and Landbouw Landbouw Tijdschrijft Vereeniging Consulenten in Nedtherlansch Indie.*

The next stage was to conduct a critique of historical sources which have been found. This process was carried out to validate whether the documents found in a primary or secondary source, authentic or not in terms of its physical document and contents. This process was done by comparing the content of the information sources with its fellow contemporaneous historical sources including the category archives, news newspapers, and magazines. From the authentic documents and relevant sources were then carried an interpretation, which the result was then considered as the fourth stage, that was historiography or historical work.

4. Results and Discussion
4.1. The birth of agricultural extension institution

The birth of institutional agricultural extension can not be separated from the establishment of the Ministry of Agriculture (Departement *van Landbouw*). It was established on January 1, 1905, based on the second article of *Koloniaal Besluite* (decision colonial) No. 28, dated July 28, 1904 (*Almanac Regeerings voor Nederlandsch Indie*, 1905). Before 1905, agricultural affairs were handled by several departments. Agricultural affairs related to education and agricultural research was under the Department *Onderwijs, Eeredienst, en Nijverheid* (Ministry of Education, Religion, and Crafts), while the agricultural technical matters were under the Department van *Binnenlandsch Bestuur* (Ministry of Internal Affairs).

Department of Agriculture from the beginning was designed to increase the agricultural community. Since the Dutch government implemented liberal policies (1860), the government was only focusing on the export plantations which was salable in international market, such as sugar, tobacco, rubber, and coffee. The large plantation system have damaged the detainees indigenous communities, especially Java. In 30 years of liberal economic policies, the majority of the Dutch people as *van Kol*, looked at the sad impact for the Java community. In a meeting in the Dutch Parliament, *van Kol* expressed his concern on the lives of farmers in Java. In terms of land ownership, *van Kol* saw the land ownership in Java was still divided for. In addition, he also saw the impoverishment of the population, planting systems were still very primitive (not familiar with tillage), crop failures, and the workload was too heavy compulsory. Although not approved the establishment of the Ministry of Agriculture that he thought it will caused the waste, van Kol urged the government to immediately took action to improve the lives of indigenous people (*Soerabajasch Handelsblad*, August 3, 1905). On another occasion (in a meeting in the Dutch Parliament) *van Kol* deplored the attitude of the Dutch government that had neglected its obligations towards indigenous agriculture. *van Kol* also deplored botanical garden (Kebun Raya) Bogor which did not carry out their duties to develop indigenous agriculture. (Soerabajasch Handelsblad, March 23, 1904).

Respondingto the van Kol's attack, colonial minister said that the Bogor Botanical Gardens were not assigned to oversee the indigenous agriculture. In accordance with the existing regulations in 1868, the Garden was a scientific institution that was beneficial to the colony, for a botanical institute in the Netherlands, and a general knowledge institutions. In the discussion of the budget increase and reorganization Botanical though, there was no desire to hand over agricultural issues indigenous to the Botanical Gardens. (Soerabajasch Handelsblad, July 22, 1904).

Colonial Minister regretted van Kol who urgedto repair the fate of the indigenous population but against the establishment of the Department of Agriculture. In fact, one way to improve the lot of the natives was the establishment of an autonomous agency that handled indigenous agriculture. Agriculture was very

important because the native indigenous population depended on agriculture. Indigenous farmers need to get guidance and counseling from agricultural experts in order to obtain good results. Based on these considerations, the government felt the need to form the Department of Agriculture.

Agriculture department was formed by agreement between General Governor of the Dutch East Indies, Colonial Minister, and Professor Treub, the director of the Bogor Botanical Gardens. This agreement began on 1901, when the General Governor wrote to the Colonial Secretary of the department that proposed the establishment of department which specially addressed agricultural problems.In 1902 the Minister then asked Prof. Treub to arrange drafting laws by appealing to the directors and members of the Council of the Indies. The law draft prepared within one year, and in 1903 Treub who was in Netherlands sent the design to the Dutch East Indies to get last inputs. After that, in 1904 a law draft that has been getting input from various parties were then discussed in the Dutch Parliament.

As the architect of the Ministry of Agriculture, Prof. Treub then appointed as a director when the department was formed in January 1905. The new structure of the Department of Agriculture was still very simple, divided into four bureaus, namely technical matters (Technische zaken), public affairs (Aggemeene Zaken), finance (Comptabiliteit), and affairs archives. The focus of attention of this new department was still on pest problem that caused crop failure in some areas, and on the establishment of trial places or rice plant breeding. This can be seen from the circular signed by the Director of Agriculture in Department of Agriculture on December 11, 1905. In the circular Treub asked the heads of government in the area of Java and Madura to immediately report to the department if it found a disaster or harvest failure. A similar circular was delivered on September 19, 1906. Treub appealed to the heads of government of Java and Madura to submit regular reports about crop failure, loss of indigenous agriculture, as well as other things that caused agricultural losses of the people.

Agricultural extension started getting serious attention after the Ministry of Agriculture led by Dr. HJ Lovink, who was appointed as director on December 22, 1909. The attention to agricultural extension was greater after the Department of Agriculture developed his authority to handle the craft and trade, so that the department changed its name in 1912 to be the Department van Landbouw, Nijverheid, en Handel (Ministry of Agriculture, Handicrafts and Trade). With the increased authority, then in 1911, the Department formed agriculture extension agency. Because of its role in the establishment of counseling agencies, Koen called Lovink as the father of Agricultural Extension (Koen, 1926).

Historiography of extension institution which was firstly found in the study were article written by AJ Koen loaded in Vereeniging Tijdschrijft an Landbouw Landbouw Consulenten in Nedtherlansch Indie (1925-1926) volume 1. In his article titled "De landbouwvoorlichtingendeienst en de aanstande bertuursreorganisatie", Koen revealed the length (30 pages) on the subject of agricultural extension of the agency function work until the formation of the extension services and duties. Functionally, the agricultural extension institution has been functioning since 1911 with the nomenclature of the Agricultural Extension Office (*Landbouw voorlichtingsdienst*). The form of this new office was just a collection of agricultural expertsboth agricultural consultant or agricultural teacher who played their function as agricultural extension. Their position was under the head of the agricultural section of the Ministry of Agriculture, Crafts, and Trade.

Agricultural extension program run by agricultural consultants. In general, they were agricultural engineer graduated from Wageningan. This extension groups already existed before Department of Agriculture was formed. The group existed for his skills required by the private plantations began to invest when the Dutch government implemented a policy of liberalization and free markets. With this policy, many Europe and America plantation companies invested in the Dutch East Indies. Since not many know about the types of plants that can grow in the Dutch East Indies, they used the services of professional agricultural consultant.

When the agriculture department was formed in 1905, many agricultural consultants were recruited to occupy on the farm. Their duties included conducting research on indigenous agriculture and developing various pilot plants for indigenous agriculture. In a limited scale, they were also heavily involved in agricultural extension.

In 1911, the agricultural extension department was formed. The agricultural consultants were widely involved in agricultural extension programs. They were scholars agriculture graduated from Wegeningen, Netherlands. In general they did not know much about indigenous agriculture. When deployed to the field as an extension, they can not simply apply the extension method as usual in Europe. They did not even understand the language. Government officials on the one hand were still reluctant to relinquish responsibility for improving indigenous people's prosperity. The government officials who work earnestly as called for increasing the indigenous economy less like the presence of this agricultural consultants. However, on the other hand, the government can not do the job themselves so it was necessary to give up some work to a consultant who was an expert (De Indische Courant, March 21, 1935).

This made them frustrated. Therefore, at the beginning they worked as agricultural extension, they mostly acted as an expert adviser for local government, conduct research, and develop experimental gardens (*Bataviaasch Nieuwsblad*, July 27, 1941). Extension services were under the agricultural section, Ministry of Agriculture, Crafts and Commerce with headquarters in Bogor. According to the Law of Decentralization, 1903, the area was divided into regions, and the regions were further divided into sub-regions, called residency. In accordance with the decentralization policy, the agriculture section supervised agricultural areas in regions.

Although the agricultural extension service has been established since 1911, but the search through Regeerings Almanac Voor Netherlands Indies (RA) indicated that the structure of these institutions firstly emerged in RA 1920. In a circular letter of Director of the Agricultural Department, Crafts and Commerce, dated 5 December 1923 No. 11931 / D (as revised circulars previously, which was dated July 7, 1919) addressed to all heads of administration of the province in Java and Madura, the Governor of Aceh, East Sumatra, Celebes, and the resident Tapanulis, West Sumatra, Palembang and Manado, mentioned that the agricultural area consisted of two or more regions. At each region, established agricultural extension services. Agricultural extension services in the region led by a senior and experienced agricultural extension worker.

He run all tasks relating to agricultural extension assisted by youth counselors who were in every part of the region. The entire extension in each region and the area underneath must submit directly to the head of the agricultural section as far as pure agricultural affairs, while business outside of agriculture they were subject to the heads of regions including areas of work. Therefore, agricultural extension should cooperate with the local government.

In a letter from the Director of Agriculture, Industry and Commerce dated December 5, 1923 and addressed to all agricultural extension in the Dutch East Indies, on the reorganization of agricultural extension services mentioned that there were seven agricultural regions in Java and outside Java five.

Table 1. Agricultural regions in Java and outside Java

No.	Agriculture Area	Position
Java		
1	Priangan, Banten and Batavia	Bandung
2	Cirebon	Cirebon
3	Semarang, Rembang, and Pekalongan	Semarang
4	Yogakarta, Surakarta, Kedu and Banyumas	Yogyakarta
5	Madiun and Kediri	Kediri
6	Surabaya, Pasuruhan, and Madura	Surabaya
7	Besuki	Bondowoso
Outside Java		
1	East Coast of Sumatra, Aceh, Tapanuli	Medan
2	West Coast of Sumatra	Padang
3	Palembang	Muara enim
4	Celebes and surrounding	Makassar
5	Manado	Tondano

Each head instructor must submit a budget for its own territory. The budget addressed to the Ministry of Agriculture, Crafts and Trade, through the head of administration of the province, the governor, and the resident. Agricultural extension department staff members were appointed by the Ministry of Agriculture, Crafts and Trade. The movement of employee placement and agricultural extension services were determined based on the Department's decision after conferring with the administration of the province and agricultural extension entrusted with the task to lead the entire agricultural area (Circular Head of Agriculture dated December 18th, 1923 No. 1816).

Since its establishment in 1911 until 1925, Koen considered that there were three periods of development as seen on Table 2.

Table 2. Agricultural period of development

No.	Stage	Development period	Characteristics
1	First stage	Initial	marked by extension that was not systematic. Almost the entire energy was devoted to local jobs, particularly in extension and agricultural cooperatives whereas the guidelines relating to counseling unclear
2	Second stage	Test Phase	characterized by high spirit examines agricultural issues at the local level.
3	Third stage	Maturation work	marked by the publication of the regulations relating to the extension. Services such as counseling and education systematically granted in accordance with existing regulations. This reorganization required study and great attention from both agencies at the central and local jobs

Sumber.: Koen, 1926: 93-94

Table 3. The division of authority between central and local government

No.	Division	Authority
1	Justice	Center authority
2	Financial	held by the central authority except action to prevent the use of opium
3	Public Administration	only releasing authority on issues related to compulsory labor. Authority over the control of land retained by the center
4	Education and religion	delegated part of its authority to the regions in matters relating to indigenous school education class 2, the education of the people, normal schools, and trade schools. Technical services, education supply, and education equal to HIS remained fully managed by the center. Public health matter involving health care, and supervision of public health, as well as the hospital, handed over to the local authority.
5	Agriculture	authority largely taken over by local governments. Likewise, the agricultural extension. This office partly delegated to local authorities.
6	Public works	almost all of the authority delegated to the regions
7	Company	not much was released. Department of state cars assigned to the province. Likewise, the granting of concessions for the city tram, the sale of salt and mineral tenure over devolved to regional governments not much was released. Department of state cars assigned to the province. Likewise, the granting of concessions for the city tram, the sale of salt and mineral tenure over devolved to regional governments

Source.: (Koen, 1925: 86-87).

Dutch East Indies government in 1913 established the Commission on Government Reform, led by Simon de Graaf. The establishment of this commission was a follow up of the Law of Decentralization (Decentralisatie wet) 1903 and then with Decentralisatie besluite in 1905 as a basis for the establishment of self-governance at the regional level. This commission worked long enough as it tried to collect inputs from various parties, ranging from the native officials to the parliamentary level in the Netherlands. The result was the release of government reform legislation (Bestuurshervormingswet) in 1922. This law underlying the formation of provincial and district governments, municipalities and autonomous in the Dutch East Indies (Wahyono, 2009).

With the establishment of the autonomous regional government, then the part of the authority given to local governments. Thus, there was the authority delegated to the regions, and there were powers retained by the central government. The division of authority between central and local government can be explained as follows:

After the formation of provinces in Java (1926 West Java, East Java in 1929, and Central Java in 1930), the agricultural extension was the duty of the provincial. Therefore, in every province established agricultural extension services. Each province was divided into areas that were the same as residency and are under the leadership of agricultural extension Wageningen graduates. These areas were divided into districts and sub-regional level under adjunct agricultural extension workers who have been educated in Buitenzorg (now Bogor). For specific technical work such as land for trial, demonstration plants, nurseries and the like, there were supervisors who came from the plantation schools in Malang and Sukabumi. Below them, there was a head foreman and the foreman for a simple agricultural work activities (Bataviaasch Nieuwsblad, July 27, 1041).

In 1934, by Decree of the Governor General of the Dutch East Indies No. 26 dated January 13, section (afdeeling) agriculture and fisheries was transferred to the Ministry of economy (Department voor Economische zaken). The decision applied by one in January 1934 (Statute Voor Netherlands Indies 1934 No. 24). Thus, the Agricultural Extension Service was under agricultural afdeeling participate moved in the Department of Economics. The share of

agriculture in the new department changed its name to Dienst voor Landbouw and Visscherij (department of agriculture and fisheries). This section supervised four areas, namely Algemeen Proefstation voor den lanbouw (a common experimental farm), Landbouw voorlichtingsdienst, Landbouw Onderwijs en publicaties (agricultural education and publicity), tuinbouwkundige dienst (official horticulture), binnenvisscherij (inland fisheries), and zee visscherij (marine fisheries). The structure of agricultural extension services consisted of inspectors, agricultural consultants, ambtenar first-class agricultural science, agricultural science ambtenar, and ajunct-agricultural consultants (Regeerings almanac, 1937).

4.2.The task and Function of Agricultural Extension Institution

The function of agricultural extension services according to Koen can be seen from two sides. Firstly, agricultural extension services served the interests of the center of the Dutch government with regard to the responsibility of the state towards indigenous agriculture. Their function was to provide advice relating to agricultural matters both technically and economically to the government or state officials, carried out the task of the government for government action was required in matters of agriculture, agricultural research, and dissemination of information about agriculture. Secondly, agricultural extension services should be able to serve local interests, which arised directly from the needs of farmers. Agricultural Extension Service not only provided information relating to local agriculture, but also provided agricultural education. They supply local interests, satisfied the desires of residents and provided solutions for local problems in agriculture both technical and economic (Koen, 1926: 92).

In the annual reports of the agricultural extension 1925 (jaarverslag van den Dienst ladbouw voorlichtings over 1925) stated that the main tasks of agricultural extension includes fertilization experiment, counseling for indigenous farmers on a pilot plant, specialized research, extension field crops and aquaculture. Besides these services, it also need to deal with agricultural education, School of Agriculture at Buitenzorg, schools plantation in Sukabumi and Malang, and education efforts in Muara (Buitenzorg). Another task that must be done was the official trials of new land. This work includes land exploitation, processing, irrigation, land cultivation, seed exchange and so on. In addition to the agricultural community, education was also conducted through demonstration for agricultural experts and horticulturist, and aquaculture, as well as farms. In the 1925 annual report of the agricultural extension services also made improvements in the irrigation system Cihea plains, Bogor.

Residency of Borneo in the West and South and East Borneo , agricultural extension services also provided counseling to the smallholder rubber plant, while Flores section also had the duty to provide counseling to cotton farmers. For this task, each department put an official of agriculture, which was placed with the special task. All these tasks may not run without the support of adequate human resources.

Employees of department of agricultural extension in 1925 consisted of : 27 agricultural consultants, 6 employees agronomist , 2 employees for inland fisheries, 6 to employees horticulturist, 64 adjunct agricultural consultants and its aspirant, 29 supervisors in agriculture, 4 supervisors plantation and one paramedic for breeding fruit, so the corps of 139 employees, all under the head of the farm and was divided in 21 regions, each of 14 people in Java and Madura, and 7 people outside Java. (Het nieuws van den dag voor Nederlandsch Indie, dated May 7, 1927)

Figure 1. Extension Car
Source: The Netherlands Indie, vol. 4 no. 3, 1937

De Indische Courant 17 April 1941 reported that in 1930 counseling agencies in the area was already running. Nevertheless, education authorities had not been able to work well. Agricultural extension and assistant were very few in number when compared with the area must be served. To be able to establish contact with the masses whose numbers were large with working area that was too broad,

formed a liaison personnel. The assistant instructor formed the core of the village. They were chosen from among the farmer's most advanced and successful. They were given a course of agricultural teachers. Furthermore, they were prepared to provide counseling in the village a more demanding practice. Because it was not much demanded theory. Rice problems for example, not much discussed in the classroom but more widely discussed in the fields themselves. Thus, the extension not only gave information about how to grow rice, but also provide an example of how to grow rice, ranging from land management such as how to plow the soil, selecting seeds, fertilizing until harvest. Through this simple education, was born connecting many workers involved in counseling. The liaison was acting as extension workers at the village level and were expected to be leaders of agricultural organizations whose members approximately 20 people. They work together, sharing information related to agriculture, selling their products, establish a granary, and saving the seeds for their own purposes.

In 1930 there were more than 1000 types of rice seedlings. Kind of rice seeds were most popular when it was "rice profit" of China and "Srivimankoti" of Suriname. Giving the name "lucky paddy" rice seed as possible can provide many more benefits when compared to other types of rice. This second type of rice grain was very small. Rice was also called "rice jacket" because of its researchers in Suriname using coat. De Indische Courant reported that the use of new seeds activity was very high. In East Java in 1940 the implementation of new seedlings reached 140,000 hectares, meaning 13% of the entire wetland. Adoption of new seeds not only occured in rice, but also soybeans and potatoes. In the same Proponsi, planting new seeds for soybeans reached 100,000 hectares and 15,000 hectares of potato (De Indische Courant 17 April 1941).
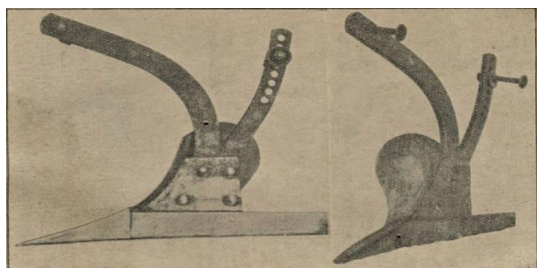

Figure 1. Left (Plow made in Germany), Right (Plow made in Kertorejo)

Source : Almanak Tani 1925-1926

Other activities undertaken extension services in addition to the development of plant breeding, was the introduction of green manure as fertilizer phosphate which was very expensive. Extension also taught farmers how to use agricultural equipment such as plows iron and pig tusks to pull rakes in arranging rows of rice plants. Furthermore, farmers were also taught how to seed storage in cans, application of fertilizers (ammonia sulfur substances) on rice and corn. No less important part was done by the department of education which was the construction of barns seeds and plant seeds store. Barn seeds should pay attention to ensuring the availability of seeds and seedlings available. In 1941 De Indische Courant noted that the vast barns seedlings reached about 6-7 hectares, and produced 200 quintals of seeds. The amount was only able to plant 400 hectares. Thus, there was still much needed granaries new seeds. To meet market needs, agricultural extension services providedthe general public, both individuals and corporations to build granaries seed. Institutions which produced seeds continue to grow because this activity was profitable for farmers.

Beyond the technical agriculture, agricultural extension services still have duties in the field of irrigation projects. Agricultural extension services should be able to provide advice in terms of both agriculture and the economy, the extend to which an irrigation project can bring benefits or not from the farmers (De Indische Courant 17 April 1941). To facilitate the farmers get seeds, fertilizers and agricultural implements such as plows (Figure 1), agricultural extension workers also helps farmers how to gain credit of Free Master farming facilities provided by the government (Stock, 1926).

5. Conclusion

The birth of institutional agricultural extension can not be separated from the establishment of the Ministry of Agriculture (Departement van Landbouw). The department was established on January 1, 1905, based on the second article Koloniaal Besluite (decision colonial) No. 28, dated July 28, 1904 (RA 1905). Before 1905 agricultural affairs were handled by several departments. Agricultural affairs related to education and agricultural research under the Ministry of Education, Religion, and Crafts, while the agricultural technical affairs

under the Ministry of the Internal Affairs. Institutional counseling was functionally formed in 1911. However, a new institutional structure was formed in 1920. The agricultural extension institutions were under Section Agriculture, Ministry of Agriculture, Crafts and Trade. At the local level, institutional counseling divided into agricultural areas. The number of agricultural areas in 1923 were 7agricultural areas in Java and 5 outside Java. After the formation of provinces in Java (ranging from West Java in 1926), it was submitted to the provincial agricultural extension. Since January 1934, the agricultural extension services was under the Ministry of Economy.

The principal tasks of agricultural extension services include the development of experimental garden, fertilizing, practiced the use of tools such as the use of plow farming, specific research, extension field of inland fisheries. In addition, this department has been tasked to handle agricultural education, School of Agriculture at Buitenzorg, schools plantation in Sukabumi and Malang, and education efforts in Muara (Buitenzorg). Beyond the technical matters of agriculture and aquaculture, agriculture extension services also provide counseling about the economy of farmers and farm credit utilization.

6. Acknowlegement

7. References

Archives
Besluiten
Jaarverslag departement van landbour, nijverheid, en handel, 1912, 1916, 1922, dan 1924
Jaarverslag landbouw voorlichtinsdienst tahun 1925
Missive departement van landbouw tahun 1905 dan 1906
Regeerings Almanak voor Nederlandsch Indie, 1905, 1920, 1926. dan 1937
Staatsblad voor Neherlandsch Indie tahun 1905, 1926, 1934

Books
Harijati S, dkk. (2005). *Dasar-dasar penyuluhan pertanian*. Buku Materi Pokok Universitas Terbuka. Jakarta
Koen, A.J. (1926). "De Landbouwvoorlichtingendients en de aanstande bestuursreorganisatie" dalam *Landbouw Tijdschrijft Vereeniging van Landbouw Consulenten in Nederlandsche Indie (1925-1926),* vol. 1
Mardikanto, T. (1993). *Penyuluhan Pembangunan Pertanian*. Sebelas Maret University Press. Surakarta.
Padmowiharjo, S. (2001). *Materi Pokok Psikologi Belajar Mengajar*. Jakarta : Penerbit Universitas Terbuka.
Slamet, M. (2003). *Pemberdayaan Masyarakat dalam Membentuk Pola Perilaku Manusia Pembangunan*. Bogor. IPB Press.
Stock, J.E. van der (1926) "Het werk van landbouwvoorlichtingdienst" dalam *Landbouw Tijdschrijft Vereeniging van Landbouw Consulenten in Nederlandsche Indie (1925-1926),* vol. 1
Suwandi, Achmad. (2001). *Administrasi penyuluhan Pertanian*. Buku Materi Pokok Universitas Terbuka. Jakarta
Sumardjo. (1999). "Transformasi Model Penyuluhan Pertanian Menuju Pengembangan Kemandirian Petani". Disertasi Doktor (tidak diterbitkan). Bogor : Program Pascasarjana IPB.
Sumintareja, (2000). *Penyuluhan Pertanian*. Departemen Pertanian, Jakarta.
_____. (1995). "Perspektif Ilmu Penyuluhan Pembangunan Menyongsong Era Tinggal Landas". Diedit oleh Aida V., Prabowo T., dan wahyudi R. Jakarta. Pustaka Pembangunan Swadaya Nusantara.
van den Ban, A.W., dan H.S. Hawkins. (1999). *Penyuluhan Pertanian*. Penerbit Kanisius. Yogyakarta.
Wahyono, E. (2009)."Desentralisasi Dan Otonomi Daerah Di Jawa Pada Masa Pemerintahan Hindia Belanda: Perubahan Pemerintahan Daerah Berdasarkan Bestuurshervormingswet 1922." Disertasi Doktor Fakulitas Ilmu Pengetahuan Budaya, Universitas Indonesia(tidak diterbitkan). Depok: FIB UI

Newspaper
Bataviaasch Nieuwsblad, 7 April 1904, , 12 Desember 1912, 27 Juli 1941
*De Indische Courant*21 Maret 1935, 17 April tahun 1941
De Sumatra Post, 8 Februari 1926,
Het nieuws van den dag voor Nederlandsch Indie, tanggal 23 Mei 1925, 7 Mei 1927, 6 Agustus 1926, 19 Oktober 1927, 5 Juli 1937, 12 Maret 1938
Soerabajasch Handelsblad, 14 November 1900, 23 Maret 1904, 6 Juli 1904, 11 Juli 1904, 18 Juli 1904, 22 Juli 1904, 28 Juli 1904, 3 Agustus 1904

Regulations
Undang-undang no. 16 tahun 2006 tentang Sistem penyuluhan pertanian, perikanan, dan kehutanan
Peraturan Pemerintah No. 154. tahun 2014 tentang Kelembagaan Penyuluhan Pertanian.

RICE-FIELD LAND ZONATION MODEL TO SUPPORT *SUBAK* SYSTEM SUSTAINABILITY IN BALI

I Putu Sriartha

Departement of Geography Education, Ganesha of University Education,
Singaraja – Indonesia

Email: psriartha@yahoo.com

Abstract

This study was aimed at analyzing the rate and factors that cause the rice-field conversion, and developing a rice-field zonation model to support the *subak* system sustainability. This study was conducted in three districts (Kuta , North Kuta, and Mengwi districts) that form the metropolitan zone of Badung District. This study used 69 *subaks* as units of analysis. The collection of secondary data was done using descriptive quantitative technique and spatial analysis aided by Geographic Information System software. The results showed that in the 2002 – 2009 period a conversion of 468.34 hectare rice-field land occurred at the average of 66.91 hectare per year at the rate of 6.71%. There were 7 factors that caused the occurrence of rice-field land conversion Based on the seven factors, a rice-field land zonation model was developed which consists of 3 types. First, type I zone (36 *subaks*), that forms an eternal/ exclusive zone whose rice-field land can be converted in a limited way. Second, type II zone (18 *subaks*), is a zone whose land can be converted in a very limited way with rigid condition. Third, type III zone (15 *subaks*) whosenrice-field land can be converted.

Keywords: rice-field land conversion, *subak* sustainability

1. Introduction

The existence of rice-field land becomes a sin qua non for agricultural development sustainability and realization of autonomy, resilience, and national food independence, however, in it there are inherently ecological and socio-cultural functions.This is confirmed by Sutawan (2005) and Susanto (2008) that rice-field land has multi-function roles as the stability of food supply, especially rice, controller of ecological balance, cultural heritage, and preservation of esthetic and spiritual-religious values.

The fact in the field shows that the existence of rice-field land is undergoing an increasingly heavier stress, in keeping with the economic development and an increasingly population growth. The stress against rice–field land is seen in the rice-field function conversion that continuously increases from year to year. The rapid rate of the rice-field conversion is especially found in Java and Bali islands. The data from Bali Province Central Bureau of Statistics (2013) shows that during the 2002-2013 period, there was a 4,151 ha rice-field conversion in Bali , which means that there was a 345.92 ha conversion each year. Even the result of JICA study (in Rai and Menaka Adnyana, 2011) shows a higher rate, that is, 1,000 ha each year. The

rapid rate of rice-field conversion in Bali has not only been pushed by urban development, but has also been caused by the local government policy that accelerates the development of tourism sector too much. If this tourism biased policy is still maintained, then it can be ascertained that rice-field land conversion in Bali region will become increasingly more massive and accelerative.

The increasingly dwindling rice-field will cause a wide effect on the safety of Bali environment and Balinese people. One of a serious threat that occurs is the less and less dominant existence of *subak* system that forms Bali's cultural heritage and since 2012 it has been decreed by UNESCO as World Cultural Heritage. The rice field land is one of the three components in the *Tri Hita Karana* (THK) philosophy that becomes the guideline of life in *subak*. If the rice-field land is nonexisting, then the other two components (social and cultural components) will not be able to survive. *subak* becomes the "spirit" of Balines culture and tourism in such a way that *subak* loss will destroy Balinese culture and tourism.The loss will threaten national culture and economy resilience, and the international community will lose one of the best cultural heritages in the world. Thus,

the problem of rapid rice field land conversion in Bali needs to be controlled immediately.

One of the policy solutions to reduce rice-field land conversion is by establishing a zonation system. The legal protection of the zonation system has been established in Act No. 41 of 2009 and Government Regulation No.1 of 2011.However, up to the present time the Local Governments, especially Local Government in Bali as not realized the act into a zonation system that regulates rice-field lands that can be converted and those that can. In addition, in the legal protection the establishment of sustainable rice-field land conversion has only used the land physical criteria, it has not yet adopted the dynamics of the developing external environment.This paper presents the results of a study with the discussion focus on the designing of *subak* rice-field zonation model from the internal and external dimentions.

Zonation (zoning) is a technique of dividing a region/ an area into some parts based on function, condition, and potentiality to enable an appropriate, effective and efficient management (Muta'Ali, 2013). In the mean time Barnet (1982) states that zonation is an endeavor to divide a region spatial environment into space use zones in which to every zone a space use control is established or to which a different rule is put into effect. In Act No 26 of 2007 concerning Space Structuring, it is stated that the zonation regulation is a controlling instrument that regulates terms and conditions for space use and the controlling measure that is organized for each assigned block/ zone. Thus, in the zonation there is a classification of space use in the form of zones, and a regulation for controlling space use in each zone.The zonation regulation contains what must, may and must not be done in the space use zone.The space use zonation theory was introduced for the first time by Von Thunen (1826, in Daldjoeni, 1992), that was called the concentric theory of agriculture land use. According to Von Thunen, agriculture land use forms a concentric pattern with the highest rate of advantage in accordance with the relative (distance) location from market town.

The process and the causes of land conversion is complex, involving many factors. Nasoetion and Winoto (in Iqbal and Sumaryanto, 2007) state that agricultural

land conversion is determined by two major factors, that is, institutional system developed by the government and the community, and institutional system that has developed naturally in the community, both as the consequence of development process or as the consequence of internal process inherent in the community in relation to use of land resource. Community institutional systems such as *subak* in Bali will also have an effect on rice-field land f conversion. Actually, *subak* that is based on THK has a great strength to protect against rice-field land conversion if it can be fully empowered by the government. In *subak* collective life tradition is effective in which collective decisions that are incorporated in *awig-awig* and *pararem* are very reliable instruments which, at the same time, are social capitals to protect rice-field land. An almost the same opinion is put forward by Susanto (1998) by explaining that the process of rice-field land conversion is caused by the effect of three important elements, that is, the government policy, non-agricultural industry type of investment and farmers' internal conditions. The government policy that is biased toward economic growth (industry, urban and tourism) brings about a broader consequence and increase the intensity in industrial development, which, in its turn, will cause rice-field land conversion. From the farmers' side, rice-field land conversion occurs because the farmers have undergone stress from the land ownership fragmentation and a very small profit margin produced by farm activities. Uncontrolled rice-field land conversion will threaten *subak* system sustainability.The source of *subak* sustainability lies in the *Tri Hita Karana* (THK) philosophy that becomes the guideline as well as the goal of *subak* life. THK philosophy is the way of life of Balinese that originates from Hinduism. *Tri* means three, *Hita* happiness/ welfare, and *Karana* cause. *Tri Hita Karana* means a road three to happiness/ welfare, that is, *parhyangan* (creating a harmonious relationship with God), *pawongan* (creating a harmonious relationship with human beings), and *palemahan* (creating a harmonious relationship with the nature). The *parhyangan* component is the manifestation of cultural wisdom, the *pawongan* component is the manifestation of social and economic wisdoms, and the *palemahan* component is the manifestation of technological and ecological wisdoms (Sriartha, 2014). The three components are

always in a fully reciprocal relationship, as shown in Figure 1. The Figure shows that the three components are in a perfect balance. Damage in one component causes damage in others. Sriartha (2014) finds out that *subak palemahan* componen, that is rice-field land and water become the critical major factor in *subak* sustainability. It means that to preserve *subak* the action has to start from the preservation of the existence of rice-field land and irrigation water (*palemahan* component).
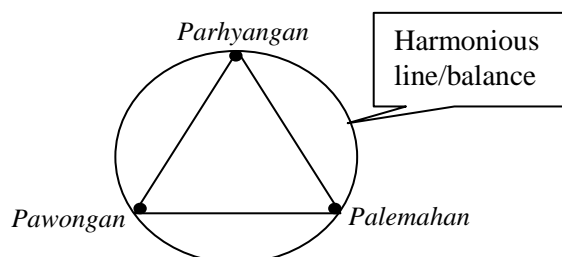

Figure 1. Reciprocal Relationship of the THK Components
Source : Windia (2002, 2006)

Based on the THK philosophy, *subak* is regarded as as something that is very unique, having strengths, among other things,as the most effective and ophisticated irrigation water management institution in the word (Ostrom, 1992; Ambler, 1992), preservation of ecosystem, unifying factor of social life, cultural support and food self-sufficiency (Lansing,1987; Karyono, et al.,2003; Baharsyah, 2005; Sutawan, 2005; Lorenzen, 2010; Lansing and Therese A. De vet, 2012). Then United Nation through UNESCO declared *subak* as world cultural heritage on June 29th, 2012 since it has extraordinary authentic values and universal values, which include strong social cohesive values (Windia and Wayan Alit Artha Wiguna, 2013).

2. Methods

This study used survey design that investigates symptoms, facts, empirical events about *subak* rice-field land conversion and factors that cause it which is then used as the basis for designing a rice land zonation model. The unit of analysis was *subak* region, and there were 69 units in number, the subjects were *subak* leaders/ *pekaseh* and the instrument was questionnaire and document record sheet. The locations of study were three districts, i.e., Kuta, North Kuta, and Mengwi Districts, that form the metropolitan region in Badung Regency. The region is basically a productive rice-field region, however, now is now undergoing secondary and tertiary economic transformations following the increase of tourism sector development.

The data about rice-field land conversion were taken from the 2002 and 2009 land use maps obtained from Directorate General of Highway Construction and Maintenance Office and Badung Regency Irrigation Office, IKONOS Image interpretation and field examination. The counting of the rice-field land area was done using Geographic Information System Software.The data about the factors that cause rice-field land conversion , that cover data about the distance from *subak* area to Kuta tourism center, road density and presence of economic and social facilities, population density, agricultural and nonagricultural land families and land productivity.The data about distance and road density were obtained from Land Use Map in 2009 counted using Geographic Information System Software. Data about socio-economic facilities, population, and agricultural and nonagricultural families were obtained from Badung Regency Central Bureau of Statistics (BPS).The data about the productivity was collected from *pekasehs/ subak* leaders.

Table1. Scoring Guidelines for *Subak* Rice-field Zonation

No.	Variable and Data Unit	Data Classification	Meaning	Score
1	Distance to tourism center (km)	< 10 km	Very close	3
		10 – 19 km	Close	2
		> 19 km	Very far	1
2	The presence of social facilities (weighed score)	< 29	A few	1
		29 – 51	Many	2
		> 51	Very many	3
3	The presence of economic facilities (weighed score)	< 270	A few	1
		270 – 482	Many	2
		> 482	Very many	3
4	Road Density (weighted road length, km/ha)	< 116	Not dense	1
		116 – 215	Dense	2
		> 215	Very dense	3
5	Population density (person /ha)	< 13	Not dense	1
		13 – 22	Dense	2
		> 22	Very dense	3
6	Percentage of nonagricultural families (%)	< 43	A few	1
		43 – 71	Many	2
		> 71	Very many	3
7	Rice –field Land Productivity (ton/ha)	< 5.5	Low	1
		5.5 – 6.7	High	2
		> 6.7	Very high	3

The highest ideal total score = 21, and the lowest ideal total score = 7
Source: The Writer's Analysis

To find out the area and rate of rice-field land convertion analysed from the 2002 and 2009 land use map using overlay technique.The analysis of factors that cause rice-field land conversion was done descriptive-quantitively.The development of the zonation model was based on the factors that influence rice-field land conversion using scoring technique.The scoring technique is presented in Table 1.

3. Result And Discussion
3.1. Area of and Factors that Cause Rice-field Land Conversion

The result of the analysis of land use in 2002 and 2009 using overlay technique showed that in the 2002-2009 period in the area of study there was a 468.34 hectare rice-field land conversion or 66.91 hectare each year at a rate of 6.71% of conversion. With the assumption that rice field land decrease rate is constant, then the presence of rice-field land will only last in 97 years from 2009. This means that rice-field land will vanish in 2106. Keeping in mind of the fact in the field that shows a rate of decrease in rice-field land area increases every year following economic development and population growth, then rice-field land will be predictably gone much earlier than 2106.

The process of land conversion is one of complex phenomenon, involving various stakeholders and is influenced by internal and external factors. In this study, the analysis of factors that cause rice-field land conversion was focused on 6 external factors and one internal factor (land productivity).

The geographical distance of the *subak* region was measured from Kuta tourism center. Considering that Kuta tourism region forms an area, then the determination of the center was established at a point that represents the region. The result of the study showed that the distance of the closest *subak* was 1 km and the farthest was 27.8 km. The largest rice-field conversion (405.06 ha) occurred in the *subak* region with less than 10 km from the tourism center, then it was followed by *subaks* with 10 – 19 km (74.95 ha) from the tourism center, and the smallest rice-field conversion (7.21 ha) occurred in the *subaks* located far from the tourism center (more than 19 km). This result explains that the closest *subak* region from the tourism center will cause a higher rate of rice-field land conversion than the one located far away from the tourism center. The distance from *subak* to the growth factor (tourism center, urban, economic center) is the geographical factor that determines accessibility of a region. Giyarsih (2009) finds out that a village with a high accessibility receives a greater effect from local resource competition and the decline of traditional socio-cultural values and activities than the one with less accessibility.

The result of analysis of socio-economic facilities showed that the *subak* region with a lot of socio-economic facilities undergoes the largest rice-field land conversion, while in the *subak* region with less socio-economic facilities has the smallest rice-field land conversion. However, between the social and economic facilities, it seems that the presence of the economic facilities has a greater effect on rice-field land conversion compared with the presence of social facilities.

The third factor of rice-field land conversion is road density. The result shows that a high rate of road density causes a high rate of rice-field land conversion, on the contrary, a low rate of road density is followed by a low rate of rice-field land conversion.This can be understood since road network has a role as a triggering factor of the increase in accessibility of an area. A high accessibility of an area will encourage people from outside to live and open various economic activities in the area. Thus, land use structure, economic structure and demography which used to be agriculturally dominant are now transformed into more heterogeneous (growth in non-agricultural population, increase in population density and socio-economic facilities). This heterogeneity then causes competition in land and water managed by *subak* with other stakeholders, disturbance in irrigation channels, cultural activities, and *subak* collective life. Muta'ali (2013) states that the transportation factor is one among the factors that trigger a region's development, formation of a region's structure, and determines the spatial orientation of the region development and its connectivity.

An increase in population density in an agricultural region will trigger agricultural land conversion as the implication of the growing need for new spaces as homes and places of activities. In the mean time, an increase in non-agricultural families

(nonagricultural) becomes an indicator of structural change of the region into non-agricultural (urban, industry or mass tourism). Hence, an increase in the population and the percentage of non-agricultural families will increase rice-field land conversion. This is supported by the result of the study that in a *subak* area with a high population growth there is a rice-field land conversion of 145.53 ha, while in the *subak* area with a low density there is only 41.41 hectare rice field land conversion. Similarly, a rice-field land conversion rate of 406.55 ha occurs in a *subak* area with a high percentage of non-agricultural families, while the *subak* area with a small nonagricultural families has only 25.98 ha rice-field land conversion.

Land productivity reflects the production margin produced in a rice-field land, in this study this was expressed in ton/hectare unit. The result showed that *subak* rice-field land with a high productivity undergoes a low land conversion (at the average of 4.33 ha), while *subak* rice-field land with a low productivity undergoes a high land conversion, that is, 14.98 ha. This means that land productivity factor undergoes a high average of rice-field land conversion. A low land productivity and a high production cost will make the farmers lose. This condition motivate them to change into other professions by selling their rice-field land.

3.2 Rice-field Land Zonation Model

In this study rice-field land zonation to support *subak* sustainability is meant as an effort to group *subak* rice-field lands into three zones. First, type 1 zone (*subak* region whose rice-field land function cannot be converted into nonagricultural use or as an eternal rice-field land). Second, type II zone (*subak* whose rice-field land fungtion can only be limited converted and conditional tight). Third, type II zone (*subak* region whose rice-field land function can be converted).

The legal protection for sustainable rice-field land zonation regulated in Act No 41 of 2009 concerning the establishment of and conversion of sustainable agricultural land function, Minister of Agriculture Regulation No 7 of 2012 concerning the zone technical guidelines, criteria and terms and conditions and sustainable food agricultural land reserves. However, up to the present time, not all of the local governments (including Badung Regency) have clarified the legal

protection in a local government regulation that regulates the protection of food agricultural land through a regulation of rice-field land zonation that is integrated into a region detailed spatial system plan.

One of the weaknesses of the regulation that protects food agricultural land above is the establishment of agricultural land objects protected from the land conversion which is only based on the land physical condition (productivity plant intensity, and irrigation characteristics), despite that fact that the land conversion process occur largely because of the presence of external pressures such as industrial development factors, urban, and tourism. Simatupang and Bambang Irawan (2002) state that the establishment of agricultural land protection zones from the process of land conversion based on the land physical condition is relatively easy to manipulate. Thus, the land conversion will occur without violating the regulation.

In this study sustainable rice-field land zonation was determined by using 7 variables that cause the occurrence of rice-field land conversion as explained above. The evaluation based on the seven variables was done using scoring technique (Table 1).Then by using Table 1 as the guideline the criteria of rice-field land zonation can be developed as shown in Table 2.

Table 2. *Subak* Rice-field Land Zonation Criteria

Score Classification	Meaning of Variable Effect on Rice-field Land Conversion	Zonation Type	Direction for Use
7 – 11	small	I	Made to become eternal rice-field land zone (cannot be converted)
12 – 16	Great	II	Can be converted with a strict limitation and rigid terms and conditions
17 - 21	Huge	III	Can be converted

Source: The Writer's Analysis, 2015

The result of the scoring of the seven variables was then related to the criteria in Table 2, and rice-field land zonation type obtained can be seen in Table 3.

Table 3. Types of Rice-field Land zonation in the Site of Study

Zonation Type	Number of Subaks (unit)	Percentage (%)
Type I	36	52.17
Type II	18	26.09
Type III	15	21.74
Total	69	100.0

Source: Analysis of Research Data, 2015

Based on the result of study in Table 3, a spatial model of rice-field land zonation types can be developed as shown in Figure 2. In that model, it appears that spatial zone type III concentrates in the south part close to Kuta tourism center and Denpasar City. The pressure on the existence of subak rice-field land in this region is very great as the consequence of an increase in land need for houses and business places in the industrial and service sector triggered by the effect of the city and tourism development. As the consequence, the rice-fields become fragmented or dispersed like "frog jumping" (leapfrog fragmentation) amongst the settlement. The most serious disturbance against the agricultural activities occur in type III zone , in which many irrigation networks are broken by buildings, irrigation water is polluted by garbage and fluid waste from industries, lack of workers, sky rocketing price of land that causes a rapid sporadic and accelerative collective land conversion. Such rice-field land condition makes it difficult to preserve the land, that the direction above in which rice-fields in type III zone can be converted, thus, the direction is rice-fields in type III zone can be converted, but still it should be based on RTRW regulation, permits, and disincentives for people who are engaged in the action of rice-field land function conversion.

Type II zone dominates in the central part with a better condition than type III zone, however, threat against the preservation is big enough since in this region there are regional and national scale growth centers such as the national highway corridor that connects Java-Denpasar City-Lombok, Mangupura City Center, Beringkit Regional Terminal Center, Bali Animal Market, Direction for the use of subak rice-field land use in this region is that it can only be converted in a limited way with very rigid terms and conditions.

While type III zone clusters in the north part, in which the subak rice-field lands are still compact and the disturbance of function conversion is not as serious as in type III

and type II zones. From the perspective of spatial structuring plan, type I zone has to be oriented towards eternal subak region whose rice-field lands cannot be converted except for strategic reasons such as natural disaster, nation's territorial security. When there is a subak member who wants to build a house in his rice-field land since the settlement in the family is already full. Then the government has to be able to seek a substitute in another location that is comparable with the rice-field land that will be used as a settlement. The regulation of zonation in type 1 zone has to be made effective by the government consistently, rigidly, and fairly by involving the community participation, in this case, subak organization. In addition, the government should make agriculture and subak empowerment based policies effective, among other things, the capacity building of subak institution in controlling rice field land conversion, aids in production facilities which are given free of charge, rice-field land tax exemption, agriculture based economic development, financial aids in the form of block grant, and price and market guarantee for agricultural produces.

4. Conclusion And Suggestion
During the 2002-2009 period, the area of subak rice-field land in the site of study underwent a 468.34 ha land conversion at the average of 66.91 ha each year at the rate of 6.71%. The factors that cause the rice-field land conversion are: (1) distance from the subak region to tourism center,(2) road density, (3) availability of social facilities, (4) availability of economic facilities, (5) population density, (6) percentage of non-agricultural families and (7) land productivity. Based on the seven factors that cause rice-field land conversion, three types of rice-field land zonation were produced. First, Type I zone (36 subaks), is an eternal /exclusive rice-field land zone. Second, type II zone (18 subaks), is the zone whose rice-field land can be converted in a very limited way with rigid terms and conditions. Third, type III zone (15 subaks), is the zone whose rice-field land can be converted. Type I zone concentrates in the north part and is located far from Kuta tourism center and Denpasar City. Type II zone is dominantly located in the central part, while all of type III zone is located in the south close to Kuta tourism center and Denpasar City.

5. Reference

Ambler, John S. (1992). Dinamika Irigasi Petani : Kerangka dan Prinsip-Prinsip Kelembagaan, In: *John S. Ambler (Ed), Irigasi di Indonesia : Dinamika Kelembagaan Petani*. LP3ES, Jakarta.

Baharsyah, Syarifudin (2005). Local Wisdom As An Important Social Capital In Rice-Based Agriculture Development, Dalam : *Sumarno, Suparyono, Achmad M. Pagi, Made Oka Adnyana (Eds), Rice Industry, Culture, and Environment, Book 1, Proceedings of the International Rice Conference, September 12-14, 2005, Tabanan Bali*. Indonesian Agency for Agricultural Research and Development in Cooperation with International Rice Research Institute.

Barnet, Jonathan (1982). *Introduction to Urban Design*. New York. Harper and Row Publishers.

Biro Pusat Statistik Propinsi Bali. 2013. *Bali Dalam Angka*. Denpasar.

Daldjoeni, N. (1992). *Geografi Baru, Organisasi Keruangan Dalam Teori dan Praktek*. Alumni. Bandung.

Giyarsih, Sri Rum (2009). Transformasi Wilayah Di Koridor Yogyakarta-Surakarta. *Disertasi (Tidak Diterbitkan)*. Universitas Gadjah Mada. Yogyakarta.

Iqbal, Muhammad dan Sumaryanto (2007). Startegi Pengendalian Alih Fungsi Lahan pertanian Bertumpu Pada Partisipasi Masyarakat. *Jurnal Analisis Kebijakan pertanian (Agricultural Policy Analysis) Volume 5 Nomor 2, Juni 2007: 167-182.*

Simatupang P. Dan Bambang Irawan (2002). Pengendalian Konversi Lahan pertanian : Tinjauan Ulang Kebijakan Lahan Pertanian Abadi. *Makalah*, Seminar Nasional Multifungsi dan Konversi lahan Pertanian, 25 Oktober 2002. Badan Penelitian dan Pengembangan Pertanian. Departemen Pertanian. Jakarta.

Kasryno, Faisal, Effendi Pasandaran, dan Achmad M. Fagi (2003). Local Wisdom of the *Subak* System In Bali : A Model of Just and Sustainable Rural Development, *Dalam : Faisal Kasryno, Effendi Pasandaran, dan Achmad M. Fagi (Penyunting), Subak dan Kerta Masa, Kearifan Lokal Mendukung Pertanian Berkelanjutan*. Yayasan Padi Indonesia (YAPADI). Jakarta.

Lansing, J. Stephen (1987). Balinese Water Temples and the Management of Irrigation. *American Antropologist No. 89.*

Lansing, J. Stephen and Therese A.de Vet (2012). The Functional Role of Balinese Water Temples : A Response to Critics. *Hum Ecol (2012) 40: 453-467, DOI 10.1007/s10745-012-9469-4, © Springer Science+Business Media, LLC 2012.* Diakses tanggal 16 Oktober 2013.

Lorenzen, Rachel P. And Stephan Lorenzen (2010). Changing Realities – Perspectives on Balinese Rice Cultivation. *Hum Ecol (2011) 39: 29-42, DOI 10.1007/s10745-010-9345-z, © Springer Science+Business Media, LLC 2010*. Diakses tanggal 16 Oktober 2013.

Muta'ali Lutfi (2013). *Pengembangan Wilayah Perdesaan (Perspektif Keruangan).* Badan Penerbit Fakultas Geografi (BPFG). Yogyakarta.

Ostrom, E. (1992). *Crafting Institutions Self-Governing Irrigation Systems*. Institut for Contemporary Studies. San Francisco.

Rai, Nyoman dan Gede Menaka Adnyana (2011). *Persaingan Pemanfaatan Lahan dan Air, Perspektif Keberlanjuta Pertanian dan Kelestarian Lingkungan.* Udayana University Press. Denpasar.

Susanto, S. (1988). Keberlanjutan Aset Lahan Sawah Beririgasi. Bagian II : Penataan Status Lahan. *Visi Irigasi, Sumberdaya Air,Lahan, dan Pembangunan, September 1988.* PSI-SDALP Universitas Andalas. Padang.

Susanto, S. (2008). Strategi Pengendalian Alih Fungsi Lahan sawah Beririgasi : Studi Kasus Kabupaten Banyumas. *Prosiding* Seminar Nasional Teknik Pertanian 2008, 18 November 2008. UGM. Yogyakarta.

Sutawan, Nyoman (2005). *Subak* Menghadapi Tantangan Globalisasi, Perlu Upaya Pelestarian dan Pemberdayaan Secara Lebih Serius. *Dalam : I Gede Pitana dan I Gede Setiawan AP. (Eds), Revitalisasi Subak Dalam Memasuki Era Globalisasi*. ANDI OFFSET, Yogyakarta.

Windia, Wayan dan Wayan Alit Artha Wiguna (2013). *Subak Warisan Budaya Dunia*. Udayana University Press. Denpasar.

Impulse Buying Behavior In Counterfeit Luxury Brands Product: Evidence From Indonesia

Musnaini[1], Wiwik Handayani[2,] Muslich Anshori, And Sri Wahyuni Astuti[4]

Doctorate Program Of Economic Science, Faculty Of Economics And Business, Universitas Of Airlangga, Surabaya, Indonesia.

ABSTARCT

This study intends to understanding of the impact of Value Consciousness (VC) and Product Involvement (PI) on Indonesian consumer's impulse buying behavior in counterfeit luxury brands product contexts. This study also attempts to show link between that Value Consciousness and impulse buying may be serve a product involvement as moderator and mediating variabel on luxury brands product counterfeiting in the context.

The results finding and show that value consciousness tendency and impulse buying behaviour with product involvement are from three experiments demonstrate that high and low Value Consciousness holds key insights into understanding consumers' impulse buying for luxury brand counterfeit product. Product involvement as moderates has positive effects on relationship of value consciousness and impulse buying of luxury brand counterfeit product. Product involvement as mediator did'nt have influence on VC and impulse buying counterfeit luxury brand product (LV and Hermes handbags). Evidence of product involvement as a mediator does not exist of VC and Impulse buying.

Research limitations/implications – This research only investigates two brand of one product category (handbags) in the context of non-deceptive counterfeiting. The article, therefore, contributes to the literature regarding the demand for counterfeits as well as the value consciousness, and consumers' impulse buying behavior in Indonesia.

Keyword: Value Consciousness, Product Involvement, Impulse Buying, Luxury Brand Counterfeit Products

1. INTRODUCTION

Consumer behaviour on luxury brand counterfeit products have been conducted problem. Counterfeit luxury brand products cause a considerable amount of damage in the global market trading of original brand, local product, increasing of the brand image and then tax devaluation (Turune and Pirjo,.2011; Chaudhry, And Walsh,.1996; Chapa, And Maldonado,.2003). In the realted to consumers making decision to select one choice of something product, sometimes consumers do not decide rationally when they want to do some buying of product (Chavosh, Halimi, and Namdar,.2011). How if sometime consumers unplanning to buying branded product counterfeit?Therefore impulse buying may happen. Based on Chavosh, et al,. (2011) Impulse purchasing is a fast pace decision and there is a short time between observing the product and buying it. impulse purchasing does not engage reflection and impulse buying takes place without great amount of evaluation.

In fact, the idea of impulse buying in marketing was first introduced by Clover, V. T. (1950), and sased on research by Chavosh, et al,. (2011) was regarded the product characteristics, based on the outcomes, there is a significant relationship between product characteristics and the consumer's impulse buying behaviour.

This study also affirm most of the previous study's results by Chavosh, et al,. (2011), to exploring consumers motivation to a deceision making of impulse buying.

On this study Impulse buying defined is as an unplanned purchasing of luxury brand product counterfeit. According some experiment studies to declared that value conciousness can make customers to be impulsive buying some branded product counterfeit. Sense of an unexpected and unplanned intention to take action. Involved in the buying procedure, this study intends to evaluate the contribution of value consciousness and product involvement on consumers' impulse purchasing of luxury brand counterfeit (Bian and Mountinho,.2011).

1. Theory development And Hypotheses
1.1 Counterfeits defined

Norum and Cuno,.(2011) defined counterfeit is a activities has the production, distributions and consumption have increasing depend on the demand of consusmers. Brand Counterfeits product are reproductions of a trademarked brand,

which are closely similar or identical to original product articles on of packaging, labelling and trademarks (Phau and Teah,.2009).

Product counterfeit is define counterfeits as products bearing a trademark that is identical to a trademark registered to another product (Bian and Moutinho,.2011). Counterfeits cannot exist without high brand value products, because the product attributes are copied from the original product, carrying only a few distinctive features (Eisend and Schuchert-Guller,.2006). From the consumer perspective, there exist two types of counterfeiting; deceptive and non-deceptive counterfeiting (Wilcox et al,.2009). The former represents a situation aspect in which a consumer is not aware of purchasing a counterfeit luxury brand product (Bloch, Bush, and Campbell. 1993).

1.2 Impulse Buying

Impulse buying behaviuor as an immediate purchase with no prior intend or objective to buy the product. Based on Beatty, S. E. and Ferrell M. E. (1998), the conceptual impulse buying of Stern, H. (1962) ,and based developtment study of Chavosh, et al,. (2011) sugest an category of impulse buying including: pure, reminder,suggestion, and planned impulse buying.

Thus the result study sugested significans of individual behaviour, and product are involved in the buying procedure, (as independent, and mediating variable) on consumers' impulse purchasing behaviour. Nine factors are major influences in impulse buying: low price, marginal need for item, mass distribution, self service, mass advertising, prominent store display, short product live, small size or lifgt weight, ease of store. Stern, H (1982). Impulsive buying tendency are product involvement are good predictors of impulse purchase (Chen, T., 2008).

1.3   The MOA framework

Frame work of the MOA model was first proposed by MacInnis and Jaworski,.(1989;1991) within the context of information processing. The model suggests that motivation, opportunity, and ability (MOA), are antecedents of consumer behaviour. A decision-making process and their decisions are mainly influenced by three factors: their motivation, opportunity and ability. Both Ability and Opportunity as

moderators of the impulse toward a particular Behavior triggered by Motivation.

The model of MOA framework who have emphasized the motivational component to performance of individual behaviour. Opportunity has and also often been added into this framework to capture all those exogenous factors that preventconsumers of situational or constraints. The model Motivation, opportunity, and ability are related constructs on the link between motivation and intention (Hughes,.2007). In this paper, the origins and prior uses of the AMO framework are presented to related are identified, and proposed of consumers intention to luxury brand counterfiet products.

2.1.1 Motivation- Value Consciousness

Value consciousness is defined as a concern for paying lower prices, subject to some quality of product constraint. When there are price is lower , concumers are more intersting to buying of product or. consumers are more likely to engage in illicit purchase behaviours when there are price pressures. (Zhan and He,.2011). In such Values Consiousness has been obseerved on consumers behaviour toward luxury brand ounterfeit products that may be of lower quality but saving money more than to genuine products. Consumer who is value-conscious high they have shown that when a counterfeit product has a distinct price advantage over the genuine product, consumers will select the counterfeit (Zhan and He,.2011).
By definition, value-conscious consumers are more sensitive to the benefit/cost ratio and, therefore, tend to exert extra effort to seek products that offer the best values of psychological benefits (Zhan and He,2011). Such as luxury brands are assumed to have the highest ratios of price to quality in the market and has benefit such status simbolic, wealth, prestigiuse, high social status, social power, self identity, personality is the benefits that luxury barand from the consumption experience options (Han *et al,.2010;* Wilcox et al,.2009).

2.1.2 Mediation and moderator effects- Product involvement

Defining of product involvement is as a consumer's enduring perceptions of the importance of the product category based on the consumer's inherent needs, values, and interests. Product involvement has been

extensively used as an explanatory variable in consumer behavior (Bian and Mountinho,.2011). This study to explaining of the product involvement has been influences all phases in the decision process on behaviour purchanig of consumers toward luxury brand product counterfeit. Product involvement used as an explaination on purchase of luxury brand counterfeit and related to dominant influential in explaining consumers' behaviour of purchase on counterfeit luxury brand product (Nia and Zaichkowsky,.2000). On result by Bian and Mountinho,.2011, was explained about the marketers of BPs

should be aware that consumers purchase both CBPs and BPs under high product involvement situation, but for different usage situations.

3. Conceptual Framework

The framework model on these study is develops begins with investigating of motivation variabel on the context to explaining how value consciousness variabel may directly influence with product involvement as mediation and moderator on impulse buying luxury brand counterfeit products. The framework conceptual on the figure 1:
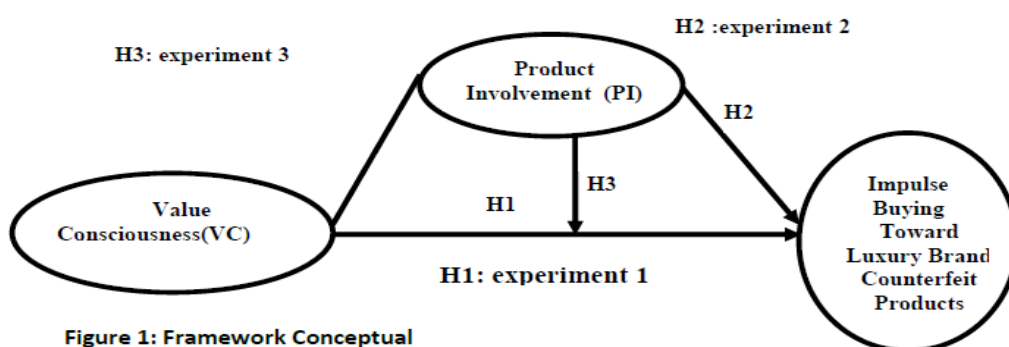

Figure 1: Framework Conceptual

4. Methodology

There are three experiments to assess two main hypotheses and one meadiating effect both value Consciousness and Impulse buying of luxury brand counterfeit : (1) High level- value Consciousness are more likely to buying intention highly and (2) High level impluse buying will indicate the same level of buying behaviour luxury brand counterfeit product. In addition, this research also investigates if the observed effects are luxury brand counterfeit specific by contrasting the results with those for legitimate comparable mediating and moderating effect on impulse buying of luxury brand products counterfeit.

The using some brands as stimuli, Experiment 1 explores the interaction effects of Value Consciousness and impulse buying of luxury brand handbags counterfeit. In Experiment 2, we replicate the interaction effects of impulse buying on buying behaviour is consideration likelihood an upstream variable mediating of the decision-making process of luxury brand handbag counterfeit. Experiment 3 is designed to investigate the potential moderating effects on impulsive buying behaviour for luxury brand handbag counterfeit and to rule out the possibility of product involvement being a opportunity affect.

5. Research Findings and Discussions

These findings provide empirical support to the theoretical MOA models and impulse purching theory behind this research.The result of research invetigations on the three Experiments provide the first evidence than value consciousness states affect luxury brand counterfeit product consumption. Specially, the relationship between VC and impule buying behaviour with moderated and mediator by product involement (PI). This research suggests that individuals impulse buying a state of unplanning are more with high value consiousness of luxury brand counterfeit handbags.

The results are consistent of whether VC as ratio of product characteristic, and low price was induced on Experiments 1, 2 and 3. Specially the view of the result experiment 3, further reveals that the interaction effect of VC and buying intentions with moderating variabel product involvement.

Methode
Brand selection

This research investigates counterfeit luxury brand is a branded popularity and long-established brand, and thus popular to the target respondents, then this brand are

available for use as stimuli which is likely to induce a wide range of knowledge level across individuals. The first pre-tested using 60 undergraduate students and identified a number of typical highly Value Consciousness (VC) and lower Value Consciousness branded products that were the most relevant to the respondents. Two stage pre-tested several brands and selected two luxury brands of handbags as stimuli: Hermes and LV.

These brands were chosen because the participan are well-known, long-established and, thus, familiar to the target respondents. Importantly, in their product portofolios these brands have both highly Product Involvement (PI) and less PI on branded products, which were used as stimuli in this study: Hermes VS LV bags (highly Value Consciousness) (low Value Consciousness) and (highly Product Involvement) (low Product Involvement). The result of brand selection descritive analysis on table 1 :

Table 1: Brands Selection

BRAND	HANDBAGS	✓
Coach		11 %
Louis Vuitton		26%
Chanel		14%
Gucci		15 %
Prada		12%%
Hermes		22%
60 Participants		100%

http://www.gudangtasbranded.com/w/1/266/7506/7506/1/show.htm#x
http://wolipop.detik.com/read/2012/07/09/153411/1961149/233/10-merek-tas-mewah-yang-paling-dicari-di-dunia

On table 1, the best choice handbags luxury brand of 26% participans is Louis Vuitton and then 22% 0f 60 participants is Hermes handbags brand. In experiment 2 and 3, LV and Hermes as stimulan luxury brand product with value concsiousness.

Participants and design
The participants comprised 60 undergraduate students at faculty of economic and business Airlangga University are voluntarily in this reasearch (aged between 18 and 25). They are 38 females and 22 males were randomly assigned to conditions in a 2 (LV = value consciousness: high, low) x 2 (Hermes = value consciousness: high, low) between-subject design.

Procedure

Participants first completed a recall task designed to manipulate value consciousness. They were then given instructions for an ostensibly unrelated study interested in examining individuals' buying experience for Luxury brand counterfeit products. Because participants might have different level of product involvement for product features (e.g., size, design, or colour etc), and different memorable of perceive value consciousness (e.g,. lower pricing, glamour, enjoying etc). Which would consequently affect their impulse buying. This study used simple manipulations that determine whether the value consciousness. Information about the products description decided to use as LV and Hermes hangbags to related in product features higly or less VC of selected brands. Thus participants were then asked to answer questions concerning their perceived level of VC and perceived level of involement of luxury brand handbags counterfeit stimuli and impulse buying in table 1, show that respondent who were asked willingness to brand unplaning

buying of brand type and product categories in the luxury brand counterfeit product .

EXPERIMENT 1

Experiment 1, tests the hypothesis that individuals have greater impulse buying to Value

Consciousness of luxury brand handbags counterfeit, when in a state of high VC and low VC. Show no difference influences in impulsive buying for two handbags luxury brand counterfeit. Almost of participant impulse buying for handbags luxury brand counterfeit no matter of value consciousness (see figure 2 and table 2).

Result experiment 1, descriptive analysis is show that individuals have greater impulse buying to Value Consciousness of luxury brand handbags LV counterfeit with price is better lower than Hermes handbags (see table 2). When in a state of high VC and low VC show no difference influences in impulsive buying for handbags luxury brand counterfeit. Almost of participant impulse buying for handbags luxury brand counterfeit no matter of value consciousness (see: figure 2).

Tabel 2: The value consciousness

BRAND	handbags	price	Functional
Louis Vuitton		Rp. 350,000	Adventures Glamour Enjoying
Hermes		Rp. 375,000	Adventures Glamour Enjoying

Resource: (primer data,2015):
http://www.gudangtasbranded.com/w/1/266/7506/7506/1/show.htm#x

The result experimen 2

Participants first completed a recall task designed to manipulate value consciousness. They were then given instructions for an ostensibly unrelated study interested in examining individuals' buying experience for Luxury brand counterfeit products. Because participants might have different level of product involvement for product features (e.g., size, design, or colour, glamour, etc), and different memorable of perceive value consciousness

of price ratio (e.g,. lower pricing). Which would consequently affect their impulse buying. This study used simple manipulations that determine whether the value consciousness. Information about the products description decided to use as LV and Hermes hangbags to related in product features higly or less VC of selected brands. Thus participants were then asked to answer questions concerning their perceived level of VC and perceived level of involement of luxury brand handbags

counterfeit stimuli and impulse buying in table 1, show that respondent who were asked willingness to brand unplaning buying of brand type and product categories in the luxury brand counterfeit product .

On the experiment 2, tests the Anova analysis that individuals have greater impulse buying to Value Consciousness of luxury brand handbags counterfeit, when in a state of high VC and low VC with mediator PI is show has difference influences in

impulsive ibuying for handbags luxury brand counterfeit. Almost of participant had impulse buying behaviour of handbags luxury brand counterfeit highly of value consciousness, when they have low PI than VC lower (see figure 3).

The result of experiment 2, product involvemet lower as mediating variable negative effect of the Value Conciousness and impulse buying of handbags luxury brand counterfeit.

Experiment 1. Relationship VC and Impulse Buying

figure 2:
Experiment 1 VC and Impulse Buying of Handbags Luxury brand Counterfeit

Figure 3:
Experiment 2: Relationship VC with mediating PI and Impulsive buying of Handbags Luxury brand Counterfeit
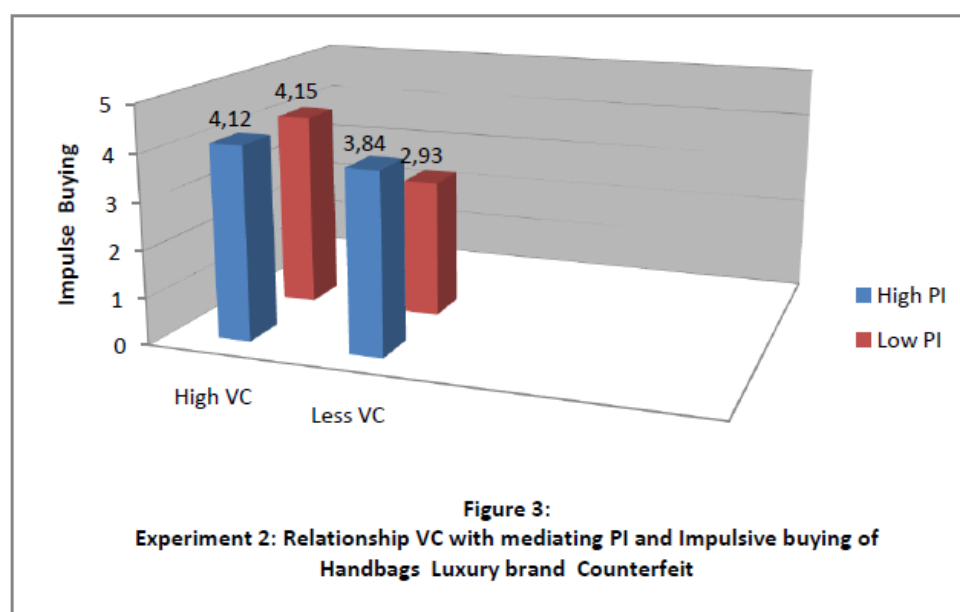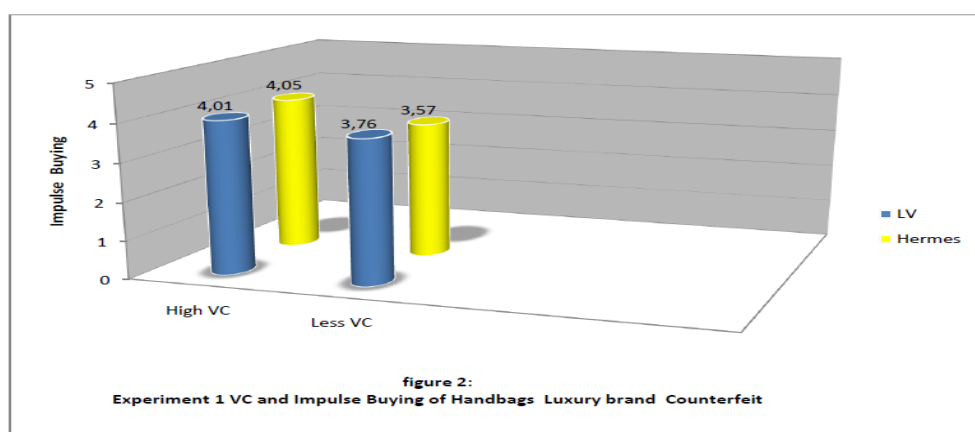
The Mediating Role of Product Involvement

To examine the mediating effect of VC and PI toward IB handbags counterfeit, this study also divides the respondents into 2 groups based on two levels VC perception and two levels of PI is opportunities of each MOA element. The no differences among means for PI among these 2 groups are

evaluated. The results (Figure 3) indicate that consumers with higher levels of PI tend to have higher influence of impulsive buying of High VC (high VC- PI-low), low level VC is low motivation- and high PI influence impulse buying with regard to participation in the evluated VC and PI (see figure 3). H2 is thus not supported.

The Moderating Role of Product Involvement

The result experiment 3, product Involvement as moderating variabel both VC and Impulse Buying. PI has positive effect to weakness relationship VC toward impulse buying handbags luxury brand counterfeit (see: Figure 4). PI-High positive to vc (high) on impulse buying handbags (LV and Hermes) luxury brand counterfeit. Participant with PI-highly has been low VC. Product involvement effect has sugest to weakness of relationship of high VC and impulsive buying behaviour on luxury brand counterfeit product (see: figure 4)

Figure 4
Experiment 3: Moderating PI on Relationship VC and Impulse Buying Handbags Luxury Brand Counterfeit
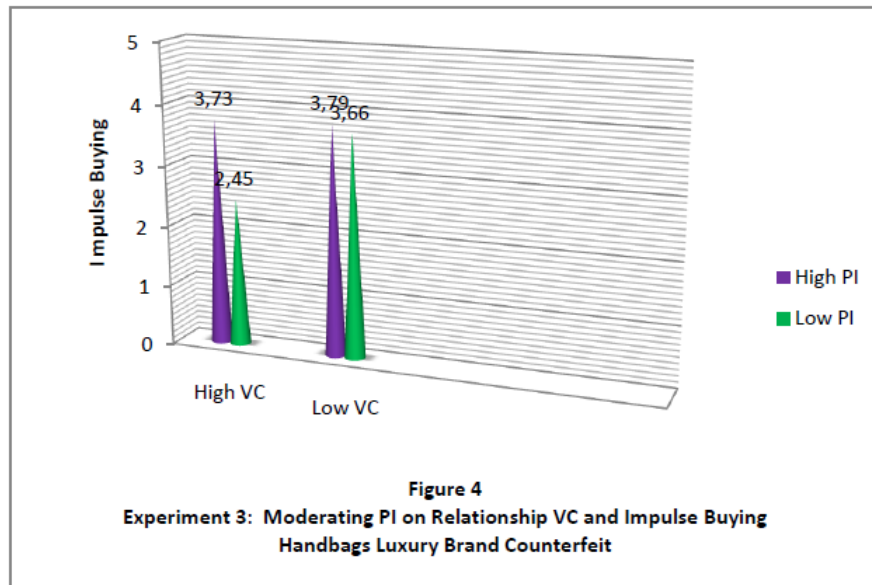
Implications and limitations

This research has important implications for the methods that luxury brand marketers might to reduce the impulsive purchase for luxury brand counterfeit product, especially handbags. Every where we funding are handbags brand of LV and Hermes on Indonesia market (traditional or moderen market), and the brand is very popular branded. This research reveals that VC and impulsive buying direcly has been positive relationsive on luxury brand counterfeit activity. But PI mediating of VC and impulse are more prone no different perception on highly VC (M=4) everybody high VC need (IP no significant to High VC).

Based on MOA, Hughes, J. (2007) also suggest theory motivation, opportunity and ability the basis of this understanding consumer behaviour. The influence of situational factors on consumer behaviours has been raised a number of times in this review. Related this research suggests that consumers should consider how the luxury brand VC, and more PI is very importance, and also have meaning influences to impulse buying of luxury brand counterfeit handbgas or other products. These study is suggest impact of value consciousnees, and product involvement on impulsive buying.

There are can be to changing behaviour impulsive buying on short decision making consumer's toward luxury brand counterfeit product. This is even more important as energy behaviour is mainly habitual behaviour, rather than based on conscious decisions. A commonality found among these applications of the MOA model and impulse purchase theory is that all participants in these studies were engaged in information processing or a decision-making process and their decisions are mainly influenced by value consciousness, product involevement and impulse buying of luxury brand counterfeit product. Similarly, impulse buying propensity can be considered as the outcomes of information processing and to be subject to the influence of these three factors. Thus, the marketer of original luxury brand product to be more managing their brand on VC and PI high level to counterfeiting increase, of the consumer's perspective.

References

Beatty, S. E. and Ferrell M. E. (1998), "Impulsive Buying: Modeling Its Precursors", Journal of Retailing, Vol. 74 No. 2, pp. 169–191.

Bian X; Mountinho L 2011. The Role Of Brand Image, Product Involvement And Knowledge In Explaining Consumer

Purchase Behavior Of Courterfeits. *European Journal Of Marketing Vol 45. No 12*

Bloch, Peter H., Ronald F. Bush, and Leland Campbell. 1993. "Consumer 'Accomplices' in Product Counterfeiting." Journal of Consumer Marketing 10 (4): 27-36.

Chen,T. 2008. Online Impulse Buying and Product Involvement.*Communication of the IBIMA*,volume 5.

Chapa, S., M.S. Minor, And C. Maldonado (2003). The Effect Of Product Category And Origin On Consumer Responses Toward Counterfeits: An Exploratory Study Among Cultures. Working Paper.

Chaudhry, P And M.G. Walsh.1996. An Assessment Of The Impact Of Counterfeiting In International Markets. The Colombia Journal Of Word Business, Fall, 34-48.

Chavosha Alireza, Anahita Bagherzad Halimi and, Javad Namdar..2011.. The contribution of Product and Consumer characteristics to Consumer's Impulse purchasing Behaviour in Singapore. *International Conference on Social Science and Humanity IPEDR vol.5 (2011) © (2011) IACSIT Press, Singapore*

Clover, V. T. (1950), "Relative Importance of Impulse Buying in Retail Stores", Journal of Marketing, Vol. 25, July, pp. 66–70.

Eisend, M., Schuchert-Güler, P. 2006. "Explaining Counterfeit Purchases: a Review and Preview". *Academy of Marketing Science Review.* Vol. 2006 No.12.

Gistri, Giacomo; Romani, Simona; Pace, Stefano; Gabrielli, Veronica; Grappi, Silvia. 2009. Consumption practices of counterfeit luxury goods in the Italian context. *Journal of Brand Management, suppl.* Special Issue: Luxury Brands 16.5-6 (Mar-May 2009): 364-374.

Han Jee Young, Nunes C.Joseph, and Drèze Xavier .2010. Signaling Status With Luxury Goods: The Role Of Brand Prominence. 2010, American Marketing Association Journal Of Marketing Vol. 74 (July 2010), 15–3 Issn: 0022-2429 (Print), 1547-7185 (Electronic)

Hughes, J. 2007. The Ability – Motivation - Opportunity Framework For Behavior Research In Is. Proceedings Of The 40th Annual Hawaii International Conference On System Sciences (Hicss'07). 1530-1605/07 $20.00 © 2007 Ieee

MacInnis, Deborah J., And Jaworsky, B.J., (1989). "Information Processing From Advertisements: Toward An Integrative Framework", *Journal Of Marketing*, 55 (October), 32-53.

MacInnis, Deborah J,.Christine Moorman,. Bernard J. Jaworski, (1991), "Enhancing And Measuring Consumers' Motivation, Opportunity, And Ability To Process Brand Information From Ads", *Journal Of Marketing*, Vol. 55 (October), 32- 53.

Nia, A. and Zaichkowsky, J. (2000), "Do counterfeits devalue the ownership of luxury brands?", Journal of Product & Brand Management, Vol. 9 No. 7, pp. 485-97.

Norum S. Pamela And Cuno Angela 2011. *Analysis Of The Demand For Counterfeit D*epartment Of Textile And Apparel Management, University Of Missouri, Columbia, Missouri, Usa, And Northcentral University, Prescott Valley, Arizona, Usa. Journal Of Fashion Marketing And Management Vol. 15 No. 1, 2011 Pp. 27-40

Phau, Ian and Teah, Min. 2009. "Devil wears (counterfeit) Prada: a study of antecedents and outcomes of attitudes towards counterfeits of luxury brands". Curtin University of Technology, Perth, Australia. *Journal of consumer marketing* .pp. 15-27.

Stern, H. (1962), "The Significance of Impulse Buying Today", Journal of Marketing, Vol. 26, April, pp. 59–63.

Turunen Linda Lisa Maria and Pirjo Laaksonen.2011. Diffusing the boundaries between luxury and counterfeits. Journal of Product & Brand Management 20/6 (2011) 468–474 Emerald Group Publishing Limited [ISSN 1061-0421]

Wilcox, Keith, Hyeong Min Kim, And Sankar Sen. 2009. "Faking It: Exploring The Motivational Factors Of Counterfeit Purchases," *Journal Of Marketing Research*, 47(1)

Zhan, L and He Y .2012. Understanding Luxury Consumption In China: Consumer Perceptions Of Best-Known Brands. Journal Of Business Research 65 (2012) 1452–1460

----

http://www.gudangtasbranded.com/w/1/26 6/7506/7506/1/show.htm#x

----

http://wolipop.detik.com/read/2012/07/09/153411/ 1961149/233/10-merek-tas-mewah-yang-paling-dicari-di-dunia

IMPACT OF TECHNOLOGY WATER PIPING APPROPRIATE TO ENTREPRENEURSHIP [Case Study in Blimbingsari Village]

I Wayan Ruspendi Junaedi

Universitas Dhyana Pura, Bali

Email: rusfil_2001 @yahoo.com

Abstract

The education of young Force outside Blimbingsari eventually not return to Blimbingsari, even left only the older generation who lived in Blimbingsari so that the incident Blimbingsari like villages' dying 'or' dying village ". From adversity this village, but there are some people [leaders] that calls for the Village Blimbingsari become village "prosperous" [living village], and transformed towards economic better. Finally Village Blimbingsari have entrepreneurs starting or starting with the appropriate technology water piping this Blimbingsari. From the appropriate technology water piping effect or impact to the entrepreneurship in Blimbingsari village.

Transformation in Blimbingsari community covering economic, social and cultural, among others, involve changes in the structure, initiator agent of change, towards more advanced [progress]. From the description above, the authors raised three issues research, as follows: 1]. What characteristic [unique] Blimbingsari Village? 2]. How do the dynamics of the water piping of appropriate technology in Blimbingsari? 3]. What is the impact of water piping of appropriate technology for rural entrepreneurship Blimbingsari? The third issue of the study, the authors raised three research objectives, namely: 1]. To explain the characteristic [unique] Blimbingsari village. 2]. To explain, the dynamics of the water piping of appropriate technology in the village Blimbingsari. 3]. To explain the impact of water piping of appropriate technology to entrepreneurship in the village Blimbingsari.

The research methodology which used in this study is a qualitative research with in-depth interviews, triangulation data and oral history. Blimbingsari already occurred in the village of economic change [economic transformation], one of which is caused by the use of appropriate technology water piping is. The impact of technological water piping appropriate that occurred in Blimbingsari is the emergence of entrepreneurs such as poultry, cattle farmers, pig farmers, ranchers catfish, sellers coconuts, sellers brown, grocer, sellers water refills, the owner of the fields, forests sengon, stalls eat and owner of the guest house / villa. There are also other entrepreneurs as employers coconut sugar makers who become entrepreneurs in the village Blimbingsari. It becomes a matter of interest to the author, in view of the development of entrepreneurship in villages Blimbingsari. The impact of water piping of appropriate technology in the village Blimbingsari which is to reduce unemployment and people start a business they have, they can survive and even be able to finance their children for further studies. They were able to improve their living standards from the "hopeless prosper". The research methodelogy used in this research is qualitative research. Qualitative research is a method to explore and understand the meaning . This qualitative research process involves important efforts, such as asking questions and procedures, analyze the data inductively from the specific themes to common themes and interpret the meaning of data. This research applies research perspective inductive style, focusing on individual meanings, and translate the complexity of a problem.

In answering the research questions as formulated above, the research process is relying on the paradigm of interpretative research using qualitative methods. Definition of interpretative research paradigm is meant here relates to how to acquire knowledge [in order to answer research questions] that is based on the process of understanding through interpretation and meaning of this research related to social reality, which of course also involves interpretation and meaning of the Researchers [subjectively] on field observations or findings during the research process, so that the research presented here is the basic ingredient of the results of interpretation and meaning.

Advice writer is, there may be other factors that influence entrepreneurial Blimbingsari village, which the author has not been thorough. So that other researchers can melanjutkanya.

Keyword: Impact, Appropriate Water Technology, Entrepreneurship, Economic Transformation, and Blimbingsari

1

. Introduction

Blimbingsari village is currently a village full of new entrepreneurs with the various efforts of each. Starting from the establishment of

'team piping irrigation water of appropriate' with the launch of Irrigation appropriate by the Regent, many new entrepreneurs have sprung up, because of the desire to improve

the economy of rural communities and to create well-being of the village. However, the authors did not examine the amount of income per capita in the village Blimbingsari, but just purely just to make sure that there is the impact of water piping of appropriate technology to entrepreneurship in the process of economic transformation "from nothing to something".

This Blimbingsari village in 2010, has become a tourism village which was inaugurated by the Regent, Prof. Dr. drg. Gede Winasa. The opening of this village into a tourism village is also one trigger Guesthouse and Villa and a multiplier effect that following them, such as the sale of souvenir "the Blady Dancing Cross", palm sugar, and brooms made of palm leaves even all the gardens, fields and farms have water.

The transformation process is not separated from the impact of technological water piping appropriate were highlighted by the leader of the village government [formal] and spiritual leaders [informal] in moving the community village of Blimbingsari changes, since the technologies water piping appropriate both changes from the side infrastruktrur village, development economic and institutional as well as rural creative economy. Judging from the time period, including a very fast transformation.

1.1. Research Issues

Problem In this study, focusing on How Technology Impact Piping water appropriate for Entrepreneurship in Economic Transformation that is capable of moving elements of church institutions and the government to make changes and development of the village Blimbingsari, from the village of "poor" into a prosperous village ["forward "], to develop an entrepreneurial spirit and performance by performing on agriculture, plantations and farms, and with the support of village infrastructure growing, eventually became a tourist village through creative economic transformation. Author lowering research problems with three more empirical research questions are: 1]. What characteristic [unique] Blimbingsari Village? 2]. How do the dynamics of the water piping of appropriate technology in Blimbingsari? 3]. What is the impact of water piping of appropriate technology for rural entrepreneurship Blimbingsari?

1.2. Research Purposes

The issue of the research above, the purpose of this study is as follows: 1]. To explain the characteristic [unique] Blimbingsari village. 2]. To explain, the dynamics of the water piping of appropriate technology in the village Blimbingsari. 3]. To explain the impact of water piping of appropriate technology to entrepreneurship in the village Blimbingsari.

1.3.Benefit of Research

There are two benefits of this research are theoretical and practical benefits. A comprehensive overview of the transformation and economic growth in the village Blimbingsari indicate that the water piping right technology to support the occurrence of an entrepreneurship that ultimately have an impact on economic transformation. The process of economic transformation changes are systematic and planned economy launched by community groups and their leaders. A leader in the community of strategic thinking, long-term oriented, and insightful, and focused on achieving results today, with a full sense of responsibility.

The implications of its application, that technology water piping right to have an impact on the transformation of the village Blimbingsari can be a reference for other villages across Bali to make the Village Blimbingsari becoming a pilot village and can be a reference in comparative studies to identify and understand the key factors that Blimbingsari affect the success of the development of the village through the process and dynamics of water piping of appropriate technology from the village 'no water / dry "and hopelessness into a village of the' Fertile / forward 'and' affluent '.

Implications theoretical, that the spiritual leader as an informal leader in the context of the country, although in the context of church pastors as formal leader is able to make cooperation between the informal leader [spiritual leader] and formal [village government], can provide guidance in shaping the technology pemipan water right to impacting entrepreneurship.

Below, the author will explain the theoretical foundation will be used in this paper is to explain the development and economic transformation, water piping of appropriate technology, entrepreneurship.

2. Theory Perspective
2.1. Piping Technology Innovation

Innovation is the process of turning ideas - creative ideas into a product or method

useful work. Therefore, an innovative leader who has the mental will transmit the virus innovative continuously, also has the ability to channel their creativity to the community members become useful results. This is a continuous process in transmitting the entrepreneurial spirit and continue memilihara and encourage innovation [Stephen P. Robbins and Mary Coulter, 2010: 21].

2.2 Entrepreneurship

Entrepreneurship is a human process related to creativity and innovation in understanding the opportunities, manage resources, so the chances of it materialized into an economic value that is able to generate profits or value for the long term. Understanding focuses on the aspect of entrepreneurial creativity and innovation, due to the nature of creativity and innovative one can find opportunities and make the added value that can increase the value of assets and capital owned.

Literally Entrepreneurship consists of basic word entrepreneur gets ke- prefix and suffix -an, so it can be interpreted entrepreneurship are things that are associated with self-employment. While the meaning of courage and entrepreneurial business means the business activities of commercial or non-commercial, so that entrepreneurship can be interpreted as the courage for someone to carry out a business activity.

[Frank Knight [1921]], Entrepreneurs try to predict and respond to market changes. This definition emphasizes the role of entrepreneurs in the face of uncertainty on the market dynamics. An entrepreneur is required to carry out the basic managerial functions such as guidance and supervision. Therefore, with grown kembangkanya knowledge about entrepreneurship, will evoke the spirit of the Indonesian people, especially young people or students, to help create jobs with entrepreneurship, not only the job seekers [job seeking]. In the spirit of nationalism that Indonesia should be able to compete arena arena of the world economy, it will be a lot of students who are motivated to drive the quality of her and spark ideas in the field of entrepreneurship kretaif highly competitive.

2.3 Development and Economic Transformation

How modern society aspired to be achieved? Rostow put forward the main requirements of the availability of capital [Fakih, 2006]. Another figure in the theory of modernization is Stauffer, [2002], which departs from the perspective of social psychology says that the basics of human psychology and attitudes are very concerned with social change. Added to that, it always involves the construction of changes in perceptions and attitudes towards life as a whole, not in separate sections [compare with Todaro, 2000].

Structural transformation will only work well if followed with equal opportunity to learn, decrease in population growth rate, and a decrease in the degree of economic dualism between rural and urban areas [French, Wendell L et al, [ed.] 2000].

Robbins [2007] states, entities or communities must be changed. If unchanged, the entity will die. All entities must change in order to survive. This statement has a meaning that changes in an entity should be formulated in such a manner for the sake of survival.

Results of the conclusion of the study Widodo [2009] explains that social change Samin caused, the modernization of agriculture with the use of technology but does not eliminate institutional mutual cooperation called the "splice" in which labor needs in agriculture was obtained by means of mutual help between households of farmers in turns without wage system.

Investment climate related to natural resources [as providers of raw material] and sound government policies. Meaning here that to make the shift from the traditional fisheries sector to the industrial sector is necessary for government policies that can provide business certainty and guarantee the welfare of coastal communities [Lewig and Dollard. 2001].

Two studies were conducted Widodo, Utomo [2008] and Hutahuruk [2008], shows the same direction, where economic transformation is closely related to the transformation or social change in the community.

Research Gunawan [2012] are more focused on what the elements of social change in the communities in rural Bali with his findings about the social change that is duality. While the research conducted Saptana, Syahyuti and Rosganda [2003] emphasizes that institutional transformation must take place to strengthen the economy of rural people.

Saptana, et al [2003], in his research "in order to strengthen the institutional transformation of the people in the rural economy with a case study in the district of"

tracked from the fragility of the people in the rural economy, which is the main cause is the fragility of the institutions that support it.

3. Methods

The method used in this study is a qualitative research. Qualitative research is a method to explore and understand the meaning [Basrowi & Kelvin, 2008; Riduwan & Kuncoro, Engkos, 2008; Strauss & Corbin, 2007; Marshall, Catherine & Gretchen, 1989]. This qualitative research process involves important efforts, such as asking questions and procedures, analyze the data inductively from the themes specific to general themes and interpret the meaning of the data. [Creswell, 2013: 4]. This research applies research perspective inductive style, focusing on individual meanings, and translate the complexity of a problem.

In answering the research questions as formulated above, the research process is relying on the paradigm of interpretative research using qualitative methods. Understanding the paradigm of interpretive research is meant here relates to how to acquire knowledge [in order to answer the research questions] that is based on the process of understanding through interpretation and meaning of social reality related to this study, which of course also involves interpretation and meaning of the Researchers [subjectively] the results of the field observations or findings during the research process, so that the research presented here is the basic ingredient of the results of interpretation and meaning [Gunawan, 2012; Marshall, Catherine & Gretchen, Rossman, 1989].

While the intent paradigm interpretative is that it epistimologi author did not follow the flow of positivism, because it is precisely the author has a critical nature and ontological using flow constructionist, arguing that from the results of the field, the authors construct a data field to bring research results.

3.1 Build Communication and Research Equipment

As a researcher, writer to be elegant and humble in order to establish effective communication with the informant. Because writers need data and information, it is often the author requested phone number or home phone number in order to establish communication. Besides, it is also because there is a recommendation and an appeal from the head of the village, that the author will conduct research faster then usually familiar with the informant. When trust arise and grow, the author is no longer considered foreigners but has been regarded as insiders or "brothers" in the community. Therefore contributes to the collection of data 'as is' [Creswell, 2007].

Readiness is indispensable before researchers began to enter the sites. The related needs such as correspondence, books field notes, interview guides, camera, and voice recorder [voice recorder].

Results recorded at least very helpful to hear back and made the transcript. Sound recordings of the informants are vital, thus avoiding the forgotten records or who could not be accommodated. Sometimes it was so asiknya discussion the authors did not get recorded, but because there is a recording, it is very helpful author.

3.2 Proses and Dynamics and Ethics Field Data Collection

At least there is a major process in the field data collection process of observation and in-depth interviews [Moleong, 2009; Strauss & Corbin, 2007]. This process always carefully, carefully, and critically. Before performing the retrieval of data, steps should be prepared early is rechecking interview guides that have been developed, adapted to the purpose of research. Although in the process [interviews] there are indicators, other questions will arise [usually] to explore in an interview.

Recording typically done at night. Data I collected from various informants categorized, in coding and made in accordance themes after the perceived saturation. And so on until all the unanswered problem formulation.

From conversations with the village head is radiated the streets to meet the members of the irrigation water of appropriate and key people as informants were very helpful to researchers, such as Pdt.Ketut Suyaga Ayub as the spiritual head GKPB time [Peniel Church Council Chairman Blimbingsari], and writers sometimes settled in the house with Pdt. Ayub and sometimes in the house of the village to observe and conduct research. Furthermore sekaa irrigation water that has served as the leader of the irrigation/Subak Blimbingsari, and all representatives enjungan, assembly once the assembly Peniel church in the village of Blimbingsari. Then the next informant is a former village chief and former Blimbingsari spiritual leaders in Blimbingsari.

Whenever depth interviews I always look at the situation and condition of the informants.

The easiest thing is to look at facial expression when the expression on his face is bright, then this is a good time and the right to conduct in-depth interviews. Patience is needed when facing a situation like this.

Another thing that is sometimes overlooked is taking pictures and video, or recording with a tape recorder. Authors seek first obtaining permission from the parties concerned, as this is the ethics of a researcher

3.3 Research Location

Research location in the village in the district Blimbingsari Melaya, Jembrana, Bali [see Figure 1].

Figure 1. Map of the island of Bali

Blimbingsari [☆] located in the southeast of the mountain Kelatakan as "Alas Cekik", with a height of 698 meters above sea level, Jembrana. So this Blimbingsari once the terrible forest. Location Blimbingsari be entered into about seven kilometers from the main road Melaya-Gilimanuk, with paved roads. Blimbingsari village located transversely from east to west in the administrative area Jembrana. Most of the area is low-lying, partly plateau of mountains and hills. North and west of the village is a teak forest area [hills and mountains Klatakan]. In the southern part Pangkung Blimbingsari adjacent to the Village Land. While in the east Blimbingsari adjacent to the Village Ekasari. Blimbingsari village is one of ten villages in the District Melaya, Jembrana. If seen research sites closer to see just Jembrana as follows [see figure 2]:
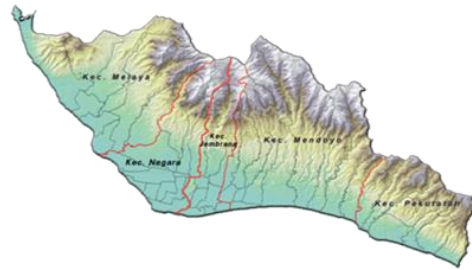

Figure 2. Map of Jembrana

From Figure 2 above, it appears there are five districts in Jembrana district, the District Pekutatan, Mendoyo, Jembrana, State and Melaya. While the village is located in the district Blimbingsari Melaya.

3.4 Teknik Data Collection
3.4.1 Interview

Interviewing is a technique of collecting data by conducting a question and answer directly to the informants [members of water piping appropriate] either the first being and the end members Blimbingsari, village heads, religious leaders, elders of the community village Blimbingsari, some diaspora communities Village Blimbingsari, administrators and devices village [LPM, LPD], as well as the village Village Blimbingsari and servant of the Church at Peniel Church Blimbingsari. As proposed by Subagyo [1995: 34], the interview is a data collection activities through debriefing conducted to obtain information directly to reveal the questions to the informant about what kind of entrepreneurship and what the role of the entrepreneur in terms of economic transformation. Koentjaraningrat [1994: 129] argues that in-depth interviews in a study aimed at gathering information about human life in a society as well as their establishment was.

Technique of determining informant done purposively, the informant who has knowledge of appropriate technology water piping Blimbingsari village until its impact on entrepreneurship. Tourism Committee [Mr. Mutiyasa, Gede Sudigda and Mrs. Cahya Herani Ayub]. Some entrepreneurs Blimbingsari [Mr. Murji, Mr. Karyan, Mr. Sukerta, Mr. Suwirya, Mr. Ketut Suyaga Ayub], seven Christian community leaders Blimbingsari, one person Bendesa Indigenous Blimbingsari, and Head Melaya.

3.4.2 Document Research and Observation

Documentary method is to collect data through a written heritage, such as archives and books on theory or legal opinion related to the research problem [Margono, 1997: 187].

In this study, the authors use the method of documentation via a means of collecting data obtained from existing documents or records that are stored, whether it be books, newspapers and others. The author also uses the technique of direct observation through the observation and recording of phenomena that appear on the process of economic transformation Blimbingsari today. As noted by Nawawi [1995: 94], this technique is a way of collecting data through observation and recording of symptoms that appear on the object of research whose implementation directly at the site of an event, circumstances or situations that are happening today. In accordance with the character of qualitative research, the technique of observation is very important because it is a way to observe the behavior of the present, and objects used or generated by today's society to be understood through research.

Likewise observations on the author to obtain data on the information concerning the object of study, is through direct observation of the dynamics or what efforts are being made to establish technology water piping appropriate, as well as the impact of technology water piping appropriate to entrepreneurship Village Blimbingsari , so that people are not "out" or "moved" to the city. Researchers involved in a systematic and inconspicuous so as to create an intense social interaction between researchers with villagers Blimbingsari.

3.4.3 Trianggulasi

As previously explained that with the opening of access to do research in Blimbingsari, so at this stage the author began to meet informants who are able to provide information based on interview guides that have been previously collated author. This interview guide writers need as a handle so that the questions focused on the direction to answer the research objectives. This method is overlooked as a triangulation of data from interviews, so according Bungin [2007: 65-66] through observation can eventually be known to be valid ejadian is actually happening in the observation unit and the involvement of every citizen of the village of Blimbingsari more objectively.

In the data collection techniques, triangulation is defined as data collection techniques that are combining of various data collection techniques and data sources that already exist. Triangulation method means that the authors use data collection techniques are different to obtain data from the same source. If the author uses triangulation, then in fact the authors collected data simultaneously test the credibility of the data with a variety of data collection techniques and data sources.

3.5 Analisis Data

This study is about the impact of water piping of appropriate technology to entrepreneurship that is evolutiv and longitudinal and in the past, so interviews and methods of the document is the main source of data for this research. Writer wants and seeks to improve the validity descriptively, interpretatip and theoretical to the reader, so I asked two village elders [Ibu Wayan Kari 105 years old and Mr. I Gusti Rata more than 100 years old]. In addition, the author also uses the document ancient archives stored in a church or a book that talks about the study.

The author conducted interviews with Pak Nyoman Muspa, Mr. Marten, Pak Made Denoh, Pdt. Ketut Suyaga Ayub. Selection of informants because they are taking care of water piping of appropriate technology involved in the process of formation water piping of appropriate technology. Although they are busy with their daily activities the author still can look for the right time so that the author can answer questions posed in the Balinese language and all of these questions can be understood. The interview did not take place only once, even if the writers often feel less detail [lack of complete data], the authors came to the informant again, and to obtain the next informants sometimes the writer asked for a recommendation from previous informant. This method is known as a method of Snowball [snow bowling method]. This interview happened like a snowball in which the interview is not directly mention the names of informants are necessary and should be interviewed that have relevance / linkages. To build confidence [trust] can be through an informal approach [Creswell, 2013; Krippendorff, 1991].

This study consisted of two phases which are old and now. For a long phase of research done using methods pemanfataan oral history and documentary study. In the present phase of research using the method of observation and interview. Once the data is collected through interviews, the author goes on to make a transcript of the interview wawanvcraa based. After that the author

makes the identification of themes from the data obtained from interviews, and prepare an outline and a writer finally wrote [Miles and Huberman, 1992: 17-19].

4. Discussion and Results
4.1. Characteristic [unique] Village of Blimbingsari

4.1.1 Art and culture
Although the majority Christian village, but in a still life using art and culture. The Church has carved as 'temple'. These matters are described below.

4.1.2 Gamelan
Blimbingsari village has a wealth of art and culture should other areas of Bali. Unique art owned by Village Blimbingsari is a dance that usually lacks the gamelan musicians are very melodic and beautiful. Gamelan musical material is made of bronze and the front of gamelan consists decoration or carving bali and usually plays the music is performed while seated.

4.1.3 Jegog
Arts and Culture is an art jegog. Jegog art this is a musical instrument typical of Jembrana. Jegog musical material is made from bamboo options diameter of 18-20 cm in size [depending on needs] and the front jegog contains decoration or carving bali. Differences with gambelan, the art of playing music jegog jegog usually this is done while standing. The number of participants who play the gamelan music and jegog almost the same amount.

Both art and jegog gamelan music is good, usually used as a musical instrument to accompany the dancers. Dance art is normally used to welcome a group of guests who come to visit and stay in the village Blimbingsari. This dance is performed by young people aged 18-20 years who have been specially trained to perform a dance of welcome or farewell. Usually this is a female dancer [Interview with a Made John Roni, the village head Blimbingsari, 2014].

4.1.4 Megibung
Other cultural arts is the current air Blimbingsari Birthday [annual event] or celebrate the big day ecclesiastical, Blimbingsari residents cook together with the entire region and divide tasks into each region. They wear clothes and eat megibung bali [sit together in one tray], do not wear their own plate.

From the aspect of art and culture, the various people or groups of guests from around the world visited Blimbingsari see the art and culture ..

4.1.5 Tourist visits and Guest House
Guests who visit the village Blimbingsari in 2014 some 1518 people. The guests are tourists [foreign tourists and domestic tourists]. Countries that come to visit the village of Blimbingsari including Australia, USA, France, Netherlands, Germany, New Zealand, Singapore, Korea, Belgium and Japan. Most guests coming is Australia. It continues today.

The impact of a visit this very clearly to community empowerment, when guests / tourists come to Blimbingsari for overnight average of 2-5 nights using the facility houses or rooms in the village of Blimbingsari's population, is able to improve the economy of the village in addition to the crop and farm and self-employed

4.2. The dynamics of appropriate water Piping Technology
4.2.1 Appropriate Water Piping construction, Blimbingsari
Interview below, tells how the water in Blimbingsari can be used for irrigating fields, fields, orchards and farms since Pdt. Ketut Suyaga Ayub invite Blimbingsari village communities build water piping of appropriate technology.

"It used to be a water system in the village of Blimbingsari is inadequate and can not meet the needs of irrigation for rice fields and our fields. Watering was made by making such a sewer is used for the water from Grojogan to the rice fields and the fields of our "Gede said Mr. Marten. "Now what, sir?" I asked. "Now with the water piping system of appropriate technology to provide benefits very much for us, not only for our rice paddies and fields but also for our farms, even water piping of appropriate technology was bought by the village and the neighboring village of Palasari Melaya".

Not only that, according to the informant who served as Perbekel, the Village Head Blimbingsari Made John Rony said that in addition to irrigation hill cider is not functioning, as well as water village Blimbingsari dirty so residents Blimbingsari construct boreholes located behind the house of Mr. Kertya and making technology water piping appropriate to the utilization of water resources in the forest Grojogan [see figure 4.1. Grojogan water sources Village Blimbingsari], because once is not utilized so that a flow of irrigation water had dried. In

2000, Mr. Pastor. Ketut Suyaga Ayub invite some friends villagers [Mr. Marten, Mr Full, Mr Pageh, Pak Made Okamona, Mr. Korni and Pak Nyoman Joseph] build water piping for even distribution of water to the gardens for all farmers in the village Blimbingsari, both in hill or in a valley.

At first some people like Mr. XX, Mr.YY lacks confidence with this idea or suggestion, do not even believe how to bring water to the whole farm/orchard farmer in the village Blimbingsari. But after so appropriate water pipeline project and inaugurated by the Regent, eventually fathers who had not agreed to even be a member of the irrigation water of appropriate because they also need clean water for gardens and livestock.

Exploiting the potential of existing water resources in the forest "*Alas Cekik*" who had once been wasted and not utilized, now reclaimed by villagers Blimbingsari. The previous name was irrigated "*Bukit Sari*" and now the water piping appropriate name with good technology.

Source : Primary Data [2013]

Figure 4.1 . Water Resources Grojogan , Blimbingsari

The problem is how to realize the potential of the water discharge Grojogan capable supplied to all fields / gardens belonging to villagers Blimbingsari with plumbing ? Under this will be explained efforts to achieve clean water piping appropriate

4.2.2 Efforts realization Appropriate Water Piping in Blimbingsari

In an interview with the Village Head Made Blimbingsari Mr. John Rony, said that every citizen who participate and use irrigation water fees charged 10,000 / month per villagers Blimbingsari. Each group was to contribute to the builders nuduk pee [which take money], namely Mr. Muspa plus per 1 cubic [1 m³] of water charged Rp 500, -. Efforts to realize the irrigation water of appropriate irrigation group of residents and team work by voluntary work, discipline, hard work cooperate ". Mutual aid, shoulder

to shoulder, will you please help, in order to realize the clean water piping appropriate using appropriate technology as well. Efforts village leaders and spiritual leaders were conducted with residents of the village work every day from 9.00 am to install the pipe [75mm], and build a storage tank with a capacity of 100m³ in the forest, 92 meters above sea level. The water source is at an elevation of 95 meters above sea level. Thence distribution Blimbingsari to be done, with a height of 82 meters above ground. This idea will be enough to irrigate 400 hectares of land Blimbingsari.

Evidently, this serves irrigation water to irrigate the entire field Blimbingsari village and inaugurated by the Regent Dr. drg. Gede Winasa. At the time of its inauguration, Blimbingsari residents held a ceremony, in which the mothers of all enjungan, [group] brought jun [barrel of clay]. Each year the groups participating in the project providing their pipes each of the shelter to a private holding tank [at least the size of 2 m] on the field / land.

In July 2008 there were more than 75 members who were also members of appropriate piping clean water and a cover letter are members of appropriate irrigation water is much to list and unresolved. The project is called the project "Living Water Piping Appropriate", because life can be started from the water. Made quoted from John Rony as perbekel suggested that "the church or Blimbingsari village residents use water available, as well as possible. Meaning that if the limited water resources are managed in a way that is right and good, then the source of this water will be a source of 'life' for village residents Blimbingsari ". Water sources
it should be preserved and used in a way that is "wise and good". The next project is to test the water tower for the re-engineering of this project from the beginning. It is always required a patience and learning in early panggunaan appropriate water pipeline project is, before they really master it, because unsuccessful projects will interfere with irrigation farm / field and crop growth.

Explanation Figure 4.2 . below is how to manage water resources from Grojogan to the farm / garden . Figure 4.2 . explained that the number 1 , is reserpoir or tower covering an area of 2 x 6 x 1.5 m which is the source of water first to be fed through a pipe to a water source to number 2 as the tank [size 5 x 3 x 3 m] . This tank of water flowed into the number 3 [tank] and 4 [bath

filter] . From the tub filter [number 4] is poured into a tank [number 5] satellite distribution [number 6] . Of wells drilled is also pumped into the distribution tub [number 6] to the rest of the farm / field Blimbingsari villagers , so that all the fields , soil , livestock rural communities obtain clean water . It is also supporting this village into a tourist village was selected because of the availability of clean water .

Source: Primary Data
Gambar 4.2. Peta Sumber Air dari Grojogan Sampai ke Ladang/Kebun

4.2.3 Had water piping technology Stop

Traveling business people use clean water is not quite 'smooth' alias was stopped, and this causes conflicts among villagers. Had investigated by Pdt. Suyaga Ayub, what the cause of the problem of clean water is stopped. Maybe there keculasan / cheating and want to be selfish among water users appropriate by cutting the pipes in place plateau and take the water directly in the interests of self so that the farmers in the valley land had no moisture. Clean water problem is quite old and tough to solve, however, it remains as a spiritual leader has the initiative to meet with all the people who ultimately given the explanation that "we are carrying smart dumb", said Mr. Pastor. Suyaga Ayub with a smile explained this to the author. Actually simple, to resolve this conflict, by stating "let us not be selfish, because cutting the pipes that make the other residents did not get clean water". Finally agreed chosen one to keep an eye on this pipeline, that person is Mr. Muspa. Until now, the authors leave the area no longer heard no clean water distribution problems.

4.3 Impact of Water Piping Appropriate Technology

The head of Blimbingsari Village Made John Rony back to discuss with the leaders of the West Bali on watering/irrigation water and the leadership of the West Bali interested, because they are really hope to resolve the problem of water in their village. Many farmers from other villages came to Blimbingsari to see and follow the way of this project, not only Blimbingsari, but Ekasari, Nusasari and Pangkung ground, too make. They are interested because it is based on ecological consideration, which does not require a land lot, does not require a dam to store water, and the water flowing from the pipes to the places of maintenance of animals [cattle and pigs], and a lot of animal waste will naturally fertilize the soil ,
Many of the impacts of the technology appropriate piping irrigation water which is useful for businesses Blimbingsari citizens.
"Examples are: agricultural production and plantations, production of the manufacture of sugar of lead coconut sap also increased, residents who have livestock / animal [beef and pork] production increased, could more easily get good water for bathing and for drinking by pet , so it is not thirsty, brown plant growth also can be better, "said Pak Wayan Murtiyasa, 2013 [one of the cocoa farmers].
The impact of water piping technology appropriate to the entrepreneurial spirit of people Blimbingsari. This is evident from the twenty-four villagers Blimbingsari have a business, which creatively build their family business because of the encouragement of entrepreneurial actors Blimbingsari like cattle business, chicken, pork, catfish, agriculture, plantation, grocery shop and brick-making, see table 4.1. below this.

Tabel 4.1. Type of entrepreneurial in Blimbingsari

Another impact is nothing to register and borrowed funds [credit business] in Maha Bhoga Highways [MBM] Ships, Mengwi, where capital is used to attempt to fatten cattle or pigs to be marketed, because seeing technology functions water piping, appropriate and so the increase in cattle production and pigs increased since the existence of the appropriate irrigation water. Before there is technology appropriate piping irrigation water, there are only a few people who raise cattle, because of water shortages. Data names of people who participated fattening program is as follows: Mr. Gede Sukabagia, Joseph Nyoman Gede Oka Mona, Gede Sudigda, Prenamia, Ketut Suyaga Ayub, Aget Ketut Gede Karyan.

Below is explained how irrigation affects cattle ranchers and hog by one informant named Pak Gede Marten. The selling price of cattle owned Pak Gede Marten is for the bulls Rp. 3 million multiplied by four head to Rp. 12 million, while for the cows, the amount of Rp. 2 million multiplied by four head to Rp. 8 million. So so total gross revenues amounted to Rp.20 million, not including maintenance costs because Mr. Gede Marten keep the cost of feed [animal feed] / day is a bear of feed worth 10,000 per one cow. So of fattening cattle, the residents are able to earn for living expenses, due to the help of appropriate water irrigation system is.

In addition to the dairy farms, there is also a pig breeder. Still with Pak Gede Marten informant, he has four pigs. In the year of the pig can be sold twice. One female pig can give birth between 8 to 10 pigs. The fact is 8 tails of piglets resultant. Eight head / year multiplied by 4 tail, multiplied by 2, multiplied by 250,000 into a number Rp.16 Million/year. So that if the family income is divided by twelve months to a total of Rp 1.333 million/month. [Note: one piglet, sometimes worth USD 250,000]. Like cattle, they also spend feed for pigs, where the pig requires 3 kg feed/day multiplied by 4 tail, multiplied by USD. 3,000 to Rp. 36,000/day. Judging from the income and expenditure

that the impact of appropriate irrigation water can increase farm incomes through either beef or pork.

Fattening calves and pigs is a livelihood, after farming coconut and chocolate. Ways such as this is used Blimbingsari residents to get out of 'poverty and adversity', boldly borrowed funds/ capital, which certainly will bring profit/gain.

Typically, to fatten a cow takes two years. By using the concentrated food, to achieve the required weight, this group only takes 5 months. At that time the calf was purchased for Rp.1.500.000 [one and a half million rupiah] and when it was fat is sold at Rp. 4,000,000 [four million rupiah]. They earn Rp.2.500.000 [two and a half million rupiah] not including the cost of food The concentrated. Jembrana government was very surprised with the achievement of outstanding results with cattle production reached 1 kg [one kilogram] a day, because of the government's target of just 0.6 kg per day, so diadopsilah this program by the government. Here are the results transcript of the interview with the author Marten Gede in Blimbingsari, dated October 15, 2013, as real evidence that increasing agricultural production with a system of "irrigation water of appropriate" as follows [see Figure 4.3.]:

Figure 4.3 An example entrepreneurship Blimbingsari

Gede Marten stated that: "equitable distribution of irrigation water useful for the villagers Blimbingsari, especially land which produces 60 coconut trees . The second is the cacao tree . Gede family of Marten produce 400-500 brown tree trunks in the land teraliri appropriate irrigation systems is appropriate".

In the same occasion, the authors conducted interviews with Nyoman Yusuf, on clear evidence that, in the presence of water efficient irrigation systems, livestock

[cattle, pigs, catfish] can live and produce manure that can be used as compost . Here are excerpts of the interview: "that farmers are now able to maintain a cow, if there is no water piping appropriate, how to find water for cattle, pigs and gardens can not be watered so that people are pleased and excited"

5. Reference

Basrowi & Suwandi. 2008."Memahami Penelitian Kualitatif". Rineka Cipta. Jakarta.

Creswell, John W. 2013. *Research Design,Pendekatan Kualitatif, Kuantitatif dan Mixed.* Penerbit Pustaka Pelajar.

Fakih, Mansour, *"Runtuhnya teori pembangunan dan globalisasi" ,* Pustaka Pelajar Offset, 2006

French, Wendell L., at.al. [ed.] 2000. *Organization Development and Transformation: Managing Effective Change*, Irwin McGrall-Hill Singapore.

Gunawan, Daddy Heryono, 2012, Perubahan Sosial di Perdesaaan Bali, Program Pasca Sarjana Doktor Studi Pembangunan Universitas Kristen Satya Wacana

Koentjaraningrat. 1994. *Kebudayaan Mentalitet dan Pembangunan.* Jakarta :. Penerbit PT. Gramedia.

Lewig, K.A. & M.F. Dollard, "Social construction of work stress: Australian newsprint media portrayal of stress at work, 1997-98", *Work & Stress*, 2001.

Marshall, Catherine & Gretchen B Rossman. 1989. "*Designing Qualitative Research*" Newbury Park, London, New Delhi: Sage Publications.

Robbins, SP & Judge, TA. 2007. Organization Behavior, Pearson International. New Jersey : Upper Saddle River.

Riduwan & Kuncoro, Engkos Achmad. 2008. Cara Menggunakan dan Memaknai Analisis Jalur [Path Analysis]. Cetakan Kedua. Bandung : CV. Alfabeta

Saptana, Tri Pranadji, Syahyuti dan Rosganda Elisabeth , 2003, "Transformasi Kelembangaan Guna Memperkuat Ekonomi Rakyat di Pedesaan dengan Studi Kasus di Kabupaten Tabanan Bali"

Stauffer Dennis. 2002. "Innovative Leadership" . Strategi Untuk Mendorong Pertumbuhan, Inovasi, dan Kinerja. BIP. PT. Bhuana Ilmu Populer. Gramedia. Jakarta.

Strauss & Corbin. 2007. "Dasar-dasar Penelitian Kualitatif". Tatalangkah dan Teknik-teknik Teoritisasi Data. Pustaka Pelajar, Yogyakarta.

Suyaga Ayub, Ketut.1999. "Sejarah Gereja Bali. Dalam Tahap Permulaan". Departemen Literatur YPPII. Malang. Jawa Timur.

Suyaga Ayub, Ketut dkk. 2004. "Gereja Yang Hidup, Kumpulan Refleksi Hamba-hmba Tuhan'. Gereja Kristen Protestan di Bali. Penerbit GKPB. Bali

Todaro, Michael P. 2000: *Economic Development: Economics, Institutions, and Development:* a Global Perspective

Widodo, Slamet, 2009, Proses Transformasi Pertanian dan Perubahan Sosial pada Masyarakat Samin di Bojonegoro

The informants interviewed as follows :

1. I Gusti Rata
2. Ni Wayan Kari
3. Sunarya, I Wayan
4. I Ketut Suyaga Ayub
5. Made John Rony
6. Sudigda
7. Murtiyasa
8. Cahya Herani
9. Murji
10. Gede Karyan
11. Sukerta
12. Nyoman Muspa
13. Gede Marten
14. Made Denoh
15. Seven community leaders village Blimbingsari
16. One person Bendesa Indigenous Blimbingsari
17. Head of districts Melaya

SELF-DIRECTED LEARNING (SDL)-BASED LEARNING CENTER (LC): A STRATEGY TO IMPROVE STUDENTS' TOEFL SCORE

By
I M. Rai Jaya Widanta, A.A. Raka Sitawati, I Nyoman Rajin Aryana,
I Wayan Dana Ardika

Politeknik Negeri Bali

Abstract

This paper addresses two things, (1) development of Learning Center (LC) as a place to learn and practice TOEFL (Test of English as a Foreign Language) and (2) a further plan to develop a computer-based LC to be a better self-directed learning (SDL) center. A conventional LC has been being developed and is about to reach its end. As a self-directed learning site, it is completed with a number of facilities, including ten learning and practice test modules, listening materials in form of CD, answer sheet, CD player, point card, membership card and directory sheet and SOP. The idea for development of LC was pursuant to the result of tracer study to see needs of assistance of students and lecturers in five universities in Bali in learning TOEFL. To be appropriate devices, the modules had been finalized through some validation including content, design, individual, and a small group test. They were required to fill in the questionnaires and give comment on the modules. The field test to see effectiveness of modules was done at the end. Thus, a group of student as sample group was given a self-directed learning for one session by using one of the modules and practice test at the end of the session. The result of the test was then compared with that of the test prior to the learning. The result showed that the mean of students' achievement between test 1 and test 2 were respectively 367.26 and 416.17. The mean of increase of both tests was 48.91 with percentage of increase 13.32. For further plan, the model will be designed in such a way that computer can be effectively used to support the LC program.

Key words: Computer assisted learning, Development, Learning Center, TOEFL

I. Introduction

Implementation of self-directed learning (SDL) has been widely energized in most parts of the world. The learning model is chosen since it gives salient benefits. It promotes the natural development of self-confidence, initiative, perseverance and life satisfaction and also decreases the probability that learners will suffer from the life-long wounds commonly produced by coercive schooling. Besides, SDL can provide opportunities to pursue a far wider range of interests than is possible in a typical school and reinforce collaboration, within and beyond the family.

SDL is a self learning which meets almost all levels of each individual and every learning situation. It is resulted by the condition that SDL involves various activities and resources, such as self-directed reading, internship which is effective for teachers to lead in students' critical thinking (Hiemstra, 1994). This is a way how to insert information into one's life (Altuger-Genc, 2013). SDL also enables students to build their comprehension on learning by identifying an adult learners' learning method and to provide them with a view of process, challenge and adult learners'

characteristic as well as to widen their insight on a formal learning (Caffarella, 1993). In addition, SDL, particularly for adult learners is more beneficial as it can trigger students to learn more effectively, creatively, initiatively, individually as well as more future oriented (Knowles, 1975; Gugilielmo, 1977; Tylor, 1981).

The model has been used as a basis for developing LC as a place to learn and practice TOEFL. TOEFL was chosen to be a measuring device in fostering Politeknik Negeri Bali students' English competence as the device is recognized as a standard testing device (Education Manual of Politeknik Negeri Bali, 2006, article 6). Referring to the statement and by determining the importance of the testing device, a number of learning models with SDL have been developed to facilitate students to improve their academic achievement (Widanta, 2008; Widanta, 2012).

LC is developed in Politenik Negeri Bali to provide students with a place where they are able to learn knowledge, like grammar, structure of English language as well as strategies to answer and practice working out TOEFL. In developing LC, there are a

number of stages that have been undertaken, such as analyzing needs of users, developing learning modules, and measuring effectiveness of the modules.

The developed model is still conventional as it is still done with a simple and manual method and with learning materials in the form of book. Pursuant to the rapid development of technology, LC is hoped to be computer assisted that it is going to be more interesting and triggering.

There have been a number of endeavors conducted to use computer to support self-directed learning. O'Donell (2006) reviewed the use of computer-assisted language learning (CALL) for English as Second Language classes in Korea. K. Lee (2000) suggests that network-based technology can be appropriate for ESL learners as it gives an experiential learning that can raise students' learning motivation and enhance their achievement. Kanna and MacKnish (2000) stated that in order for students to practice their skills and to expose themselves to computer and provide themselves with peer and alternative learning environment, they have to use the online learning. The model of learning is able to reduce students' anxiety, especially when it is offered in the multimedia lab the opportunity to aid students' visualization of the situation can be largely enhanced (Huang & Liu, 2000). The learning model is also beneficial in many general education situations because of the immediacy of feedback as delay in giving feedback to students can be a serious issue (Atikson & Davies, 2005).

II. Methodology and Result, and Discussion

The development of LC for TOEFL was based on result of tracer study undertaken in five universities and colleges in Bali, including Udayana university, Ganesha University of Education, Foreign Language Institute of Saraswati Denpasar, Warmadesa University, and Politeknik Negeri Bali (Widanta, 2013). The study was focused on four major activities including (1) to recognize basic competency of students in those five places; (2) to know responses of deans and department heads on development of LC; (3) to know response of English lecturers on development of LC; and (4) to know response and hope of students in the five universities and colleges on learning TOEFL. As the result of each component positive, development of LC

program for student to learn and practice TOEFL was a proper decision.

There were a number of stages carried out to realize LC. There were: (1) designing TOEFL modules, (2) designing instruments for validation, (3) validating modules, (4) giving pre test, (5) implementing the learning with the developed module, and (6) giving post test.

TOEFL modules comprise of two parts, learning module and test module. There are ten modules designed to facilitate LC. The modules are graded from the first until the tenth pursuant to the level of difficulty. Participants are required to work out the modules hierarchically from module 1until 10.

Instrument for modules validation was prepared upon the completion of modules. There were five kinds of instrument prepared for the validation, including content validating instrument, design validating instrument, individual try out, small group try out, and field or big group try out instrument. Each instrument consists of questionnaire for judges or student to score and to comment on the modules.

Validating was conducted upon the completion of instruments. Content of the modules was validated by a senior lecturer from Ganesha University of Education whose home base was English education. Design validation was given by a senior lecturer who has been intensively conducting research and is expert in research and development.

Individual try out, small group try out and field or big group try out were conducted by inviting students to judge the modules. A student who was from any level of proficiency was assigned to give an individual judgment. Three students from low, middle and high level of proficiency were invited to give judgment on the modules. Any comment and suggestion given by judges and students during validation and try out were complied and used as bases for revising the modules. It was done to have fixed modules.

Up on the revision, the final modules were used for try out. The group of student in one class who was given pre test was used as participant. They were given time to learn TOEFL material on their own. Self-directed learning was given once before the participants were given post test. Taking for about 90 minutes, SDL was conducted by instructor of the class concerned. The post test by using TOEFL test filed at the end of

the module was given to the participant. The test was started with listening (part A), structure and written expression (part B) and reading comprehension (part C). To see

effectiveness of the module, both results of the test were graded and analyzed.
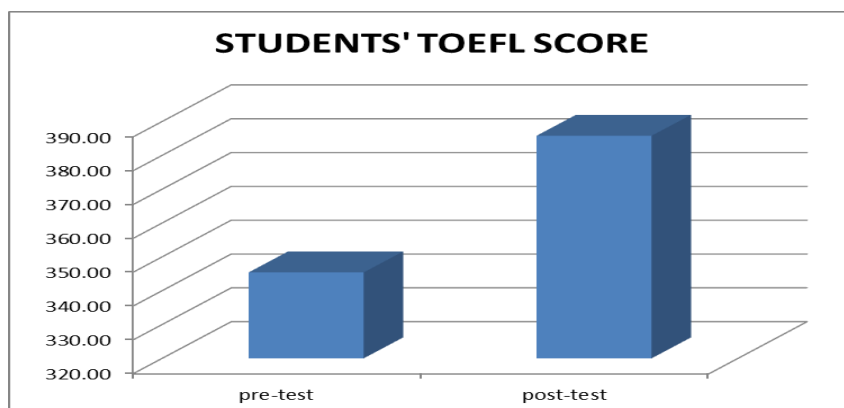
	pre-test	post-test
Means	367.26	416.17
Means of progress	-	48.91
Percentage of progress	-	13.32
Median	363.00	420.00
Standard of deviation	31.04	45.29
Variants	963.66	2050.88

It is clearly shown that means of pre test score is 367.26 and means of post test score is 416.17. The increase in percentage is 48.91. The increase is considered significant. The increase in means between pre test and post test can give feasible information that LC with SDL model of learning for TOEFL is effective. Even though LC was done conventionally, which excludes the use of computer technology it is triggering and motivating students to learn. And, although students were taught in a relatively short time, they were considered able to show good achievement. Besides, students were seen to be motivated to learn and work out the test as they found a clear path to do so.

III. Conclusion and Further Suggestion

The conventional LC works sufficiently to increase students TOEFL score. Even though it was not computer-assisted, it was a sufficiently effective model of learning. LC center is a proper place for students to learn things which need skill, perseverance, and self-motivation. By doing SDL students found that experiencing the way to solve problem on their own is very beneficial.

However, an attempt for a better learning device should continuously be planned. The conventional LC will be of much trigger and motivation if it is presented with computer technology. Students who spend their almost whole day with the technology in doing their academic tasks will be beneficial. For further work, computer-based LC for learning TOEFL will be the priority.

For further development, academicians, researchers, instructors or teachers who intensively deal with SDL for learning TOEFL should try to develop more trendy learning models. Development can be enhanced by choosing other test tools, participants involved in the research, learning model, or others. The most chased issue is the use of computer system to support its perfectness. For this case, modules can be saved in computer that students will be able to learn and work out the test efficiently.

Bibliography

Atikson, T & Davies, G. 2005. Computer-Aided Assessment (CAA) and language mearning, Module 4.1 *Information and communications*

Technology for Language Teachers. Retrieved June 17, 2005 from http://www.ict4lt.org/en/en_mod4-l.htm#introduction.

Altuger-Genc, G. 2013. Design and development of a self-directed learning component for a mechanical engineering technology course. SUNY Farmingdale State College.

Caffarella, R. S. 1993. Self-directed learning. In S.B. Marriam (ed), An Update on adult learning theory, no.57.San Francisco: Jossey-Bass.

Hiemstra, R. 1994. Self-directed learning. In T. Husen & T.N. Postlethwaite (Eds.), *The International Encyclopedia of Education* (second edition), Oxford: Pergamon Presss.,Retrieved May 31, 2006 from http://home.twcny.rr.com/hiemstra/sdlhdbk.html.

Huang, S.J. & Liu, H.F. 2000. Communicative Language Teaching in a Multimedia Language Lab. *The Internet TESL Journal, 6*(2). Retrieved May 23, 2005, from http://itslj.org/Articles/Lee-CALLbarriers.html

Kannan, J. & Macknish C. 2000. Issues Affecting On-line ESL Learning : A Singapore Case Study . *The Internet TESL Journal, 6*(11). Retrieved May 16, 2005 from http://itslj.org/Articles/Kannan-OnlineESL.html

Knowles, M.S. 1975. Self-directed Learning. New York: Association Press.

Lee, K. 2000. English Teachers' Barriers to the Use of Computer-assissted Language Learning. *The internet TESL Journal, 6* (12). Retrieved May 23 2005 from http://itslj.org/Articles/Lee-CALLbarriers.html

O'Donnell, Timonthy J. 2006. Learning Engish as a foreign language in Korea: Does CALL have a place? Asian EFL Journal. The EFL Professional' Writen Forum. Retrieved April 2006. Fom http://www-asian-efl-journal.com/pta-April06-TJO

Taylor, M. 1981. The Social Dimension of Adult Learning. In: Salter L (ed.). Communication Studies in Canada Butterworth. Toronto, Ontario, 133-146.

Widanta. I. M. R. J. 2008. Pengembangan model pembelajaran mandiri berbasis TOEIC di bidang teknologi, Politeknik Negeri Bali. Laporan penelitian hibah bersaing Dikti 2008.

Widanta. I. M. R. J. 2012. Pengembangan model pembelajaran mandiri berorientasi TOEFL Untuk meningkatkan nilai TOEFL mahasiswa Politeknik Negeri Bali. Laporan penelitian hibah bersaing Dikti 2012.

Widanta. I. M. R. J. 2013. Studi empiris tentang kebutuhan mahasiswa, dosen, dekan dan ketua jurusan di empat universitas di Bali terhadap pengembangan learning center (LC) berbasis TOEFL. Laporan penelitian hibah unggulan perguruan tinggi (HUPT) Dikti 2013.

INDEX

The 1st International Conference on Innovative Research Across Disciplines was initiated by the Research Institute of Ganesha University of Education to be a forum for all international researchers to share and publish the results of their innovative, excellent, and robust works in the field of education, social science and humanities, as well as science and technology