



3rd International Conference on Mathematics and
Natural Sciences

IC 2021 ON MNS

3 & 4th of November 2021

Abstract Book



**“Innovative Research on Mathematics, Natural
Science and Education in New Normal Era for
Addressing the Industry 4.0 Challenge”**

Organized by :



The Faculty of Mathematics and Natural Sciences
Universitas Pendidikan Ganesha

<http://fmipa.undiksha.ac.id/>

WELLCOME ADDRESS: RECTOR UNDIKSHA

**WELCOME NOTE
ON THE 3rd INTERNATIONAL CONFERENCE ON MATHEMATICS AND
NATURAL SCIENCES (IConMNS)
3rd NOVEMBER 2021**

The honourable:

1. Vice Rectors of Universitas Pendidikan Ganesha;
2. Head of Research and Community Service Institute of Universitas Pendidikan Ganesha;
3. Dean of Faculty of Mathematics and Natural Science of Universitas Pendidikan Ganesha;
4. Deans and Director of Postgraduate Program of Universitas Pendidikan Ganesha;
5. Heads of Study Programs;
6. Heads of Departments.

The respected Keynote Speakers:

1. Prof. Judith Puncochar, Ph.D. of Northern Michigan University;
2. Prof Dr. Ir. Haryanti, M.Si of Biotechnology in Aquaculture, BBRBLPP Gondol;
3. Dr. Sabina Eggert of University Gottingen;
4. Prof. don Faus of Northern Michigan University;
5. Prof. Dr. rer. nat. Agus Rubiyanto, M.Eng.Sc of Institut Teknologi Sepuluh Nopember.

The respected Invited Speakers:

1. Prof. Dr. Ketut Suma, M.S of Universitas Pendidikan Ganesha;
2. Dr. Ibrohim, M.Si of Universitas Negeri Malang;
3. Dr. Woro Sumarni, M.Si, of Universitas Negeri Semarang;
4. Rooselyna Ekawati, S.Si, M.Sc., Ph.D of Universitas Negeri Surabaya;
5. Dr. Putu Artawan, S.Pd., M.Si of Universitas Pendidikan Ganesha;
6. Dr. I Dewa Ketut Sastrawidana, M.Si of Universitas Pendidikan Ganesha;
7. Dra. Ni Luh Watiningsih, M.Si of Universitas Udayana;
8. Dr. I Gede Adhitya Wisnu Wardhana, M.Si of Universitas Mataram.

Om Swastiastu, Assalamualaikum Warahmatullahi Wabarakatuh,
May God Bless us all, Salam Harmoni

On behalf of Universitas Pendidikan Ganesha, I would like to extend my warmest regards to all speakers and participants of the 3rd International Conference on Mathematics and Natural Sciences under the theme “Innovative Research on Mathematics, Natural Sciences and Education in New Normal for Addressing the Industry 4.0 Challenge.”

First, thank the Almighty God, Ida Sang Hyang Widi Wasa/Tuhan Yang Maha Esa, for the blessing we received in preparing this conference. Second, let me express my sincere appreciation for the committee that has worked hard to provide a means for the researchers and lecturers to exchange ideas and gain new knowledge. Hopefully, this virtual conference will run smoothly and be fruitful.

Honourable Speakers, respected researchers, and esteemed scholars,

As predicted by experts, the fourth industrial revolution is evolving at an exponential pace, disrupting almost every industry in every country. The pandemic has proven the disruption, the challenges we need to face. All of us can recall how 2020 has forced us to adapt to the 'new normal'; the work-from-home setting, the home-schooling, lockdown, and quarantine, as well as the mandatory health protocol. Automation begins to substitute labor as technology is far more efficient to reduce physical interaction. Such a situation has demanded us the constant adaptation we need in life, implying that skill and talent will be more valued in the future. Hence, to contribute to the constant adaptation for better human resources, our conference is themed “Innovative Research on Mathematics, Natural Sciences and Education in New Normal for Addressing the Industry 4.0 Challenge.”

Respectable researchers,

Thank you for joining our 3rd International Conference on Mathematics and Natural Sciences; I wish you the most fruitful conferences. May this conference bring plentiful benefits for us, the global society, and humanity.

Om Santhi, Shanti, Shanti, Om.

Wassalamu a’laikum Wr. Wb,

Rector of Universitas Pendidikan Ganesha

TTD

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

WELLCOME ADDRESS: CHAIR OF THE COMMITTEE

Good morning everyone. Welcome to the IConMNS 2021
**Om Swastiastu, Assalamualaikum Wr. Wb., Namo Buddha ya, Syalom, Salam
Kebajikan.**

The honourable Rector of Universitas Pendidikan Ganesha , and all Vice Rectors.
The Head of Research Institute and Community Service Universitas Pendidikan
Ganesha.
The Dean of the Faculty of Mathematics and Natural Sciences and all Vice Deans,
The Speakers and Participants,

Ladies and Gentlemen,

First of all, let us praise and thank The Almighty God for His graces bestowed upon us. It is my pleasure and privilege to extend our warmest welcome to all participants of the IConMNS 2021, the 3rd International Conference on Mathematics and Natural Sciences 2021 with the theme of **“Innovative Research on Mathematics, Natural Science, and Education in New Normal Era for Addressing the Industry 4.0 Challenge”**. The purpose of this conference is to promote and encourage the exchange of thoughts and ideas of the advanced research in the fields of Chemistry, Physics, Biology, Marine Sciences and Aquaculture, Environmental Sciences, Mathematics Education, Physics Education, Chemistry Education, and Biology Education.

We, Universitas Pendidikan Ganesha, are proud to organized and host this conference. To all presenters and participants, thank you very much for your enthusiasm for the conference. We are highly appreciated your presence today. On this special occasion, I honorably welcome our outstanding keynote and invited speakers who are pleased to make contributions to our conference and share their new research ideas with us. They are:

1. Prof. Dr. Haryanti, MS. from Institute for Mariculture Research and Fisheries Extension (IMRAFE), Ministry of Maritime and Fisheries Affairs, Indonesia;
2. Prof. Dr.rer.nat. Agus Rubiyanto, M.Eng.Sc. from Department of Physics, ITS, Indonesia;
3. Prof. Don Faust, Ph.D from Northern Michigan University, USA;
4. Prof. Judith Puncochar, Ph.D. from Northern Michigan University, USA;
5. Dr. Sabina Eggert from Gottingen University, Germany
6. Dr. Ibrohim, M.Si. from Biology Department, Universitas Negeri Malang, Indonesia;
7. Dra. Ini Luh Watiningsih, M.Sc., Ph.D. from Biology Department, Universitas Udayana, Indonesia;
8. Prof. Dr. Ketut Suma, M.S from Science Education Department, Universitas Pendidikan Ganesha, Indonesia;
9. Dr. I Dewa Ketut Sastrawidana, S.Si., M.Si from Chemistry Department, Universitas Pendidikan Ganesha, Indonesia;
10. Dr. Putu Artawan, S.Pd.,M.Si from Physics Education Department, Universitas Pendidikan Ganesha, Indonesia;
11. Dr. I Gede Adhitya Wisnu Wardhana from Universitas Mataram, Indonesia;

12. Dr. Woro Sumarni, M.Si. from Universitas Negeri Semarang, Indonesia; and
13. Rooselyna Ekawati, S.Si., M.Sc., Ph.D. from Universitas Negeri Surabaya, Indonesia.

In addition, we also have 4 parallel presentation sessions including Chemistry, Physics, Biology, Marine Sciences and Aquaculture Environmental Sciences Mathematics Education, Physics Education, Chemistry Education, and Biology Education. You can have the opportunity to share with us any thoughts, ideas, and innovations confidently. Hope you will enjoy this conference and contribute effectively. So, you can take home valuable knowledge and experience, good relationships and good memories. Although we try our finest to be professional, on behalf of Universitas Pendidikan Ganesha, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event.

Last but not least, I also express my deepest gratitude and appreciation to Committee. Thank you for all the hard work. I will not be able to stand here, in front of all of you today, if not because of amazing people in the organizing committee who have been with me since the very beginning.

I wish you a very productive conference with exciting and encouraging discussions and exchange of knowledge so that together we can anticipate a future of groundbreaking knowledge, research, and technology.

Om, Shanti, Shanti, Shanti, Om; Wassalamualaikum Wr. Wb.; Sadhu, Sadhu, Sadhu; Syalom

Singaraja, November 3rd, 2021

Chair,
Gede Iwan Setiabudi

COMMITTEE
(in Indonesian)



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
UNIVERSITAS PENDIDIKAN GANESHA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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KEPUTUSAN DEKAN FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN GANESHA

NOMOR : 44/UN48.9/KP/2021

TENTANG

PANITIA SEMINAR INTERNASIONAL FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN GANESHA TAHUN 2021

DEKAN FAKULTAS MIPA UNIVERSITAS PENDIDIKAN GANESHA

- Menimbang : bahwa untuk kelancaran pelaksanaan seminar internasional Fakultas MIPA, dipandang perlu membentuk Panitia Seminar Internasional Fakultas MIPA Universitas Pendidikan Ganesha Tahun 2021, yang ditetapkan dengan Keputusan Dekan;
- Mengingat : 1. Undang-Undang Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional;
2. Undang-Undang Nomor 12 Tahun 2012 tentang Pendidikan Tinggi;
3. Peraturan Presiden Nomor 11 Tahun 2006 Tentang Perubahan IKIP Negeri Singaraja menjadi Universitas Pendidikan Ganesha;
4. Peraturan Pemerintah No. 32 Tahun 2013 tentang Perubahan Atas Peraturan Pemerintah Nomor 19 Tahun 2005 tentang Standar Nasional Pendidikan;
5. Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Nomor 44 Tahun 2015 tentang Standar Nasional Pendidikan Tinggi;
6. Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Nomor 14 Tahun 2016, tentang Organisasi dan Tata Kerja (OTK) Universitas Pendidikan Ganesha;
7. Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Nomor 75 Tahun 2017 tentang Statuta Universitas Pendidikan Ganesha;
- MEMUTUSKAN:
- Menetapkan : KEPUTUSAN DEKAN FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM UNIVERSITAS PENDIDIKAN GANESHA TENTANG PANITIA SEMINAR INTERNASIONAL FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM UNIVERSITAS PENDIDIKAN GANESHA TAHUN 2021.
- KESATU : Menetapkan yang namanya tercantum dalam lampiran keputusan ini sebagai Panitia Seminar Internasional Fakultas MIPA Universitas Pendidikan Ganesha Tahun 2021;
- KEDUA : Personal Pelaksana Kegiatan Panitia Seminar Internasional Fakultas MIPA Universitas Pendidikan Ganesha Tahun 2021, bertanggungjawab kepada Dekan;
- KETIGA : Segala biaya yang timbul akibat diterbitkan Keputusan ini dibebankan pada DIPA Fakultas MIPA Universitas Pendidikan Ganesha Tahun 2021;
- KEEMPAT : Keputusan ini berlaku sejak ditetapkan, dengan ketentuan bilamana dikemudian hari terdapat kekeliruan dalam keputusan ini akan diadakan perubahan seperlunya.

Ditetapkan di Singaraja
Pada tanggal 26 April 2021

DEKAN FAKULTAS MIPA
UNIVERSITAS PENDIDIKAN GANESHA,
Prof. Dr. INENGAH SUPARTA, M.Si.
NIP. 196507111990031003

LAMPIRAN
KEPUTUSAN DEKAN FAKULTAS MIPA
UNIVERSITAS PENDIDIKAN GANESHA
NOMOR : 44 /U4N48.9/KP/ 2021
TANGGAL, 26 APRIL 2021
TENTANG PANITIA SEMINAR INTERNASIONAL
FAKULTAS MIPA UNIVERSITAS PENDIDIKAN GANESHA
TAHUN 2021.

Pengarah	: Prof. Dr. I Nengah Suparta.,M.Si
Penanggung Jawab	: Dr. I Wayan Sukra Warpala, M.Sc.
Wakil Penanggung Jawab	: 1. Dr. I Gusti Lanang Wiratma,M.Si 2. I Nyoman Sukarta,SPd.,M.Si
Ketua	: Dr. Gede Iwan Setiabudi, S.Pd., M.Si.
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Bendahara	: 1. Luh Sri Astri Muliartari,SE 2. Ketut Viera Yunista, SE. 3. Kadek Swandewi,A.Md
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8. Ni Luh Putu Ananda Saraswati, S.Si., M.Si.
9. Jasmine Masyitha Amelia, S.Pi., M.Si.
9. Kadek Adi Subagia
- Seksi Tempat/Perlengkapan : 1. I Gusti Nyoman Yudi Hartawan, S.Si, M.Sc (Koordinator)
2. Alexander Korinus Marantika, S.Pi, M.P
3. I Gede Sukerata, SH
4. Gede Widiasta
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5. Putu Dinda Karina Mahendri, S.Pd
- Seksi Dokumentasi : 1. Drs Dewa Putu Subamia, M.Pd (Koordinator)
2. I Gusti Bagus Suryaningrat, SE.
3. Ida Bagus Wiradinata, S.Pd

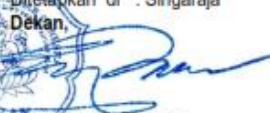
Ditandatangani di : Singaraja
Dekan

I NENGAH SUPARTA
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RUNDOWN

Day 1: Wednesday 3rd November 2021

Time (Wita)	Program
07.30 – 08.30	Registration
08.30 – 09.30	Opening Ceremony <ul style="list-style-type: none"> • Welcome Dance • Indonesia Anthem • Prayer • Welcoming Speech from the Chair of IConMNS 2021 • Opening Speech from Rector Universitas Pendidikan Ganesha • Token of Appreciation and Photo Session.
09.30 – 09.40	Coffe Break
09.40 – 10.30	Plenary Session 1 (<i>Main Room</i>) Keynote Speaker: Prof. Dr. Ir. Haryanti, M.S. (Biotechnology in Aquaculture, BBRBLPP Gondol) Moderator: Jasmine Masyitha Amelia, S.Pi., M.Si.
10.30 – 11.20	Plenary Session 2 (<i>Main Room</i>) Keynote Speaker: Prof. Dr. rer.nat. Agus Rubiyanto, M.Eng.Sc. (Professor in Medical Physics, Institut Teknologi Sepuluh Nopember) Moderator: Jasmine Masyitha Amelia, S.Pi., M.Si.
11.20 – 12.10	Parallel Session (<i>Breakout Room</i>) Room 1 (Mathematics, Mathematics Education, and Computer Science) Invited Speaker: Rooselyna Ekawati, S.Si, M.Sc., Ph.D. (Psychology of Mathematics Education, Universitas Negeri Surabaya) Moderator: Dr. Gede Suweken, M.Sc. Room 2 (Chemistry and Chemistry Education) Invited Speaker: Dr. Woro Sumarni, M.Si. (Chemistry Education, Universitas Negeri Semarang) Moderator: Ni Luh Putu Ananda Saraswati, S.Si., M.Si. Room 3 (Physics, Physics Education, and Natural Science Education) Invited Speaker: Prof. Dr. Ketut Suma, M.S. (Physics Education, Universitas Pendidikan Ganesha) Moderator: Luh Mitha Priyanka, S.Pd., M.Pd. Room 4 (Biology, Biology Education, Marine Science, Fisheries, Life Science, and Environmental Science) Invited Speaker: Dr. Ibrohim, M.Si. (Biology Education, Universitas Negeri Malang) Moderator: Ni Putu Dian Pertiwi, S.Si., M.Si.
12.10 – 13.10	Lunch
13.10 – 14.00	Parallel Session (<i>Breakout Room</i>) Room 1 (Mathematics, Mathematics Education, and Computer Science) Presentation Video 1 Presentation Video 2 Presentation Video 3 Discussion

Time (Wita)	Program
	Room 2 (Chemistry and Chemistry Education) Presentation Video 1 Presentation Video 2 Presentation Video 3 Discussion
	Room 3 (Physics, Physics Education, and Natural Science Education) Presentation Video 1 Presentation Video 2 Presentation Video 3 Discussion
	Room 4 (Biology, Biology Education, Marine Science, Fisheries, Life Science, and Environmental Science) Presentation Video 1 Presentation Video 2 Presentation Video 3 Discussion
14.00 – 14.50	Plenary Session 3 (<i>Main Room</i>) Keynote Speaker: Dr. Sabina Eggert (Central Institute for Teacher Education and Research, Göttingen University) Moderator: I Gede Arjana, S.Pd., M.Sc. RWTH.

Day 2 : Thursday 4th November 2021

Time (Wita)	Program
07.30 – 08.00	Registration
08.00 – 08.50	Plenary Session 4 (<i>Main Room</i>) Keynote Speaker: Prof. Don Faust (Mathematics and Computer Science, Northern Michigan University) Moderator: I Gede Arjana, S.Pd., M.Sc. RWTH.
08.50 – 09.40	Plenary Session 5 (<i>Main Room</i>) Keynote Speaker: Prof. Judith Puncochar, Ph.D. (Educational Psychology, Northern Michigan University) Moderator: I Gede Arjana, S.Pd., M.Sc. RWTH.
09.40 – 10.00	Coffe Break
10.00 – 10.50	Parallel Session (<i>Breakout Room</i>) Room 1 (Mathematics, Mathematics Education, and Computer Science) Invited Speaker: Dr. I Gede Adhitya Wisnu Wardhana, M.Si. (Mathematics-Algebra, Universitas Mataram) Moderator: Dr. Gede Suweken, M.Sc. Room 2 (Chemistry and Chemistry Education) Invited Speaker: Dr. I Dewa Ketut Sastrawidana, M.Si. (Environmental Chemistry, Universitas Pendidikan Ganesha) Moderator: Ni Luh Putu Ananda Saraswati, S.Si., M.Si. Room 3 (Physics, Physics Education, and Natural Science Education) Invited Speaker: Dr. Putu Artawan, S.Pd., M.Si. (Physics, Universitas Pendidikan Ganesha) Moderator: Luh Mitha Priyanka, S.Pd., M.Pd. Room 4 (Biology, Biology Education, Marine Science, Fisheries, Life Science, and Environmental Science) Invited Speaker: Dra. Ni Luh Watiniasih, M.Sc., Ph.D. (Biodiversity and Behavioural Ecology, Universitas Udayana) Moderator: Ni Putu Dian Pertiwi, S.Si., M.Si.
10.50 – 11.35	Parallel Session (<i>Breakout Room</i>) Room 1 (Mathematics, Mathematics Education, and Computer Science) Presentation Video 4 Presentation Video 5 Presentation Video 6 Discussion Room 2 (Chemistry and Chemistry Education) Presentation Video 4 Presentation Video 5 Presentation Video 6 Discussion Room 3 (Physics, Physics Education, and Natural Science Education) Presentation Video 4 Presentation Video 5

Time (Wita)	Program
	Presentation Video 6 Discussion
	<u>Room 4</u> (Biology, Biology Education, Marine Science, Fisheries, Life Science, and Environmental Science) Presentation Video 4 Presentation Video 5 Presentation Video 6 Discussion
11.35 – 12.35	<u>Lunch</u>
12.35 – 13.20	<u>Parallel Session</u> (<i>Breakout Room</i>) <u>Room 1</u> (Mathematics, Mathematics Education, and Computer Science) Presentation Video 7 Presentation Video 8 Presentation Video 9 Discussion <u>Room 2</u> (Chemistry and Chemistry Education) Presentation Video 7 Presentation Video 8 Presentation Video 9 Discussion <u>Room 3</u> (Physics, Physics Education, and Natural Science Education) Presentation Video 7 Presentation Video 8 Presentation Video 9 Discussion <u>Room 4</u> (Biology, Biology Education, Marine Science, Fisheries, Life Science, and Environmental Science) Presentation Video 7 Presentation Video 8 Presentation Video 9 Discussion
13.20 – 13.30	Closing Ceremony

PARALLEL SESSION SCHEDULE OF THE 3rd IConMNS 2021

ROOM 1		
Topics: Mathematics Education; Mathematics; and Computer Science		
Moderator: I Made Suarsana, S.Pd., M.Si.		
ID	Presenter	Title
IConMNS 02	Komang Sujendra Diputra	Why fraction is difficult to be learned in elementary school ?
IConMNS 10	I Putu Wisna Ariawan	The Impact of Covid-19 on The Management of Mathematics Learning
IConMNS 12	Sita Armi Aulia	The Shape of a Non-Coprime Graph of a Dihedral Group
IConMNS 13	I Made Ardana	Learning Mathematics Meaningfully During the Covid-19 Pandemic through the Implementation of the PMbKGOP Model
IConMNS 14	Gede Suweken	Modeling School Zone Border Using GeoGebra
IConMNS 18	Daisyah Alifian Fatahillah	Some Elementary Construction of Generalized Quasi Cyclic Codes
IConMNS 19	I Made Suarsana	Development E-Module of Numerical Methods with Multiple Representation Approaches and Containing Contextual Problems
IConMNS 22	Ronaldo Kho	Visuospatial reasoning ability of the papua indigenous learners in constructing three-dimensional objects
IConMNS 27	Burhanuddin	Making Nonparametric Regression Packages with Refining Parameter Optimization Using Particle Swarm Optimization
IConMNS 30	I Made Suarsana	Initial Design of Multimedia Learning Mathematics Based on Cognitive Theory for Deaf Students Grade 8 th
IConMNS 31	Dewa Ayu Putu Pradnyadewi	Development of Digital Modul with Multi Representation Aproach and Contain Contextual Problems for Students Grade 10th in Relation and Function Topic
IConMNS 32	Nadia Rieva Nala	Generalized Autoregressive Conditional Heteroskedasticity Model in Forecasting the Indonesian Inflation Rate
IConMNS 33	Harja S. Purba	Modelling of Student Activity Monitoring on Interactive Learning Media
IConMNS 34	Zurriatussalmi	Comparison of Kernel and Fourier Series Nonparametric Regression in Modeling Poverty Data of Nusa Tenggara Barat Province
IConMNS 37	Ni Nyoman Parwati	The "PAS" Learning Model as an Alternative to the Implementation of Mathematics Learning to Build Students' Positive Characters
IConMNS 40	Bakri Mallo	Effect of Active Learning Start With A Question Model on Student Learning Outcome at State High School

ROOM 1		
Topics: Mathematics Education; Mathematics; and Computer Science		
Moderator: I Made Suarsana, S.Pd., M.Si.		
ID	Presenter	Title
IConMNS 41	I Gusti Nyoman Yudi Hartawan	The New Flexible Extended (NFE)-Weibull Distribution for Analyzing Covid Case Data
IConMNS 42	Made Juniantari	Development of Multi-Representation Learning Media Based on PEDATI Model
IConMNS 48	I Gusti Nyoman Yudi Hartawan	Comparison of the Performance of Lee Carter's Model with CBD in Estimating Mortality Rates of Population
IConMNS 53	Gede Ryan Arya Wisnu Wardana	Prediction of Energy Crisis in Indonesia Through Simulation Models System Dynamic
IConMNS 55	Faizar Rusyadi	Covid-19 Penyebab Pengangguran Bertambah yang mempengaruhi Angka Kemiskinan Bali Meningkat
IConMNS 56	Tresna Dwipayana Kadek	Simulasi Tingkat Pengangguran Terbuka Di Bali Dengan Powersim Studio 10
IConMNS 57	I Gusti Putu Sudiarta	Investigation of Students' Mathematical Online Discussion: Experience of Online Learning Implementaion in Yunior High School During the Covid-19 Pandemic
IConMNS 58	Dede Ardiansyah	Prediction of Many Tourist in Buleleng Through Simulation of System Dynamics
IConMNS 59	I Gusti Putu Sudiarta	Development of Online Learning Model with Digital Multimodal Approach to Improve Mathematical Proficiency and Character of Junior High School Students in Bali
IConMNS 63	Gede Wahyu Ari Putra	Prediction of Water Availability Through Simulation of Dynamic System Based on Powersim Studio 10.
IConMNS 68	I Nengah Suparta	On Strongly Gracefulness of Sun Graphs
IConMNS 78	Muklas Maulana	Some Characteristics of Prime Graph of Ring $\mathbb{Z}_n$
IConMNS 81	Abdul Gazir Syarifudin	Non-Coprime Graph of Subgroup of Dihedral Group
IConMNS 82	I Gede Aris Gunadi	Simulation of Sidementation Prediction Due to Growth Of Water Biomass ' Eceng Gondok ' In Lake Buyan Buleleng Bali
IConMNS 83	I Putu Pasek Suryawan	Balinese sacred building ethnomathematics study and how to acquire its knowledge
IConMNS 84	I Gusti Ngurah Pujawan	Effectiveness of Authentic Problem-Based Learning Assisted by Maple Software on Linear Program Topics
IConMNS 85	I.N. Sukajaya	Assessment For Learning of Students' Cognition In Solving Mathematics Problems Based on Cognitive And Psycomotory Domain
IConMNS 86	Sutji Rochaminah	Development of Learning Models Based on Mathematical Problem Posing to Improve Critical Thinking Skill

ROOM 1**Topics: Mathematics Education; Mathematics; and Computer Science****Moderator: I Made Suarsana, S.Pd., M.Si.**

ID	Presenter	Title
IconMNS 96	Helfra Durasu	Implementation of Polya Theory in Problem Solving Operations of Algebra
IconMNS 101	I Wayan Puja Astawa	Students Difficulties in Solving Limit of Function and Limit of Sequence
IconMNS 107	Gede Suweken	The Effect of The Implementation of The Model Eliciting Activities on Productive Disposition
IconMNS 111	I Nengah Suparta	Some New Results on Edge Irregularity Strength of Chain Graphs
IconMNS 114	Winsy Weku	Spatial Interpolation With Nonparametric Bessel Covariance Function To Model The Hole Effect of Land Price In Manado
IconMNS 119	Oknardo Tulung	Spatio Temporal Characteristics of LST to NDBI and NDVI in Tondano Lake Based on Landsat Imagery
IconMNS 121	Yohanes Langi	Optimizing Model for Sustainable Harvesting of Cempaka Trees (<i>Elmerillia</i> Sp) in the Carbon Trading Scenario
IconMNS 122	Umi Nur Qomariyah	Statistical Thinking Process in solving statistical problems with Field Dependent Cognitive Style

ROOM 2**Topics: Chemistry Education; Chemistry; and Environmental Science****Moderator: Ni Luh Putu Ananda Saraswati, S.Si., M.Si.**

ID	Presenter	Title
IconMNS 3	Putu Eka Dharma Putra	In the used of Fourier Synthesis and Maximum Entropy Method to Investigate Crystalline Defects of the T'-Pr ₂ -xCeCuO ₄ nanocrystals
IconMNS 21	I Putu Parwata	Ectoine and hydroxyectoine produced by halophilic bacteria isolated from traditional solar saltern at Pejarakan Village, Province of Bali, Indonesia
IconMNS 24	I Ketut Sudiana	Encyclopedia of Chemistry Laboratory Equipment to Support Basic Chemistry Practicum Learning
IconMNS 25	I Nyoman Tika	Effect of Thiamin In Wine Fermentation With Yeast <i>Saccharomyces Cerevisiae</i> ILS6
IconMNS 26	Ni Putu Sri Ayuni	Adsorption Study of Methyl Orange Using Nata de Coco – Leri Adsorbent
IconMNS 28	Siti Maryam	Flavonoid Levels Of Red Beans (<i>Phaseolus Vulgaris</i> L) Tempeh In Various Concentrations Of Inoculum And Length Of Fermentation Time
IconMNS 29	I B N Sudria	Developing guided inquiry learning modul supported by hypothesis proving Presentation Videos on buffer solution topic
IconMNS 38	I Wayan Subagia	Experimental Method Use to Improve Scientific Skills and Learning Achievement of Undergraduate Students
IconMNS 39	Ketut Ratnayani	Solvent Selection and Deproteination Methods in Extracting Free Amino Acids and Short Peptides from Germinated Pigeon Pea (<i>Cajanus cajan</i> (L.) Millsp)
IconMNS 44	Adrian Lawren Lumy	Tannin Levels In Chayote, Mung Bean, Flour And Biscuit Based On Chayote (<i>Sechium Edule</i>) And Mung Bean (<i>Vigna Radiata</i>)
IconMNS 45	Ade Putri Milania	Analysis Of Saponins In Biscuits Formulation Of Chayote (<i>Sechium Edule</i>) And Green Beans (<i>Vigna Radiata</i>)
IconMNS 52	Ni Luh Putu Ananda Saraswati	Equilibrium and thermodynamic study of Remazol Red dye adsorption on coconut based-activated carbon
IconMNS 54	I Wayan Redhana	Validity, practicality, and effectiveness of electronic chemistry textbooks based on Balinese local cultures
IconMNS 72	I Wayan Suja	Ethnochemistry of Zingiberaceae in Traditional Balinese Seasonings
IconMNS 73	I Wayan Muderawan	Inclusion Complex Formation of <i>Kaempferia galanga</i> Essential Oil with β -Cyclodextrin

ROOM 2**Topics: Chemistry Education; Chemistry; and Environmental Science****Moderator: Ni Luh Putu Ananda Saraswati, S.Si., M.Si.**

ID	Presenter	Title
IconMNS 75	Gede Iwan Setiabudi	Algacidal Potential of the Endosymbiont Bacterial Consortium of the Seagrasses <i>Enhalus acoroides</i> and <i>Thalassia hemprichii</i>
IconMNS 92	Ketut Srie Marhaeni Julyasih	Efectivity of Some Plant Leaf Extracts on Mortality Of <i>Plutella xylostella</i> L. in Cabbage
IconMNS 93	I Gusti Lanang Wiratma	Portrait of Chemistry Learning at SMAN Bali Mandara During The Covid-19 Pandemic
IconMNS 99	I Wayan Karyasa	Inorganic Nanomaterials for Developing Smart Fabrics: A Review
IconMNS 115	Edi Suryanto	Antioxidant and Sunscreen Activity of Petroleum Ether and Ethanol Extract from Cui Lemon Peel (<i>Citrus microcarpa</i>)
IconMNS 116	Edi Suryanto	Antioxidant and Sunscreen Activity from Solvent Fraction of Nutmeg Shells (<i>Myristica fragrans</i> Houtt.)
IconMNS 117	Edi Suryanto	Antioxidant Activity of Dietary Fiber from Baruk Sago Waste (<i>Arenga microcarpha</i> Becc.)
IconMNS 118	Edi Suryanto	Bacterial Inhibitory Activity of Nutmeg Flesh Liquid Smoke with Calamansi Lemon Nanoparticle Formulation
IconMNS 120	Ratna Siahaan	Riparian Soil Composition of Ranoyapo River, South Minahasa- North Sulawesi
IconMNS 127	Sintia Tangel	Herbal soap made of virgin coconut oil and pangi fruit rind extract (<i>pangium edule</i> reinw) as natural antioxidant and antibacterial agent
IconMNS 129	I Wayan Karyasa	Nanotechnology Meets Arts: Introducing Inorganic Fixator Nanopaste for Improving Quality of Silk Yarn during Natural Dyeing to Balinese Woven Crafts Center at Sinabun Village og Buleleng Regency.

ROOM 3**Topics: Physic Education; Physics; and Natural Science Education****Moderator: Luh Mitha Priyanka, S.Pd., M.Pd.**

ID	Presenter	Title
IconMNS 11	Ni Ketut Rapi	The Effect Of Inquiry-Based Learning Tools For Self-Efficacy And Physics Learning Outcomes
IconMNS 15	I Made Maissy Gita Harumi	Development of integrated science module based on guided inquiry on the theme of gadgets in life for students class VIII
IconMNS 17	Putu Yasa	The Influence of Context-Based Physics Problem Solving Learning Model on Students' High Order Thinking Skills in Physics Education Study Program
IconMNS 23	Luh Putu Budi Yasmini	How Students Respond of Using PhET Simulation Interactive and Phyphox App in Physics Learning
IconMNS 46	Wijaya Gede Sutresna	Dose Analysis and Irradiation Time in The Lung Cancer Treatment Based on Carbon Ion Radiotherapy and Boron Neutron Capture Therapy Using PHITS Program
IconMNS 47	Nia Erlina	The Effectiveness of Project-Based Learning on the Professional Attitude of Preservice Science Teachers Through Andragogy Self-Assessment
IconMNS 50	Agus Ramdani	Analysis of Student Science Literacy: Learning Studies Using Blended Learning-Based Laboratory Inquiry Learning Tools
IconMNS 60	Ni Made Pujani	The Effect Of The Flipped Classroom Learning Model On Problem-Solving Skills
IconMNS 62	I Nyoman Suardana	Need Analysis For Developing On Yunior High School Science Teaching Materials Based On Science, Technology, Engineering, And Mathematics
IconMNS 64	Putu Widiarini	Development Of Project-Based Electronics Practicum Module With Virtual Lab To Increase Student's Creativity
IconMNS 71	Dewi Oktofa Rachmawati	The Viscosity Coefficient Value Of Purification Result Cooking Oil Based On Active Charcoal Temperature With The Falling Ball Method
IconMNS 76	I Wayan Suastra	The Effectiveness of the Junior School Science Learning Model containing Indigenous Science to Develop Character Based on Local Wisdom and Students' Higher-Order Thinking Skills
IconMNS 77	Pande Putu Agus Santoso	The analysis of current and voltage in solar panel circuits using ANOVA
IconMNS 87	A Halim	Effects of Emotional Intelligence on Students' Cognitive Ability in Internship Courses
IconMNS 88	A Halim	Analysis of Physics Question Items for the Comprehensive Exam

ROOM 3		
Topics: Physic Education; Physics; and Natural Science Education		
Moderator: Luh Mitha Priyanka, S.Pd., M.Pd.		
ID	Presenter	Title
IconMNS 89	I Gede Eka Saputra	Use of PhET Simulation Assisted Adventure Educational Games and Their Effect of 4C Skills on Online Learning
IconMNS 90	I Wayan Santyasa	The Relationship Between Social Attitudes, Spiritual Attitudes, and Cognitive Engagement on Students' Critical and Creative Thinking in Learning Physics in High School
IconMNS 91	Pande Putu Agus Santoso	The Effect of Blade Density Variation to Cocopeat Mass that Produce by Poltesa Cocopeat Machine
IconMNS 95	I Wayan Sukra Warpala	Learning Foundation and Option of Assessment Type for Critical Thinking Skill in Science Instruction
IconMNS 102	Rai Sujanem	The Effectiveness of the Probasinphys E-Module assisted by PhET Simulation to Improve Critical Thinking Skills of High School Students
IconMNS 103	Mitha Priyanka	Ethnoscience Study of Balinese Weaving and its Integration into Science Curriculum for Junior High School
IconMNS 104	Ida Bagus Putu Mardana	Effect Of Experiential Learning Model With Virtual Experiment Assisted In Physics Learning On The Senior High School Students' Misconception In Singaraja.
IconMNS 107	Putu Artawan	Analysis Of Characteristic Design Microstripline Antenna Array Variants And Its Application In Satellite Communication System
IconMNS 109	Gede Iwan Setiabudi	Distribution of Seagrass Species and Its Correlation with Aquatic Parameters in Urban Estuaries
IconMNS 113	Verna Albert Suoth	Design and Implementation of The Soputan Volcano Early Warning System Based On SMS-Gateway
IconMNS 123	Yoni Nur Lutfiyah	Effect of Experiential Learning Model With Online Aided on Physics Achievement of The Students XI IPA SMAN 3 Singaraja
IconMNS 124	I Putu Albert Purnama Putra	The Effect of Discovery Learning Learning Model on Critical Thinking Skills Physics Student Grade XI MIPA at SMA Negeri 1 Tabanan
IconMNS 125	I Wayan Yasana	Application of Problem Based Learning (PBL) Model With Online Learning Media To Improve Critical Thinking Skills Of Learners In Physics Learning In Grade X MIPA 3 SMA Negeri 1 Pupuan Year 2020/2021
IconMNS 126	Hanny Frans Sangian	The study of composition range of the (RONs 90)-ethanol-water and gasoline (RONs 92)-ethanol-water in stable emulsions

ROOM 4**Topics: Biology Education; Biology; Fisheries; Life Science; and Marine Science****Moderator: Ni Putu Dian Pertiwi, S.Si., M.Si.**

ID	Presenter	Title
IconMNS 4	Ni Luh Putu Manik Widiyanti	Analysis of the synbiotic yogurt <i>Caulerpa lentilifera</i> drink on blood cholesterol levels in <i>Mus musculus</i> mice
IconMNS 5	I Made Surya Hermawan	A Model of Balinese cultural value in biology learning
IconMNS 6	Nyoman Wijana	Potentials and Strategies for Development of Forest Tourism in The Bukit Kangin tanganan pegriingsingan karangasem bali
IconMNS 7	Sanusi Mulyadiharja	Research Contribution In The Gumi Banten Forest In The Perspective Of Forest Tourism Development In Wanagiri Village, Buleleng
IconMNS 8	I Made Sutajaya	Community Development Through a Participatory Ergonomic Approach and Social Media Help to Improve Community's Understanding and Care Attitude on The Governance of Village Credit Institutions
IconMNS 9	I Made Sutajaya	Tukad Tourism Implementation With Tantri Character And Socio-Cultural Ergonomic Orientation Can Improve Community Care Attitude And Understanding On Environmental Governance In Peliatan Village Ubud Gianyar
IconMNS 16	Desvia Norita Angelina	Developing Virtual Laboratory To Improve Procedural Knowledge In Bacteria Learning Material Of Tenth Grade Students
IconMNS 35	Zulfadhli	Effect of Turmeric Extract in Artificial Feed to Stimulate Growth of Bileh Fish (<i>Rasbora</i> sp.) In the Context of Domestication of Aceh Local Fish
IconMNS 36	Ni Putu Sri Ratna Dewi	Increase Students learning interest by using Tri Hita Karana oriented Flipbooks
IconMNS 49	Gusti Permana	DEVELOPMENT OF HEMOLYMPH IMMUNOPARAMETER IN TAURA SYNDROME INFECTION OF SHRIMP VIRUS <i>L. vannamei</i>
IconMNS 51	Ketut Srie Marhaeni Julyasih	Study On Organoleptic Quality Of Jams Processed From Seaweed <i>Gracilaria verrucosa</i> AND <i>Eucheuma cottonii</i>
IconMNS 65	Ketut Mahardika	Vertical distribution of bacteria population in coastal waters at the clustered marine fish farming of North Bali, Indonesia
IconMNS 66	Putu Justika Nirmala Ardhiana Puspanjali	Comparative Analysis Of Effect Iodine, Ozone And Peracetic Acid As Material Disinfectant Off Eggs Cantang Grouper
IconMNS 67	Desak Made Citrawathi	Implementation Of Case-Based Learning In Nutrition And Health Courses

ROOM 4		
Topics: Biology Education; Biology; Fisheries; Life Science; and Marine Science		
Moderator: Ni Putu Dian Pertiwi, S.Si., M.Si.		
ID	Presenter	Title
IConMNS 69	I Nyoman Dodik Prasetya	Condition and Abundance of Bambu Laut (Isis spp) in Lovina Sea, Singaraja Bali
IConMNS 70	I Nyoman Dodik Prasetya	Biology and Ecology of Natural Resources in Gilimanuk Bay, Bali
IConMNS 74	Ahmad Muzaki	The use of technical chlorine for seawater sterilization in the rearing of barramundi larvae Lates calcarifer
IConMNS 79	Putu Budi Adnyana	Effectiveness Of Online Microteaching Using Supplementary Teaching Material
IConMNS 80	Ida Ayu Putu Suryanti	The Effect of The Additon of Local Microorganism to the Density of Bacteria and Macronutrients of the Catfish (Clarias sp.) Biofloc System Waste
IConMNS 94	I Made Oka Riawan	Analysis of Diversity and Abundance Soil Insects in Taman Gumi Banten, Forest of Wanagiri Village, Buleleng
IConMNS 97	Novia Arinda Pradisty	Site Suitability for Artificial Reef Placement Based on Water Quality Parameters in the Waters of Buleleng, Bali, Indonesia
IConMNS 98	Eghbert Elvan Ampou	Nudibranchia in seawaters of Sumberkima Village, Buleleng Regency, Bali
IConMNS 100	Iis Triyulianti	Water Quality Status Using The Trophic Index (Trix) Values In The Coastal Waters Of Sumberkima Village, Buleleng Province Of Bali
IConMNS 105	Gede Iwan Setiabudi	Natural Traveling Behavior Characteristics of Dolphins in North Bali Waters
IConMNS 106	Haryanti	Effect of Use Probiotics and Constant Temperature on survival, growth and health performance of Asian Seabass Lates calcarifer fry
IConMNS 108	Nurul Yunita	Trend Fluctuation of Fish Catch Volume Towards The Influence of Chlorophyll Distribution in West Kalimantan Province
IConMNS 112	A.A. Inten Paraniti	Analysis of Learning Loss: An Insight From Biology Education Department

KEYNOTE SPEAKERS

Prof. Judith Puncochar, Ph.D



Educational Physiology
Northern Michigan University

Prof. Don Faust, Ph.D.



Mathematics and Computer Sciences
Northern Michigan University

Dr. Sabina Eggert



Gottingen University, Germany

Prof. Dr. Ir. Haryanti, M.S.



Biotechnology in Aquaculture
BBRBLPP Gondol

Prof. Dr.rer.nat. Agus Rubiyanto, M.Eng.Sc



Medical Physics
Departemen Fisika FMIPA ITS

INVITED SPEAKERS

Dr. Ibrohim, M.Si.



Biology Education
FMIPA UM

Dra. Ni Luh Watiningsih, M.Sc., Ph.D.



Biodiversitas and Behavioral Ecology
FMIPA Universitas Udayana

Prof. Dr. Ketut Suma, M.S



Science Education
FMIPA Undiksha

Dr. I Gede Adhitya Wisnu Wardhana



Mathematics – Algebra
FMIPA Universitas Mataram

Dr. Woro Sumarni, M.Si.



Chemistry Education
FMIPA UNNES

Dr. I Dewa Ketut Sastrawidana, S.Si., M.Si



Environmental Chemistry
FMIPA Undiksha

Dr. Putu Artawan, S.Pd.,M.Si



Physics
FMIPA Undiksha

Rooselyna Ekawati, S.Si., M.Sc., Ph.D.



Psychology of mathematic Education
FMIPA UNESA

ABSTRACT COLLECTIONS

The Shape of a Non-Coprime Graph of a Dihedral Group

S. A. Aulia^{1*}, I. G. A. W. Wardhana², Irwansyah², Salwa⁴, & W. U. Misuki⁵

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Abstract. Group representation through a graph is currently a hot topic of research. This topic is a marriage of two fields of science in mathematics, namely Group Theory and Graph Theory. Some of them are group representations in coprime graphs or group representations in non-coprime graphs. Suppose that G is a finite group, the non-coprime graph of group G is denoted by $\Gamma G^{\overline{=}}$ is a graph with vertices consisting of $\overline{G} = G - \{e\}$ and two different vertices $u, v \in G$, said to be neighboring $(|u|, |v|) \neq 1$. Misuki gives some properties of the non-coprime shape from the dihedral group when n is a prime power. We will give a more general property when n is a regular composite number. The main result is the non-coprime shape from a dihedral group is a complete graph or a collection of the disjoint complete subgraph.

Keywords: non-coprime graph, dihedral group, disjoint subgraph.

Some Elementary Constructions of Generalized Quasi Cyclic Codes

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Abstract. In this paper, we describe some elementary constructions of Generalized Quasi Cyclic (GQC) codes. These constructions are lengthening, puncturing, direct sum, $(u, u+v)$ -, and a construction via Gray map from codes over the ring, $A_1 = F_2 + vF_2$, where $v^2 = v$. Moreover, we show that the well-known Reed-Muller code $R(1, m)$ is a GQC code.

Keywords:

Making Nonparametric Regression Packages with Refining Parameter Optimization Using Particle Swarm Optimization

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Abstract. This study aims to create a nonparametric kernel regression package. This package is made using the R programming language. Particle Swarm Optimization (PSO) algorithm is used in the process of selecting the optimal bandwidth value to minimize the Generalized Cross Validation (GCV) value. The results obtained are a package that facilitates the process of nonparametric regression modeling and simplifies the process of selecting the optimal bandwidth value. The program test was carried out using data with four independent variables, namely data on the crude birth rate of West Nusa Tenggara Province in 2018 and obtained very high model accuracy results.

Keywords:

Generalized Autoregressive Conditional Heteroskedasticity Model in Forecasting the Indonesian Inflation Rate

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Abstract. This study aimed to predict the inflation rate in Indonesia, which is important for the stability of the Indonesian economy. The data used were monthly inflation data from January 2003 to December 2018. This data has high volatility and a seasonal pattern so that the data were modeled with SARIMA. The best SARIMA model chosen was SARIMA (1,1,0)(0,1,1)¹² with a Mean Square Error (MSE) value of 0.0001287. The modeling results with SARIMA obtained residuals that did not meet the assumptions of white noise residual and were normally distributed. The results of the squared residual of the SARIMA model were then modeled with GARCH because they contain elements of heteroskedasticity, which were indicated by the measure of the Lagrange Multiplier value. The best GARCH model chosen to predict inflation data was GARCH(1,1) with a Mean Absolute Percentage Error (MAPE) of 6,05%, which states that the results of forecasting the inflation data obtained were very good.

Keywords:

Comparison of Kernel and Fourier Series Nonparametric Regression in Modeling Poverty Data of Nusa Tenggara Barat Province

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Abstract. Poverty is one of the economic problems faced by almost every country, especially developing countries like Indonesia. The case of poverty in one of the provinces in Indonesia, West Nusa Tenggara Province, is still quite high because it is still above the average national poverty level. This condition places West Nusa Tenggara in the eighth position in the top ten provinces with the largest percentage of poor people in Indonesia. One of the efforts that can be done to control this condition is by analyzing the factors that influence the high poverty rate, such as by using regression analysis. In regression analysis, the assumed curve of unknown shape can be approached with nonparametric regression. One of the nonparametric regression approaches that are widely used is the kernel approach and the Fourier series. The kernel method has good ability in modeling data that does not have a certain pattern, is flexible, has easy mathematical form, and can achieve a relatively fast level of convergence. Furthermore, the advantage of the Fourier series approach is that it is able to overcome data that has a trigonometric distribution, with repeated data patterns. This study aims to model the problem of poverty using kernel and Fourier series nonparametric regression. In this study, two models were obtained to be compared, namely the nonparametric kernel regression model and the Fourier series model. Based on the analysis results, the kernel nonparametric regression model was obtained with a Generalized Cross-Validation (GCV) value of 96.9176392, a Mean Square Error (MSE) value of 28.67494, and an R^2 value of 31%. Furthermore, a nonparametric Fourier series regression model was obtained with a GCV value of 9.52377×10^{-24} , a MSE value of 6.678032×10^{-24} , and an R^2 value of 99.9999931%. Therefore, by considering the measures being compared, it can be concluded that the best model for the analyzed data is the Fourier series model.

Keywords: fourier series, kernel, nonparametric regression, poverty data

The New Flexible Extended (NFE)-Weibull Distribution for Analyzing Covid Case Data

I Gusti Nyoman Yudi Hartawan*, I Gusti Ngurah Pujawan, I Putu Wisna Ariawan, Gst. Ayu Mahayukti, & Nurul Fatimah

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Abstract. The aim of this study is to analyze COVID-19 case data in Bali Province using the **NFE-Weibull Distribution**. This distribution is a extended distribution of the Weibull distribution which is well known as a very good tool for modeling lifetime data such as Covid case data. To provide an overview of the Covid cases in Bali Province, the **NFE-Weibull Distribution** was used by the following steps: 1. Estimating the parameters of the probability distribution function using Maximum Likelihood Estimation (MLE); 2. Determining the value of the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and goodness-of-fit measures such as the Kolmogorov-Smirnov (KS) test statistics; 3. Determining the survival function; and 4. Plotting the survival function. The results obtained that the value of the estimated parameters are $\theta = 0.8343575$; $\eta = -0.2756247$, with value of $AIC = 24.06523$; $BIC = 24.45968$; $KS = 0.22778$ and $p = 0.6593$. These results indicate that the distribution is very appropriate in providing an overview of the Bali Province Covid case data. The

survival function is
$$S_x = \frac{1 - (1 - e^{0.28x^{0.83}})^2}{e^{1 - e^{-0.28^2}}}$$
. The plot of the survival function shows the probability that a person can survive up to time x .

Keywords : Covid-19, NFE-Weibull Distribution, maximum likelihood estimation

Comparison of the Performance of Lee Carter's Model with CBD in Estimating Mortality Rates of Population

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Abstract. The purpose of this study was to compare the performance of the Lee-Carter model with the CBD model in estimating mortality rates. The data used in this study is data on the Italian population obtained at www.mortality.org. The stages of this research are 1. Formulating the Lee-Carter and the CBD Models; 2. Determining the estimator of the parameters on the lee-carter and CBD methods; 3. Predicting the mortality rate of the population using the lee-carter and CBD models; 4. Determining the RMSE of the model. The results showed that the RMSE values for the Lee-Carter model were 0.014147 and 0.047985 for the CBD model. Thus it can be said that the Lee-Carter model is better at estimating the mortality rate of the Italian population. Key words: Lee Carter's Model, CBD Model, Mortality Rates

Keywords:

On Strongly Gracefulness of Sun Graphs

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Abstract. A corona of a graph G on p vertices and a finite graph H , denoted with $G \odot H$, is a graph which is obtained by copying p times graph H , and then joining the i th vertex of G with all vertices of the i th copy of H . In this talk we consider a corona of cycle graph on $n \geq 3$ vertices, C_n , and the 1-vertex complete graph, K_1 . This corona graph is usually called sun graph. Consider a graph $G(V, E)$ with vertex set V and edge set E . Assume a function f from V into the set $\{0, 1, \dots, |E|\}$, is injective, where $|E|$ is the cardinality of E . If the set $\{|f(u) - f(v)| : uv \in E\} = \{1, 2, \dots, |E|\}$, then f is called graceful labelling for $G(V, E)$, and the graph $G(V, E)$ is called graceful. Let M be a set of edges of $G(V, E)$ such that any pair of elements of M are non-adjacent, then M is called matching. Furthermore, if every vertex in V is incident with exactly one element of M , then the matching M is said to be perfect. In this case, the graph $G(V, E)$ is called with perfect matching. Moreover, if a graceful graph G , with graceful labeling f , is with perfect matching M such that for every $uv \in M$ we have that $f(u) + f(v) = |E|$, then $G(V, E)$ is called strongly graceful. In this talk we characterize the sun graph $C_n \odot K_1$ in regards with its strongly gracefulness.

Keywords: Corona graph, sun graph, graceful, matching, strongly graceful.

Some Characteristics of Prime Graph of Ring $\mathbb{Z}_n$

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Abstract. The notion of prime graph of a ring R was firstly introduced by Bhavanari, Kuncham, and Dasari in 2010. The prime graph of a ring R , denoted by $PG(R)$ is a graph whose vertices are all elements of the ring. Two distinct vertices x and y are adjacent if and only if $xRy=0$ or $yRx=0$. In this paper, we study forms and properties of $PG(\mathbb{Z}_n)$, and some examples of the number of its spanning trees. In this paper, it is found that for all n , the maximum degree of vertices of $PG(\mathbb{Z}_n)$ is $n-1$ and the minimum degree of its vertices is 1. The second result is, for all n , $PG(\mathbb{Z}_n)$ is neither a Hamiltonian graph nor an Eulerian graph. We also found some examples of the number of its spanning trees.

Keywords: Prime graph, number of spanning trees, Hamiltonian graph.

Non-Coprime Graph of Subgroup of Dihedral Group D_{2n}

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Abstract. The non-coprime graph of the subgroup of a group is the graph where vertices are all nontrivial subgroups and two distinct vertices are adjacent if and only if the order of subgroup is not pairwise relative prime. In this research, we will discuss the non-coprime graph of the subgroup of a dihedral group and its properties. The method that is used is to study literature and deductive proof. The results of this research are the form of the graph, degree of each vertices, radius, diameter, and domination number that contained in the graph when n an odd prime number is determined.

Keywords: the non-coprime graph, subgroup, dihedral group, domination number.

Some New Results on Edge Irregularity Strength of Chain Graphs

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Abstract. Let $G = G(V, E)$ be a connected, simple and undirected graph with vertex set $V(G)$ and edge set $E(G)$. For some positive integer k , a vertex k -labeling for the graph G is a mapping that maps the vertex set $V(G)$ into the set $\{1, 2, \dots, k\}$. The range of this mapping is called labels for the vertices of G . We associate weight for an edge $e \in E(V)$ as the sum of end points labels of e . If any two distinct edges of G have different weights, the mapping is called irregular vertex k -labeling. The minimum k such that the mapping is irregular vertex k -labeling is called the edge irregularity strength of G .

Keywords: Chain graphs, irregularity strength

Spatial Interpolation with Nonparametric Bessel Covariance Function to Model The Hole Effect of Land Price in Manado

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Abstract. As a result of the increasing population in Manado, there is a need for land as residential land. So that the land has its own value which is spatially distributed which can be modeled spatially. This study aims to model the land price in Manado using a geostatistical approach. The land price data used is 150 sampled points, which has a sinusoidal shaped experimental variogram graph pattern (hole effect). The variogram model used in this study is the exponential covariance function and Bessel hybrid, which is then used to predict the unsampled point using the Kriging method. The hybrid Bessel function is a linear combination of the exponential and the Bessel function of the first kind, which has a parameter between 0 and 2 to indicate the level of smoothness of a model. The results show that the exponential and Bessel variogram models provide a spatial distribution of land prices that decrease when moving away from the city center (business center). However, the hybrid Bessel variogram model is more accurate in providing the location of land prices (contours map) that are not evenly distributed in all areas of the city of Manado compared to the exponential variogram.

Keywords: Hybrid Bessel Function, Hole effect, Kriging, Land Prices, Variogram.

Spatio Temporal Characteristics of LST to NDBI and NDVI in Tondano Lake Based on Landsat Imagery

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Abstract. Rapid development of building growth resulted in the decline of green area around Tondano Lake. Tondano lake as a conservation area also act as a tourist area and watershed. The reduction of green land with the increasing number of buildings causes the ground surface to absorb more hot temperatures from the sun, this will cause an increase in surface temperature on land. This research was conducted with spatiotemporal to analyze land cover in Tondano lake using Landsat-8 Imagery with TIRS (Thermal Infrared Red Sensor) and OLI (Operation Land Imager) bands in the period 2015, 2019, and 2021. The model is based on LST (Land Surface Temperature), NDVI (Normalized Difference Vegetation Index) and NDBI (Normalized Difference Built-up Index) algorithms. Variations in the vegetation greenness index ranged from -0.30 – 0.86 in 2015, -0.21 – 0.86 in 2019 and -0.06 – 0.84 in 2021. Meanwhile, the highest building density index ranged from 0.22 in 2015, 0.29 in 2019, and 0.18 in 2021. Pearson Product Moment correlation is used to determine the relationship between land surface temperature or LST affects greenish levels or NDVI and building density levels or NDBI. The results of the correlation test showed the relationship between LST and NDVI is that the higher the land surface temperature in one region, the lower the level of vegetation in the region, in contrast to the relationship between LST and NDBI.

Keywords: Tondano Lake, Landsat-8 Imagery, LST, NDVI, NDBI.

Optimizing Model for Sustainable Harvesting of Cempaka Trees (*Elmerillia Sp*) in the Carbon Trading Scenario

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Abstract. Forests as potential natural resources with will provide maximum benefits if managed properly. Good forest management to get the maximum profit is not an easy job, because there are many difficult decisions that must be made by forest management policy holders in order to get optimal results, one of them is in making decisions to determine the location of forest harvesting plots. Stands management in community forests such as agroforestry, and stands outside forest areas can reduce greenhouse gas emissions within the framework of the Kyoto Protocol . The agroforestry system is one of the better options in reducing climate change compared to other options in terrestrial ecosystems because it has multiple economic and ecological benefits, such as helping food sustainability, increasing farmers' income, maintaining biodiversity, soil conservation, reducing emissions and expanding Forest. Wasiancempaka tree (*ElmerilliaSp*) is an endemic tree of Sulawesi, especially North Sulawesi, which is one of the prima donna of forest wood from North Sulawesi. Data shows that in the last 20 years, public awareness in planting and cultivating cempaka trees on private land has increased significantly. Mathematical modeling can be used to solve the problem of optimizing sustainable harvesting systems by considering various constraints, such as harvesting volume, harvesting cycle and profit by determining harvesting time and location of harvest plots of community forest stands. The mathematical model formed is able to provide an overview for farmers to obtain optimal yields by considering sustainability aspects in a sustainable harvesting system in cempaka tree community forest stands.

Keywords: optimization, harvesting, cempaka tree, community forest, mathematical model

Dose Analysis and Irradiation Time in The Lung Cancer Treatment Based on Carbon Ion Radiotherapy and Boron Neutron Capture Therapy Using PHITS Program

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Abstract. Cancer or neoplasm is a disease that can be marked by spotting abnormalities of the cell cycle, causing an uncontrollable cell growth then attacking surrounding healthy tissue and tissue on another part of the body through blood circulation or lymphatic system called a metastasis. In this research, Boron Neutron Capture Therapy and Carbon Ion Therapy were used to treat cancer. Boron Neutron Therapy uses Boron-10, which is injected into the human body to be delivered to cancer and then Boron-10 irradiated with the neutron. In contrast, Carbon Ion Therapy uses energy from Ion carbon to destroy cancer. To destroy cancer a dose of 50 Gy is needed in the Gross Tumour Value (GTV) with the smallest possible dose of healthy tissue, to obtain a dose of 50 Gy on cancer cells in BNCT boron-10 concentration is required. In contrast, in Carbon Ion Therapy, the energy calculation of carbon ions is required. In this research, cancer was modeled with stage 1A with GTV of 3 cm and located in the right lobe of the lung and modeled as closely as possible to the body of an adult male in PHITS. This research concludes that the optimum boron concentration valued 110 µg/g for 7.55 hours irradiation while the Optimum energy of ion carbon valued 170 MeV for 36.57 minutes irradiation to reach 50 Gy on GTV.

Keywords: BNCT, PHITS, Carbon Ion Radio Therapy (CIRT)

The Viscosity Coefficient Value of Purification Result Cooking Oil Based on Active Charcoal Temperature With The Falling Ball Method

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Abstract. Viscosity value is not specifically stated in the cooking oil quality standard. This value indicates the inhibition power caused by friction between the oil molecules so that the fluid flow is restrained. Cooking oil with a high viscosity value will stick to the fried food ingredients. Used cooking oil is cooking oil with a high viscosity value. This oil contains free fatty acids that are harmful to the body. Reuse of used cooking oil for frying foodstuffs is not recommended. Purification of used cooking oil is one way to make cooking oil safe to be consumed again. The increase in the surface absorption of activated charcoal is carried out by heating. The temperature variations of activated charcoal on heating are 27oC, 40oC, 50oC, 70oC, and 90oC. Changes in the value of viscosity in cooking oil due to the clarification process with activated charcoal at that temperature are interesting to study. Falling ball is chosen to determine the value of the viscosity coefficient. This method measures the terminal velocity when the three forces namely buoyancy, friction and gravity are balanced. Data were analyzed descriptively and presented in graphical form. The result shows that the viscosity of the purified cooking oil decreases with the increase in the temperature of activated charcoal. The viscosity value of cooking oil purified with activated charcoal at a temperature of 90oC is 0.8545 ± 0.0035 Pa.s

Keywords: viscosity, cooking oil purification, falling ball method

The Analysis of Current and Voltage in Solar Panel Circuits using ANOVA

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Abstract. This research aims to analyze the value of currents and voltage on a solar panels circuit (series and parallels). This research uses quantitative methods. The independent variable were the current (I) and voltage (V) of each solar panel (solar panels 1 and 2). The dependent variable were I and V values of the solar panel circuit. The data was collected using digital ampere and voltmeter. The amount of data from each sample group was 50. The data analyzed using ANOVA. The result of the solar panels series circuit, there was no difference in current value between I_1 , I_2 , and I_{sum} . This was relevant with the theoretical concept that in the series circuit $I_{sum} = I_1 = I_2$. On the other hand, there was a difference in voltage values between V_1 , V_2 , and V_{sum} . This was relevant with the theoretical concept that in the series circuit $V_{tot} = V_1 + V_2$. The result of solar panels parallels circuit, there was a difference in current value between I_1 , I_2 , and I_{sum} . This was relevant with the theoretical concept that in the parallels circuit $I_{sum} = I_1 + I_2$. On the other hand, there was no difference in voltage values between V_1 , V_2 , and V_{sum} . This was relevant with the theoretical concept that in the parallels circuit $V_{sum} = V_1 = V_2$.

Key word: ANOVA, current, solar panel circuits, voltage.

The Effect of Blade Density Variation to Cocopeat Mass that Produce by Poltesa Cocopeat Machine

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Abstract. *Cocopeat* machines that have been developed today, were carried out with variations in the speed of rotation, blade length, blade shape, and treatment of objects (coconut coir immersion). There has been no development of a *cocopeat* machine that focuses on variations of blade density. It is suspected that the blade density affects to the difference of *cocopeat* mass produced. This study was a true experiment. The dependent variable was *cocopeate* mass. The independent variables were blade density, consisting of σ_1 ($84/210\pi$), σ_2 ($42/210\pi$) and σ_3 ($21/210\pi$). For each variation of the independent variable was conducted 10 experiments. The study sample was 30 pieces of coconut coir. The mass of each coconut coir was 50 grams. The engine's spin speed, length and blade shape, are the same for all samples. The data was analyzed using the t test at a significance level of 5%. The average mass values of cocopeat were σ_1 ($= 16.5430$; $S_1 = 1.9674$), σ_2 ($= 12.2650$; $S_2 = 1.8341$) and σ_3 ($\mu_3 = 10.0988$; $SD = 1.8943$). The t test showed that the difference in the average value of *cocopeat* mass between groups were $to_{12} = 5,030$; $to_{23} = 2,598$; and $to_{13} = 7,462$. If t-table value for $v = 18$ was 2,101, so . H_0 was rejected and H_1 accepted, so there was a difference of cocopeate mass that produced by *poltesa cocopeat* machine, which is effected by variations of blade density.

Keywords: blade density, cocopeat mass, machine, variation.

Analysis Of Characteristic Design Microstripline Antenna Array Varians And Its Application In Satellite Communication System

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Abstract. Analysis of Design Microstripline Antenna Array was started by doing numeric analysis with empirical formula that supports the counting in relation to the characteristics antenna that is optimally applied in satellite communication system. The result of analysis of 2×2 array curved microstripline antenna that was obtained as Antenna Parameter such as VSWR (0.59), Reflection Coefficient (0.28) and Return Loss (-11.06dB). For 2×4 array, the result that was obtained as Antenna Parameter such as VSWR (1.19), Reflection Coefficient (0.09) and Return Loss (-20.92dB). And, for 4×4 array, the result that was obtained as Antenna Parameter such as VSWR (1.14), Reflection Coefficient (0.07) and Return Loss (-23.58dB). These result will be compared with the simulation and measurement. This study was obtained design of Curved Microstripline Antenna Array with more optimal characteristics parameter in its application in satellite communication system that will be fabricated and applied as pointer antenna which is better and taught.

Keywords: Microstripline, Array, Satellite

Design and Implementation of The Soputan Volcano Early Warning System Based On SMS-Gateway

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Abstract. The Soputan Volcano monitoring system is currently being observed by the Center for Volcanology and Geological Disaster Mitigation (PVMBG), what PVMBG is doing is recording the seismic activity of the Soputan volcano. The PVMBG will inform the status of the volcano in the event of seismic activity. An early warning system is really important so that people are alert and able to independently evacuate in the event of an eruption. Along with technological developments, tools are needed that can provide seismic signals in the event of a catastrophic eruption. This study aims to create a tool that can detect seismic activity in the event of a volcanic eruption. The seismic information sent is based on the SMS gateway by developing the MPU-6050 module as a vibration sensor and IC LM35 as a temperature sensor. The remote monitoring system method uses data obtained from the vibration sensor which is received by the Arduino nano module and then sent using the GSM sim 800 L module. This GSM module is a transmitter that functions to send any data from the sensor into SMS form. The SMS data is in the form of nodes, so 1 node is equal to 1 time sending SMS. The data that has been sent is then received back by the GSM sim 800 L module which is a receiver that functions to receive any data that has been sent. And the data will be processed into the Delphi program and then displayed using a Personal Computer (PC). From the results of this design, the data displayed in the Delphi program is in the form of a graph. The parameter for the vibration sensor is the number of vibrations to time, and for the LM35 temperature sensor, the parameters are already in degrees Celsius (oC). The expected visual data is not fully real-time because there is a 5-second delay from the event time. Based on the test results obtained the detection process works well.

Keywords: Early Warning System; SMS gateway: Module MPU-6050, LM25, Ardunio nano

The Study of Composition Range of The (Rons-90)-Etanol-Water and Gasoline (Rons-92)-Etanol-Water in Stable Emulsions

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Abstract. The present study is to report the composition range of gasoline (RONs 90)-ethanol-water and gasoline (RONs 92)-ethanol-water in stable emulsions without using a surfactant. The previous investigations found that the stable emulsions were formed by conditioning the ethanol used was an anhydrous alcohol which was expensive and employing a surfactant. It was discovered that aqueous ethanol having purity from 80-97% were dissolved completely with gasoline (RONs 90). But gasoline (RONs 92) was mixed perfectly into an aqueous ethanol which its concentration was above 88%. It was observed that stable emulsions were attained with composition ranges of the gasoline (RONs 90)-pure ethanol-water were of 6.43-99.21%, 0.69-74.85% and 0.10-18.72%. While the gasoline (RONs 92)-pure ethanol-water were of 12.96-77.76%, 21.54-76.59%, dan 0.70-10.45%. By adding aqueous ethanol continually after stable emulsion was formed, there would not be a component separation.

Keywords:

Abstract Topic : Computer Science

IConMNS 33

Modelling of Student Activity Monitoring on Interactive Learning Media

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Abstract. Interactive learning media becomes essential in the *new normal* where learning is widely done partly asynchronous and independently. Nevertheless, interactive learning media often focus on how to display material and do not have monitoring features. However, these features are essential for teachers to ensure that students carry out the learning process to achieve learning goals. Therefore, research is carried out in literature studies and surveys to model student activities so that monitoring can be carried out on interactive learning media. The research method begins with a literature study of 3 aspects of monitoring indicators in the developed media. These three aspects are a teacher and student activities and student activities that hinder the learning process in the classroom. The survey was given to 24 respondents who worked as teachers to choose the relevant activity in the learning process in the classroom. The survey results will be analyzed and filtered to eliminate activities that cannot be modelled and monitored on interactive learning media using standard computer devices input such as keyboard and mouse, which is the research limitation. The results of this study are a matrix that can be used to develop student activity monitoring on interactive learning media.

Keywords: interactive learning media, student activity monitoring, learning activity monitoring.

Prediction of Energy Crisis in Indonesia Through Simulation Models System Dynamic

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Abstract. According to the Ministry of Energy and Mineral Resources (2016), the development of the times accompanied by an increase in the world's population, makes energy use also increase. Especially with the industrial revolution that triggers industrial growth in all sectors, making energy use also increase. The fulfillment of energy needs must be balanced with the availability of energy in an appropriate, integrated and sustainable manner in order to facilitate activities in all sectors of energy users, such as the household sector, transportation, industry, commercial, and others. The balance between energy supply and energy demand needs to be analyzed in order to give an idea of the impending energy crisis in Indonesia. The data used in this report is secondary data collected by literature study technique. The problem faced by Indonesia is that energy consumption is increasing, especially in the transportation sector, increasing to 15,000,000 terajoules in 2060, while energy production in Indonesia has increased which is not too significant. This resulted in an energy crisis. Judging from the simulation of the dynamic system approach, it is predicted that Indonesia will experience an energy crisis in 2051. In order to overcome the problem of the energy crisis in Indonesia, energy conservation is needed in various layers, both from the aspect of energy management and from the community.

Keywords: energy, energy crisis, simulation, dynamic system.

Covid – 19 Penyebab Pengangguran Bertambah yang Mempengaruhi Angka Kemiskinan di Bali Meningkat

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Abstract. In March 2020, Indonesia was affected by Covid-19, starting with two people who were affected, until it finally spread to this day, the influence of covid-19 greatly affects life, various impacts are starting to be felt in various regions, one of which is Bali from the fields of Education, Economics, social and health. One of them is in the socio-economic field, many workers are laid off and result in unemployment, poverty in this case is caused by unemployment which adds to the amount of poverty and sufficient or high income and assistance from the government that can reduce poverty by assuming that high incomes can help the community. the poor, while unemployment comes from the productive age who is laid off and laid off and the income is obtained from several workers who are laid off, laid off, and those who are working, using existing assumptions and data results that poverty continues to increase along with the population that continues to increase as long as the conditions are the same like this until next year.

Keywords: covid-19, population, unemployment, poor.

Simulasi Tingkat Pengangguran Terbuka Di Bali Dengan Powersim Studio 10

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Abstract. The open unemployment rate in Bali began to increase so the simulation aims to find out how this can happen. Population is the main factor that affects the number of unemployed in Bali. Because every year the increase in the number of residents that causes competition to find work is increasingly competitive. But it was not accompanied by the opening of massive jobs. So it is not comparable between the population and the available jobs. The population leads to a higher labor force increase. In addition, the influence of several sectors of economic growth such as Gross Domestic Regional Product (GDRP) can add to the economic reach. The better the economic level as many investors will go to Bali so that employment is more open and unemployment can be overcome. Investment can also affect inflation and the rate of layoffs. But high wages, inflation and layoffs will cause the open unemployment rate in Bali to get higher.

Keywords: Unemployment, Population, Inflation, GDRP, Economics.

Prediction of Many Tourist in Buleleng Through Simulation of System Dynamics

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Abstract. This simulation is a simulation which aims to find out how the state of tourism in Buleleng Regency is by looking at the number of tourists visiting and the impact of the COVID-19 pandemic on the arrival of tourists to Buleleng. The research method used is the literature study method, which is a method with data collection directed at searching for data and information through documents that can support the writing process. The data and information about tourism in Buleleng that were obtained were then simulated with various assumptions given in accordance with the existing conditions and conditions so as to get the simulation results in the form of the number of tourist arrivals to Buleleng starting from 2016 to 2036. The main result of this simulation is the annual graph of the number of tourist arrivals to Buleleng Regency where from the graph it can be seen how the influence of Covid-19 on tourist arrivals to Buleleng Regency tourism which showed a very drastic decline during the Covid-19 pandemic. Tourist arrivals are influenced by two variables, namely an increase in tourists and a decrease in tourists, and one condition variable, namely the COVID-19 pandemic variable. In the variable, the increase is influenced by one main variable, namely tourist objects and the decrease in tourists is influenced by security and comfort. With this simulation, it can be concluded that during the COVID-19 pandemic, tourist visits to Buleleng Regency experienced a very drastic decline and Buleleng Regency tourism returned to normal conditions in 2025. The length of the pandemic period is obtained assuming 4 years of the covid-19 pandemic and tourism is opened little by little not all at once

Keywords: tourist, tourism, pandemic, simulation

Prediction of Water Availability Through Simulation of Dynamic System Based on Powersim Studio 10

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Abstract. This article is about simulating the availability of water in Indonesia. Water is a very important component for all countries, not just Indonesia. Water is part of the primary needs of all Indonesian people, water is used in daily needs such as washing, cooking and other needs. Therefore, it is important to save in the use of existing water. This simulation is supported by data obtained from the Central Statistics Agency. In data collection the method used is the literature method that is by reading existing references as a support in running this simulation. The need for clean water for the community every year is always increasing in accordance with the dynamics of development both as drinking water and households, industry, agriculture and supporting other commercial businesses. Therefore, it is important to facilitate the availability of water so that the community can further save the use of clean water.

Keywords: Simulating, The availability of water, indonesia

Simulation of Sedimentation Prediction Due to Growth of Water Biomass ' Eceng Gondok ' in Lake Buyan Buleleng Bali

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Abstract. Buyan Lake, is one of the caldera lakes originating from an ancient volcanic eruption in Bali. Geographically, Lake Buyan is located in Pancasari Village, Sukasada District, Buleleng Regency. The existence of this lake is very important for the surrounding community. This lake is a source of drinking water, tourism, agriculture for the people in Buleleng Regency. One of the factors that influence the existence of Lake Buyan is the uncontrolled growth of water biomass (Eceng Gondok) is influenced by fishing and agricultural activities that produce nitrite and phosphate. 10 individuals of eceng gondok can grow to 600000 individuals within 8 months. The relationship of the number of cementations (Ton) to the area covered by eceng gondok (Ha) is expressed by the relationship $y = 0.25x - 11,525$. The sedimentation prediction simulation model is carried out by taking conditions in 2020, in Lake Buyan there are 8 JKA (Floating Cage Net) stations, the value of nitrite and phosphate growth rates for each station, and the growth of fishery activity is 1%. It was found that the sedimentation deposits showed a significant effect which caused the shrinkage of Lake Buyan. Sedimentation in 2020 are still around 0.48 tons, but in 2050 the annual will be 40.34 tons. This causes the shrinkage of Buyan Lake in 2020 which is still 370 Ha, but in 2050 only 31 Ha.

Keywords: Sedimentation, Biomass, Eceng Gondok , Buyan Lake, Simulation

In The Used of Fourier Synthesis and Maximum Entropy Method to Investigate Crystalline Defects of The T'-Pr_{2-x}Ce_xCuO₄ Nanocrystals

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Abstract. In this study, the use of Fourier synthesis and the so-called Maximum Entropy Method (MEM) are evaluated in order to reveal the crystalline defect of the T'-type structure of one of 214 cuprate system, namely Pr_{2-x}Ce_xCuO₄ (PCCO) nanocrystals. In the low-level density, the MEM calculations give a clear picture of the scattering and can eliminate the secondary scattering which previously may missed genuine the main electron distribution of the specific atomic site. The covalent-bond is even clearer to be seen rather than the one obtained by the Fourier synthesis. This brings a further suggestion to use the MEM calculations in case of describing the scattering density of electron. Moreover, by means the used of the MEM calculations, the defect induced magnetism including the role of the tetravalent ionic doping and the annealing reduction effect is briefly discussed in this report.

Keywords: rietveld analysis, Fourier synthesis, maximum entropy method, crystalline defect

Ectoine and Hydroxyectoine Produced By Halophilic Bacteria Isolated from Traditional Solar Saltern at Pejarakan Village, Province of Bali, Indonesia

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Abstract. Text The increasing used of ectoine and hydroxyectoine in cosmetic and pharmaceutical products has lead the increasing demand of these bioactive compounds. This study aimed to investigate the production of ectoine and hydroxyectoine by the halophilic bacteria isolated from the traditional solar saltern at Pejarakan Village, Buleleng Regency, Province of Bali, Indonesia. The production of ectoine and hydroxyectoine was investigated by inoculating the bacteria in MM63 media composed of (per liter): 13.61 g KH_2PO_4 , 4.21 g KOH , 1.98 g $(\text{NH}_4)_2\text{SO}_4$, 0.25 g $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 0.0011 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, 5 g $\text{Glucose} \cdot \text{H}_2\text{O}$, and 120 g NaCl . Ectoine and hydroxyectoine were than extracted from the bacterial cells using a mixture of methanol/chloroform/water (10/5/4). The ability of the bacteria excreting ectoine and hydroxyectoine was investigated using osmotic downshock technique. The results showed that 33 halophilic bacteria were able to produce ectoine and hydroxyectoine with the levels of 9.1 to 301.8 mg/L and 3.9 to 122.1 mg/L, respectively. All the bacteria were also able to excrete ectoine and hydroxyectoine after osmotic downshock process with the levels of 9.8 to 277.5 mg/L and 14.3 to 122.7 mg/L, respectively. The level of hidroxyectoine produced by the bacteria was lower than ectoine with an average ratio of 1 to 2. However, the bacteria were more effective excreting hydroxyectoine (80.8 to 361.4%) than ectoine (57.5 to 152.4%). In addition, several halophilic bacteria were able to produce ectoine as well as hydroxyectoine in MM63 media containing maltose or sucrose as carbon source. Our study has found promising candidates for ectoine and hydroxyectoine producer.

Keywords: ectoine, hydroxyectoine, halophilic bacteria, solar saltern

Effect of Thiamin In Wine Fermentation With Yeast *Saccharomyces Cerevisiae* ILS6

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Abstract. The purpose of this study was to determine the effect of adding thiamine to wine fermentation with the yeast *Saccharomyces cerevisiae* ILS6. The research design used a randomized block design (RBD with two factorials. The first factorial is the variation of thiamin concentration 0.5 and 1% (w/v). The second factorial is the length of fermentation time 7, 14, 21, 28, and 35 days. Each experiment was repeated two times to obtain 20 experimental sets. The variables observed were alcohol content, sensory quality (aroma, taste, and color), and polyphenol compounds. The results showed that the addition of 0.5% w/v thiamin showed an alcohol content of 12.5%. Organoleptic test with panelists revealed that the quality of wine from addition of 0.5% w/v thiamin with a fermentation time of 21 days. The taste, aroma, and color were better, with the best overall effectiveness test of 1.37. The results of the analysis of the polyphenol content showed that some of the compounds produced Dihydro-3- Mettlineae -2-furfural galloyl-hexoxide, ferulic acid, chlorogenic acid, gallic acid, caffeic acid, catechins, epicatechin, punicalagin, and ellagic acid. Therefore , the results of the data analysis showed that the addition of thiamin had a positive effect on wine fermentation

Keywords: Wine, *Saccharomyces cerevisiae* ILS6, Polyphenol, Organoleptic

Adsorption Study of Methyl Orange Using Nata de Coco – Leri Adsorbent

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Abstract. The aims of this study were to (1) prepare and characterize the adsorbent (2) determine the adsorption efficiency (3) determine the pattern of the MO dye adsorption isotherm with nata de coco-leri adsorbent. The research stage is the manufacture of the adsorbent followed by the characterization of the adsorbent which includes functional group analysis with FTIR spectrophotometer and water absorption test. MO dye adsorption using nata de coco-leri adsorbent was carried out at various pH (2, 4, 7, 10, 12), contact time (15, 30, 45, 60, 75 minutes) and MO dye concentration (5, 10, 15, 20, 25 mg/L). The adsorption filtrate was analyzed using a UV-Vis spectrophotometer so that the maximum adsorption percentage, capacity, and pattern of adsorption isotherms could be calculated. The adsorbent has been synthesized with the results of the swelling test characterization. The swelling test results reached an average of $97.204\% \pm 0.04$ which means the adsorbent can absorb well. The results of the MO dye adsorption efficiency using the optimum nata de coco-leri adsorbent at pH 4, contact time of 60 minutes was 95.33%. The maximum adsorption capacity of 3 mg of dye is absorbed in 1 gram of nata de coco-leri adsorbent.

Keywords: methyl orange, adsorbent, nata de coco-leri, adsorption

Flavonoid Levels of Red Beans (*Phaseolus vulgaris* L) Tempeh in Various Concentration of Inoculum and Length of Fermentation Time

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Abstract. Red bean (*Phaseolus vulgaris* L) tempeh is the result of fermentation of red bean (*Phaseolus vulgaris* L) using powdered inoculum (raprima). The purpose of this study was to determine the flavonoid content of red bean (*Phaseolus vulgaris* L) tempeh produced at various fermentation times, 36, 48 and 60 hours and inoculum concentrations of 1, 2 and 3 grams per kg of red beans. This study produced nine kinds of red bean (*Phaseolus vulgaris* L) tempeh. The nine kinds of red bean tempeh are made into powder by drying the tempeh and grinding it using a blender so that it forms a powder. The method used in analyzing the flavonoid content was maceration of red bean tempeh flour using ethanol solvent, then concentrated and finally the flavonoid components were tested using HPLC. The results showed that the flavonoid components in red bean (*Phaseolus vulgaris* L) tempeh were: 113.84 mg/100 gr (F₁K₁); 119.04 mg/100 gr (F₁K₂) ; 127.71 mg/100 gr (F₁K₃) ; 120.85 mg/100 gr (F₂K₁) ; 131.92 mg/100 gr (F₂K₂) ; 137.64 mg/100 gr (F₂K₃) ; 138.77 mg/100 gr (F₃K₁) ; 135.67 mg/100 gr (F₃K₂) and 128.48 mg/100 gr (F₃K₃). It is recommended that the manufacture of red bean tempeh pays attention to the length of fermentation time, to produce tempeh that contains high flavonoids.

Keywords: red bean, red bean tempeh, length of fermentation time, the concentration of inoculum, flavonoid

Solvent Selection and Deproteination Methods in Extracting Free Amino Acids and Short Peptides from Germinated Pigeon Pea (*Cajanus cajan* (L.) Millsp)

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Abstract. Germination can activate the degradation of storage protein in legumes to release short peptides and free amino acids which can be utilized in many fields, especially in food and health. This study aimed to choose the best solvent in extracting the free amino acids and short peptides from pigeon pea germinated flour and to determine the most effective deproteination method in precipitating the dissolved protein. The extraction of free amino acids and the short peptides was carried out with two kinds of solvents, namely water, and 0.1 N HCl. Following the extraction step, the deproteination of the extract was carried out using 4 kinds of various methods namely the protein isoelectric precipitation method with pH variations (4.0; 4.5; 5.0), and protein precipitation with 70% ethanol. The free amino acid content was determined spectrophotometrically, while the short peptide content after ultrafiltration of the extract using membrane 10 kDa was determined using the biuret method. The results showed that using 0.1 N HCl as a solvent produced higher free amino acids and short peptides contents in the extract than using water. Based on the amount of the protein precipitated, the most effective deproteination method was isoelectric precipitation at pH 4.0 for the aqueous extract and isoelectric precipitation at pH 5.0 for the HCl extract.

Keywords: free amino acid, peptide, extraction, pigeon pea

Equilibrium and Thermodynamic Study of Remazol Red Adsorption on Coconut-Based Activation Carbon

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Abstract. The use of synthetic dyes in large quantities (reaching 0.7 million tons per year) remains a big problem, because these compounds cannot be used entirely in industrial processes. In the textile industry, for example, almost as much as 15% of the dye used cannot be bound to textile fibres, so it is still contained in quite concentrated concentrations in wastewater. One of the preferred treatments in reducing the levels of synthetic dyes is adsorption method, due to its relatively low cost and the availability of many natural adsorbents. Many analyses are needed to obtain a complete picture of the adsorption process using certain adsorbents. This study aimed to analyse the effect of activation temperature on the surface characteristic of coconut-based activated carbon and to study the equilibrium and thermodynamic properties of the adsorption of Remazol Red dye. The results showed that the adsorption of Remazol Red dye on coconut based-activated carbon took place optimally and reached equilibrium at a contact time of 30 minutes. Langmuir isotherm model fitted well the adsorption equilibrium data. The adsorption was found to be endothermic based on thermodynamic study conducted.

Keywords:

Inclusion Complex Formation of Kaempferia galanga Essential Oil with β -Cyclodextrin

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Abstract. Kaempferia galanga belonging to Zingiberaceae family is a spice plant that can be used as a food flavoring agent and herbal medicine. The rhizomes are the main source of K. galanga essential oils which are rich in various natural products and revealed low solubility in water, volatile and sensitive to environmental factors. The main components of the oils are ethyl trans-p-methoxycinnamate (57.17%), pentadecane (18.78%), ethyl trans-cinnamate (6.97%), Δ -3-carene (3.97%) and ethyl trans-m-methoxycinnamate (2.90%) as main components. Cyclodextrins (CDs) are cyclic oligosaccharides with a hydrophobic cavity and hydrophilic surface. CDs have been widely used to prepare inclusion complexes to improve the stability and solubility, modify the release of volatile compounds and turn liquid substances into stable powders. The aim of this study was to form inclusion complex of the essential oil in β -cyclodextrin (β -CD) and to investigate the encapsulation efficiency (%EE) and encapsulation capacity (%EC). The inclusion complex essential oil/ β -CD was prepared using co-precipitation method with five essential oil to β -CD ratios of 5:95, 10:90, 15:85, 20:80 and 25:75 (%w/w). The results showed that the recovery of the powder at various K. galanga essential oil to β -CD ratios was in the range of 83.14-95.61% and the ratio at 20:80 essential oil/ β -CD showed the highest EE (92.5%) with EC (125.5 mg of oil/g of β -CD) when compared with other ratios. The initial result of this study showed that K. galanga essential oil could be complexed with β -cyclodextrin to form inclusion complex by the co-precipitation method.

Keywords: K. galanga essential oil, β -cyclodextrin, inclusion complex formation

Inorganic Nanomaterial for Developing Smart Fabrics: A Review

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Abstract. Smart fabrics today become high attention due to industrial revolution 4.0 and Society 5.0 issues as well as new normal life after worldwide experience of pandemic and natural disaster caused by global warming. Smart fabrics should have extraordinary properties in terms of their strength, antimicrobial, antifungal, air breathable, and other designable and fashionable properties as well as ecofriendly. A review using last decade literatures was conducted in order to find out the current development of nanomaterials especially in area of inorganic nanomaterials for supporting the development of smart fabrics. In addition, our current results of study were discussed in order to give contribution as well as prospective future look. The nanomaterials especially ecofriendly and renewable inorganic nanomaterials take important role in developing smart fabrics, for instance the developing of inorganic fixator nano pastes for supporting the revitalization of natural dyes of cotton, silk and other fabric fibers.

Keywords: smart fabric, inorganic nanomaterial, natural dye, fixator nano paste.

Antioxidant and Sunscreen Activity of Petroleum Ether and Ethanol Extract from Cui Lemon Peel (*Citrus microcarpa*)

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Abstract. Cui lemon peel (*Citrus microcarpa*) is a local commodity and the main waste from the cui lemon juice. This study aimed to determine the antioxidant and sunscreen activity of petroleum ether extract and ethanol extract of lemon cui peel. Lemon cui peel powder was extracted by soxhletation using petroleum ether and 80% ethanol for 6 hours. Each filtrate then was evaporated and oven dried to obtain the petroleum ether extract (EPE) and ethanol extract (EE). Then the extracts were tested for total phenolic content, flavonoids, free radical scavenging activity and sunscreen effectiveness. The results showed that the highest total phenolic content was in EE (28.96 g/mL) compared to EPE (7.49 g/mL), the highest total flavonoid content was in EE (27.91 g/mL) compared to EPE (17, 62%), the highest free radical scavenging activity was found in EE (47.88 g/mL) compared to EPE (16.08%) and the highest sunscreen effectiveness was found in EE compared to EPE. Thus it can be concluded that the ethanol extract (EE) has antioxidant and sunscreen activity.

Keywords: Antioxidant, sunscreen, cui lemon, sun protection factor (SPF)

Antioxidant and Sunscreen Activity from Solvent Fraction of Nutmeg Shells (*Myristica fragrans* Houtt.)

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Abstract. Nutmeg is one of the most widely produced agricultural products in Indonesia. Nutmeg farming activities will produce 30-40% nutmeg waste consisting of nutmeg flesh and seed shells. In Indonesia, there have been many studies of natural sunscreens that have been developed, while natural sunscreens using nutmeg seed shells have not been widely developed. This study aims to determine the antioxidant and sunscreen activity of the solvent fraction of the nutmeg shell. Nutmeg shell powder was extracted by maceration method using 80% ethanol. Nutmeg shell extract was fractionated successively with petroleum ether, ethyl acetate, n-butanol and water. The obtained fractions were then tested for total phenolic content and free radical scavenging activity. The sunscreen activity of the obtained fractions was evaluated by analysis of the Sun Protection Factor (SPF) using a UV-Vis spectrophotometer. The results showed that the ethyl acetate fraction had the highest total phenolic content, free radical scavenging activity and sunscreen activity was found in the ethyl acetate fraction with a total phenolic content value of 55.36 µg/mL, free radical scavenging activity of 80.92% and SPF of 37.91. Thus, it can be concluded that the ethyl acetate fraction has antioxidant and sunscreen activity.

Keywords: Nutmeg shell, antioxidant, sunscreen, SPF, fraction

Antioxidant Activity of Dietary Fiber from Baruk Sago Waste (*Arenga microcarpha* Becc.)

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Abstract. Baruk sago is an endemic plant that grows a lot in the districts of Sitaro, Sangihe and Talaud, North Sulawesi. In the process of production of baruk sago flour, it produces waste which has not been utilized optimally. On the other hand, this waste contains lignocellulosic materials and contains phytochemical compounds. So, this study aims to determine the potential antioxidant activity of dietary fiber from baruk sago waste. The baruk sago waste were prepared into three size parameters, which is 50, 100 and 200 mesh. Each powder obtained was tested for total dietary fiber content. Then, the powder was extracted by reflux using 80% ethanol as solvent to obtain free and bound phenolic extracts. The extract obtained was tested for free radical scavenging activity using the DPPH method. The results showed that the highest total dietary fiber content was found in particle sizes of 50 mesh (79.19%), 100 mesh (75.49%) and 200 mesh (57.17%). Meanwhile, the highest free radical scavenging activity was found in free phenolic extracts compared to bound phenolic extracts with three particle sizes. Thus, it can be concluded that dietary fiber from baruk sago waste has antioxidant activity

Keywords: baruk sago, antioxidant, phenolic, dietary fiber

Bacterial Inhibitory Activity of Nutmeg Flesh Liquid Smoke with Calamansi Lemon Nanoparticle Formulation

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Abstract. Liquid smoke and calamansi lemon possess antimicrobial properties because of phenol and acid content. The implementation of nanoparticle synthesis is intended to increase the activity of active ingredients because of their small particle size. This research aimed to identify the bacterial inhibitory activity of nanoparticle formulation between liquid smoke from nutmeg flesh and calamansi lemon. Total phenolic and acid content determination, antibacterial assay against *Staphylococcus aureus* and *Escherichia coli* and nanoparticle characterization with PSA were conducted. The formulation with redistilled liquid smoke that has the highest total phenolic content was F1 (411,59 µg/mL), as for the highest total acid content was F5 (0,57%). All of the formulations are capable of hindering bacterial growth. F2 had the largest inhibition zone with 8.67 ± 1.15 mm against *Staphylococcus aureus* and 9.67 ± 1.26 mm against *Escherichia coli*. Results indicate that nanoparticle formulation nutmeg flesh liquid smoke with calamansi lemon is capable of inhibiting bacterial growth.

Keywords: Nutmeg flesh, calamansi lemon, liquid smoke, disinfectant, nanoparticle

Herbal Soap Made of Virgin Coconut Oil And Pangi Fruit Rind Extract (Pangium Edule Reinw) as Natural Antioxidant and Antibacterial Agent

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Abstract. Skin problems are not only caused by dirt but can also caused by free radicals and the harmful bacteria. The purpose of this study was to make and analyze the quality of herbal soap made from Virgin Coconut Oil and pangi fruit rind extract. Soap quality testing is based on SNI 3532-2016 quality and organoleptic characteristics obtained from the assessment of semi-trained panelists. Determination antioxidant activity test by 1,1 diphenyl-2-picrylhydrazyl (DPPH) method and the antibacterial activity using the paper disc diffusion method (Kirby- Bauer). The soap formulation with the addition of pangi fruit rind extract qualified the SNI quality while the soap formulation without the addition of extract does not qualified the standard. Organoleptically, the panelists' preference level on formula 3 soap because of its transparent color appearance. The ethanol extract of the pangi fruit rind has an IC50 value of 40.76 g/mL which is classified as a very strong antioxidant. The % inhibition value of all soap formula ranged from 81.8-84.6% which was almost equivalent to commercial antioxidant soaps ranging from 89.2-90.8%. The antibacterial activity of all soap formulas was classified as strong to very strong in inhibiting the growth of *Staphylococcus aureus* and *Escherichia coli* bacteria. In conclusion, soap formulas 2, 3 and 4 have qualities that meet SNI and have excellent antioxidant and antibacterial activity, so they have the potential to be commercialized.

Keywords:

Nanotechnology Meets Arts: Introducing Inorganic Fixator Nanopaste for Improving Quality of Silk Yarn During Natural Dyeing to Balinese Woven Crafts Center at Sinabun Village of Buleleng Regency

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Abstract. Nanotechnology today becomes widely applied in almost all areas of life, particularly in the area of arts and crafts for improving their product quality. Traditional Balinese woven craftsmen especially at Sinabun Village of Buleleng Regency have resistantly problems on silk yarn quality after dyeing for further processes of weaving the yarn in woven crafts that is well known as “Balinese tenun endek”. For solving the problem, we have recently already developed an inorganic fixator nanopaste for enhancing the quality of natural dyeing of silk yarn. We introduced the nanotechnology by applying the community development approach of participatory action and learning system. The nanotechnology could meet properly to the craftsmen community. The nanomaterials of inorganic fixator nanopaste were successfully applied in the natural dyeing process of silk yarn. The quality of silk yarn could be retained and not be damaged during the natural dyeing processes; hence the natural-colored silk yarn can be further used in the weaving processes. The craftsmen were also engaged well, and they were interested to further use the nanotechnology as part of their crafts production.

Keywords: inorganic fixator nanopaste, silk yarn, natural dyeing

Abstract Topic : Fisheries Science

IConMNS 35

Effect of Turmeric Extract in Artificial Feed to Stimulate Growth of Bileh Fish (*Rasbora* sp.) In the Context of Domestication of Aceh Local Fish

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Abstract. This study aims to determine the effect of adding turmeric extract in artificial feeds on the growth of Bileh fish (*Rasbora* sp.) in the context of domestication of Aceh local fish. The research method is experimental and uses a completely randomized design (CRD), consisting of 4 treatments (P) with 3 replications. The treatment given was the addition of turmeric extract with different doses in artificial feed, namely: 0.0 ml/kg (control/P1), 0.05 ml/kg (P2), 0.1 ml/kg (P3) and 0.15 ml/kg feed (P4). The research phase includes preparation of containers, treatment feed, fish rearing, and data collection. Parameters taken and evaluated include: specific growth rate (SGR), absolute length growth (ALG), feed conversion ratio (FCR), feed efficiency (FE), survival rate (SR) and water quality parameters. Data processed and analyzed with statistics (Anova). The results of statistical analysis showed that the addition of turmeric extract in artificial feed had a significant effect on SGR, ALG, FCR and FE ($P < 0.05$), but had no significant effect on survival ($P > 0.05$).

Keywords: turmeric, feed, growth, bileh fish

Development of Hemolymph Immunoparameter in Taura Syndrome Infection of Shrimp Virus *L. Vannamei*

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Abstract. Cases of infectious diseases, especially TSV in vannamei shrimp (*Litopenaeus vannamei*) are closely related to the immune status of these shrimp. The indicator of the immune status and health of shrimp is a description of the normal value of total haemocytes (TH) and phagocytic activity (AP) which helps in the diagnosis of shrimp disease. This study aims to provide information about the total value of haemocytes and shrimp phagocytic activity as a consideration for determining the health status of shrimp and in the future can be used to diagnose infection and disease. The samples used introduced broodstock that were clinically healthy and SPF (specific pathogen free), shrimp that were positive for TSV infection but were still alive, and shrimp infected with TSV but died. Each shrimp was taken hemolymph from the ventral-sinus cavity. The results of this study showed that the highest average total haemocytes were shrimp with SPF of $6.06 \pm 0.79 \times 10^6$ cells/ml, and shrimp infected with live TSV of $4.66 \pm 1.39 \times 10^6$ cells/ml. , while the shrimp infected with TSV died at $1.08 \pm 0.49 \times 10^6$ cells/ml. The value of phagocytic activity (AP) of *L. vannamei* shrimp with SPF is higher than the others. The increase in TH and AP makes the capacity of granular cells to increase to carry out phenoloxidase activity so that shrimp can be resistant to disease. From these results, TH and AP parameters can be used as sensitive parameters to determine the health status of shrimp.

Keywords: haemocytes, phagocytosis, TSV, vannamei shrimp

Vertical Distribution of Bacteria Population in Coastal Waters at The Clustered Marine Fish Farming of North Bali, Indonesia

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Abstract. Bacterial population is often used as an indicator of aquatic biology. The purpose of this study was to determine the vertical distribution of bacterial populations in coastal waters at the clustered marine fish farming in North Bali. Water sampling was carried out in coastal waters with a depth of 5, 10, 20 and 30 m from the shoreline in two hatchery areas in Gerokgak Village and Penyabangan Village, and three sampling points around floating net cages in Kaping bay, Sumberkima Village. Water samples were taken at the surface, middle, and bottom at each sampling point. Water sampling was conducted once a month in two periods of seasonal transition (April to June and August to October) in 2019. The results showed that the total bacteria had almost the same distribution in surface, middle and bottom. Bacterial population was seen low in August (101 -102 cfu/mL), while other months varied between 102 -104 cfu/mL. The total bacteria at three points in Pegametan Bay was evenly distributed at 103 cfu/mL. Total *Vibrio* spp. surface water was higher than the total *Vibrio* spp. middle and bottom water. Similarly, the total *Vibrio* spp. at a depth of 10 m higher than the total *Vibrio* spp. at depths of 20 and 30 m. Total *Vibrio* spp. in Pegametan Bay was higher than the two coastal waters. Halotolerant bacteria at a depth of 5 and 10 m were found to be more abundant in April-June up to 5×10^2 cfu/mL. Meanwhile, rod-shaped gram-negative bacteria were more commonly found in August and September.

Keywords:

Comparative Analysis of Effect Iodine, Ozone and Peracetic Acid as Material Disinfectant Off Eggs Cantang Grouper

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Abstract. Problems in the fish hatchery sector often occur such as high egg mortality or low quality of fish eggs. Optimizing biosecurity is one of the efforts to improve the quality of fish eggs, for example by adding disinfectants such as iodine, ozone and peracetic acid. The use of chemical disinfectants will produce good results if the right dose, time and commodity are used. In this study. This research aims (1) to determine whether the use of chemicals including iodine, ozone and peracetic acid had an effect as a disinfectant to increase the hatching rate of grouper fish, (2) to determine the level of effectiveness and efficiency of the use of chemicals as a disinfectant. This research is an experimental research type. The research subjects included in the study were cantang grouper fish eggs at PT. Pakarti Daksa Segara who used the exploratory sampling method. Conclusion of this study indicate that there is an influence on the growth rate of the use of iodine, ozone and, peracetic acid chemicals as disinfectants of cantang grouper eggs and there is a comparison of the effectiveness and efficiency of the use of the three chemicals which includes the percentage of the hatching rate, the cost of the disinfectant material and the time, which is needed in the use of the disinfectant. Iodine has the best level of effectiveness from the comparison of hatching eggs of cantang grouper and peracetic acid is the most efficient type of chemical.

Keywords: Disinfectant, iodine, ozone, peracetic acid

The Use of Technical Chlorine for Seawater Sterilization in The Rearing of Barramundi Larvae Lates Calcarifer

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Abstract. Disease prevention is very important in the rearing of barramundi larvae, one of which is by sterilizing the seawater using technical chlorine. This study aimed to determine the effect of chlorinating water used for rearing barramundi larvae on growth, survival, and water quality. The treatment in this study was different seawater used for water exchange during larval rearing. Seawater was sterilized with 25 ppm technical chlorine for 24 hours. Before use, the water was neutralized using 12.5 ppm sodium thiosulfate. As a control in this study, direct seawater or untreated sea water was used for water exchange. The study was conducted with 3 replications. The parameters observed in this study were growth, survival, virus monitoring, growth variation, and water quality. Sterilization of seawater with 25 ppm technical chlorine used for rearing larvae of barramundi has no significant effect for growth, survival, growth variation and water quality of rearing larvae. The use of filtered seawater is recommended in the sterilization of seawater for rearing larvae of barramundi. Increasing the dose of chlorine or using chlorine which has a high active substance could increase effectivity of water sterilization.

Keywords:

Algacidal Potential of the Endosymbiont Bacterial Consortium of the Seagrasses *Enhalus acoroides* and *Thalassia hemprichii*

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Abstract. The *EhEd* isolate and *ThEd* isolate are the consortiums of the endosymbiont bacteria which are isolated from the seagrasses *E. acoroides* and *T. hemprichii*. The two isolates of such consortiums of bacteria can impede the growth of *dinoflagellate Porphyridium sp.* The algacidal activities of the two consortiums are 94.1% and 92.8% each. However, the values of the BG plankton culture target are smaller; they are 57.1% and 48.6% each, showing that the performances of the algacidal activities of the consortiums of the seagrass endosymbiont bacteria of the dinoflagellate group are highly good and good. The performance of the algacidal activity of the diatom group is relatively effective, as far as *Nitzschia sp.* is concerned, and ranges from 44.9% to 52.6%; however, the performance of the algacide activity of the other diatom group is highly low, showing that the endosymbiont *E. acoroides* and *T. hemprichii* can be used as an algae ecide source. In general, the algacidal activity of the endosymbiont bacterial consortium of the *EhEd* isolate is stronger than that of *ThEd* in the target dinoflagellate group. That fact allowing the endosymbiont bacterial consortium to be used as a bio-agent which can overcome the phenomenon of what is referred to as algae e bloom which happens to the dinoflagellate group in general and *Porphyridium sp.* and BG culture in particular.

Keywords: algacidal activity, endosymbiont bacterial consortium, dinoflagellate, diatom

Effect of Use Probiotics and Constant Temperature on Survival, Growth and Health Performance of Asian Seabass *lates calcarifer* Fry

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Abstract. Culture of Asian seabass *L. calcarifer* is an important economic activity and very strategic for the global market. Meanwhile, fry availability is very limited due to high mortality and fry health problems. This study is conducted to provide information on the effect of temperature and incorporation of probiotics on growth, survival and health performance of Asian seabass *L. calcarifer* fry. In this study, constant temperature of 30 ± 0.5 °C was applied for larval rearing of Asian bass combined with probiotic supplements (*Alteromonassp.* BY-9 dan *Bacillus cereus* BC). Containers for larval rearing were using a polycarbonate tank with volume of 200 L. The treatments applied were (A) application of temperature and probiotics and (B) without application of temperature and probiotics (Control). Each treatment was repeated 6 times and the rearing tanks were positioned in a large tank to form a waterbath system. The study was designed with a t-test. The health performance of Asian sea bass fry was expressed from gene profiles related to immunity using RT-qPCR with ABI PRISM sequence detection system. The results of growth of body length and body weight of fry during reared with constant temperature and supplemented of probiotics (A) and control (B) showed different growth profiles. At the same age, Asian sea bass fry in treatment (A) grew faster, both in length and weight than growth of fry in Control (B). The time needed to reach a body length of 2.5 cm in (A) treatment was only 37 days after hatching, while in (B) treatment it took 2 days longer, which was 39 days. The increasing ability to fight viral infectious diseases, ie. VNN and Iridovirus resulted in varying multiples of immunity. In treatment (A), immunity increased in all target genes by relatively high multiples expression (5 times in CAT , 3-30 times in HSP-70 and 1 -1.6 times in SOD).

Keywords: temperature, probiotic, *L. calcarifer*

Fluctuation Trend of Fish Catch Volume Towards The Influence of Chlorophyll Distribution in West Kalimantan Province

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Abstract. The purpose of this research were to analyze fluctuation trend of fish catch volume and also the distribution of chlorophyll influence toward it, used fisheries catch data in West Kalimantan Province and satellite image data for the last 5 years. The result showed that there is fluctuation in fish catch volume in each year. Sambas, Mempawah, Kubu Raya, Kayong Utara and Ketapang were the region with The high fish catch volume. And it goes together with the klorofil distribution in Mempawah, Kubu Raya, Kayong Utara and Ketapang. Meanwhile, chlorophyll concentration approximately 0,45 – 18 mg/m³. With the distribution in each area were different.

Keywords: fish catch, chlorophyll, West Kalimantan, Distribution

Study on Organoleptic Quality of Jams Processed from Seaweed *Gracilaria Verrucose* and *Eucheuma Cottoni*

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Abstract. The use of seaweed until now in Indonesia has been limited as a food ingredient for people living in coastal areas and not many industrial circles are willing to look at the potential of this seaweed. Seaweed can be used as raw material for making jam because seaweed has properties such as pectin in fruit. The purpose of this study was to examine the level of consumer preference for seaweed jam *Gracilaria verrucose*, *Eucheuma cottonii* and a mixture of *G. verrucosa* and *E. cottonii*. The research method used was hedonic test on color, texture, aroma, taste and spreadability of jam using 15 panelists. The study consisted of four treatments, namely comparison strawberry jam (P0), *Gracilaria verrucose* seaweed jam (P1), *Eucheuma cottonii* seaweed jam (P2), and a mixture of *G. verrucose* and *E. cottonii* jam (P3). The results of the hedonic test on the parameters of texture, aroma, and taste showed significant differences ($p < 0.05$) between treatments. In the test parameters color and smear power showed no significant difference between treatments ($p > 0.05$). The conclusion of these research were the different types of raw materials for making jam affect the level of preference of the panelists on the taste of the jam, the aroma and the texture of the jam. Jam with *G. verrucosa* seaweed as raw material had the highest average value for the aroma parameter, about 4.07 ± 1.223 score, with the preferred category but not significantly different from *E. cottonii* jam with an average of 3.80 ± 0.862 , and significantly different with mixed jam and comparison jam. Jam with *G. verrucosa* seaweed as raw material had the highest average value for the taste parameter, about 3.80 ± 1.014 score, but not significantly different from *E. cottonii* jam with an average of 3.47 ± 0.640 , and significantly different with mixed jam and comparison strawberry jam.

Keywords: *Gracilaria verrucosa*, *Eucheuma cottonii*, seaweed, hedonic.

Condition and Abundance of Bambu Laut (*Isis* spp) in Lovina Sea, Singaraja Bali

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Abstract. Abstract. Bambu Laut (*Isis* spp) is a species of octocoral that lives in the tropical waters of the Indo-Pacific. Bambu Laut has a high economic value which is generally used by the community for pharmaceutical raw materials, a mixture of porcelain ceramics, and in several studies it is stated that it contains anti-virus compounds. The purpose of this study was to determine the conditions and criteria for the abundance of Bambu Laut in the Lovina area. Distribution of Bambu Laut in Lovina sea is generally found in small solitary colonies, except in the sea of Kalibukbuk Village where it is found in large colonies.

Keywords:

Biology and Ecology of Natural Resources in Gilimanuk Bay, Bali

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Abstract. The Gilimanuk Bay area is included in the traditional zone of the West Bali National Park area. Traditional zones are areas within the national park that are designated for traditional use by the community, this is permitted under conditions where the community depends on the resources in the national park. So that its use for the community is allowed. Management of aquatic resources in Gilimanuk Bay as a support for human life, especially tourism, requires an in-depth and comprehensive study. The study of the carrying capacity of aquatic resources is a study to determine the environment to absorb materials, energy and/or other components that enter or are discharged into it. It is important to carry out this in relation to sustainable management, so that the resulting study can become a basic reference for all parties who will manage this area. The existence of the three ecosystems provides a pattern of complex biological and ecological relationships in a bay. The purpose of this research is to assess the condition of the biological and ecological carrying capacity of aquatic resources in Gilimanuk Bay. The coastal ecosystem in Gilimanuk Bay consists of mangroves, seagrass beds, and coral reefs.

Keywords:

Site Suitability for Artificial Reef Placement Based on Water Quality Parameters in the Waters of Buleleng, Bali, Indonesia

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Abstract. In the recent decades, coral reef ecosystems undergo mass and rapid declines due to climate change and anthropogenic disturbances. As a response, artificial reefs with nursery corals have been deployed in order to increase the coral reef abundance and diversity in many tropical coastal areas. In this study, we assessed the site suitability for artificial reef placement based on water quality, to ensure a successful coral reef restoration in the coasts of Buleleng Regency, Bali, Indonesia. The regency of Buleleng has the longest coast compared to other regencies and city on Bali Island, thus has a great potential for coral reef restoration site. The water quality parameters assessed in this study was obtained from in situ measurement using Multiparameter Quality Meter and plankton identification in the laboratory, at six locations: Lovina, Tukadmungga, Penimbangan, Pacung, Bondalem and Les. Remote sensing approach were also applied to observe chlorophyll-a, total suspended matter (TSM), turbidity and sea surface temperature (SST) within the study area. The Chlorophyll-a and TSM properties were derived from Sentinel 2 imagery using Case2regional Coast Color (C2RCC) algorithm, while the turbidity parameter was derived using Nechad2016 algorithm from Acolite. The Sea surface temperature information was derived from Sentinel 3 SLSTR sensor using ArcSST algorithm. It is hoped that the results derived from this study can benefit the stakeholders and local communities for supporting science-based policy of coastal zone management.

Keywords: artificial reef, coral reef restoration, remote sensing, water quality

Nudibranchia in Seawaters of Sumberkima Village, Buleleng Regency, Bali

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Abstract. The coastal ecosystem of Sumberkima Village has an important coral reef area where several types of associated and very interesting marine biota live, one of which is Nudibranchia. The Nudibranch community can be an indicator of the health ecosystem from its diversity and structure. This study aims to determine the distribution and value of the Nudibranchia ecological index in the waters of Sumberkima Village, Gerokgak District, Buleleng Regency, Bali Province. The research method applied is observation by visual census with underwater (underwater visual census) camera and SCUBA diving equipment at depth range 5-25 meters. Observation data were collected in April 2021. A total of 15 species were found: *Chromodoris annae*, *Chromodoris magnifica*, *Goniobranchus reticulatus*, *Hypselodoris apolegma*, *Hypselodoris bullockii*, *Nembrotha cristata*, *Nembrotha kubaryana*, *Nembrotha* sp, *Notodoris serena*, *Phyllidia elegans*, *Phyllidia elegans*, *Phyllidiapus varicosa*, *Phyllidiopsis pipecki*, *Phyllidiopsis shireenae* at 10 dive sites. The most dominant species found was the genus *Phyllidia*. While the *Goniobranchus reticulatus* as uncommon species. It is hoped this information can provide economic value, particularly in marine ecotourism.

Keywords: Nudibranchia, ecological index, ecotourism, Sumberkima, Bali

Water Quality Status Using The Trophic Index (Trix) Values in The Coastal Waters of Sumberkima Village, Buleleng Province of Bali

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Abstract. Water quality can be assessed utilizing physical, chemical and biological parameters in marine coastal waters. The assessment of water quality in this research was using trophic index (TRIX) value as a piece of basic information that is needed in terms of aquatic management resources. TRIX value giving us the depiction of water enrichment by nutrients that cause the increase of water productivity. The objective of this research was to determine the status of water quality by using the value of the TRIX index in coastal waters of Sumberkima Village, Buleleng, Province of Bali. The TRIX values were calculated from the result of nutrient and the level of transparency waters measurements includes biological activities in those water columns. The calculation uses a linear logarithmic combination of 4 variables were Chlorophyll-a, the concentration of dissolved oxygen, Total Nitrogen (Nitrate, Nitrite, Ammonia) and Phosphate. The range value of the TRIX index for water quality status in marine coastal of Sumberkima Village waters were 3,11 – 3,77 for all stations. Those TRIX index values showed the water quality status in the coastal waters of Sumberkima Village was in Low Tropic Level or Oligotrophic condition. The Low Tropic Level indicating values lower than 4 TRIX units are associated with scarcely productive coastal waters.

Keywords: Water Quality, TRIX index, Sumberkima, Oligotrophic, Coastal

Natural Traveling Behavior Characteristics of Dolphins in North Bali Waters

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Abstract. The northern waters of Bali are a hotspot for several types of dolphins. Dolphin watching tourism that has been going on for a long time has affected the natural behavior of dolphins. Therefore, the traveling behavior of dolphins in these waters is not well known. The COVID19 pandemic provides a rare opportunity to learn about the natural traveling patterns of dolphins in North Bali waters. Based on observations, there were 3 species identified during the study, such as *Stenella longirostris* (Spinner dolphin), *Stenella attenuata* (Spotted dolphin) and *Tursiops truncatus* (Bottlenose dolphin). The behaviors observed during the study were traveling, breaching, spy hop, bow riding and playing with floating objects such as seagrass leaves. The eastern area of Lovina became the meeting point of 2 large groups of Dolphin. The eastern lovina area is the meeting point of 2 large Dolphin groups, the eastern group and the western group. The location has the following characteristics: the water temperature is 1⁰ C warmer than the surrounding area, there are lots of seagrass leaf fragments, the waters are 610m deep and the distance from the beach is 300-500 meters. The groups of dolphins will rotate and play, with random movements and breaching. After 30 minutes, the two groups will separate according to the direction of arrival. The western group moves north and then turns northwest, tending to stay away from the coast. The eastern group moved to the east with a position closer to the coast, after Penimbangan Beach turned north.

Keywords: Dolphin, Travelling, Behavior, Characteristics, North Bali Waters

Abstract Topic : Environmental Science

IConMNS 94

**Analysis of Diversity and Abundance Soil Insects in Taman Gumi Banten,
Forest of Wanagiri Village, Buleleng**

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Abstract. The forest in Wanagiri Village about 1.055 ha, and almost 250 ha of that forest managed as “village forest”. Village forest is the forest that is used by villagers, and in addition to being a natural reservoir area and maintaining water availability. This research aims to explored diversity and abundance soil insects that play a role in maintaining soil fertility. Surface insects were collected using the pitfall trap method, while infauna or ground insects were collected using the core method. The plot to take the sample is scattered using random purposive sampling. The results showed that macrofauna species were higher than infauna. The dominance index value for the highest macrofauna is in plot 15 with a value of 392,352 in the high category. The dominance index value for infauna highest in plot 13 nad it included high category and the other plot in low category.

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Keywords: insect diversity, soil insect, infauna.

Riparian Soil Composition of Ranoyapo River, South Minahasa - North Sulawesi

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Abstract. Ranoyapo River is a main river of Ranoyapo Watershed. Soil stabilization is important issues related to landslide of soil riparian. The aim of this research is to analyze the composition of riparian soil of Ranoyapo river. The research stations were located at Kinamang Village, South Minahasa. The soil samples were collected from riparian zone. All samples were analyze using XRF spectrometer. The result showed that riparian soil contained several minerals i.e., Al, Si, P, K, Ca, Ti, V, Cr, Mn, Fe, Cu, Zn, Eu and Re. The river water is one of main factors to distribute and influence the mineral component of riparian soil. The riparian soils are from sedimentation of upland soils at river bank. This increases the heterogeneity of riparian soils.

Keywords: riparian soil, Ranoyapo River, soil composition

Analysis of The Synbiotic Yogurt *Caulerpa lentilifera* Drink on Blood Cholesterol Levels in *Mus musculus* mice

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Abstract. Lactate drinks including synbiotic yogurt drinks that contain live lactic acid bacteria that are beneficial for health being able to lower blood cholesterol. The purpose of this study was to determine blood cholesterol levels in *Mus musculus* mice after being given a synbiotic yogurt drink. This study is a true experimental study with the following design: Pre-Posttest control group design. The number of samples of the symbiotic drink refers to the Federer formulation with the formula: $t_{(r-1)} \geq 15$. The independent variable in this study was the ratio formulation of yogurt and seaweed extract (*Caulerpa lentilifera*) 1:3, 1: 2, 1: 1, : 1 and 2 : 1. The results of the anova test showed that the decrease in blood cholesterol levels before and after given synbiotic yogurt with various treatment showed was significantly different with $p < 0.05$. The results of the further LSD test showed that the decrease in cholesterol levels between before and after treatment was significantly different with $p < 0.000$

Keywords: synbiotic, hypercholesterolemic, blood cholesterol

Extracellular Hydrolase Produced by Halophilic Bacteria Isolated from Traditional Solar Saltern at Tedjakula Village, Province of Bali, Indonesia

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Abstract. Three type of hydrolases are widely used in many industrial process, i.e. lipase, amylase, and protease. To meet the extreme conditions of industrial process such as high temperature, low water activity, extreme pH, and high level of salt, a stable hydrolase are required. This study aims at exploration of halophilic bacteria producing potential extracellular hydrolases. The halophilic bacteria were isolated from the brine and soil samples obtained at the traditional solar saltern of Tedjakula Village, Buleleng Regency, Province of Bali, Indonesia. The extracellular hydrolase activity of the bacteria were investigated using specific media, i.e. starch agar for amylase, rhodamine-olive oil agar for lipase, and specific protease media for protease. The level of NaCl in the media was varied to determined the salt tolerance of each hydrolase produced by the bacteria. The results showed that a total of 50 halophilic bacteria have been isolated from the solar saltern of Tedjakula Village. Ten bacteria were able to produce extracellular amylase and most of them showed the salt tolerance up to 15% w/v. A total of 22 bacteria showed extracellular lipase activity with the salt tolerance up to 15% w/v. However, no extracellular protease activity was significantly observed. The lipase and amylase produced by the halophilic bacteria in this study is very promising for industrial use.

Keywords: extracellular hydrolase, halophilic bacteria, solar saltern

The Effect of The Additon of Local Microorganism to the Density of Bacteria and Macronutrients of the Catfish (*Clarias* sp.) Biofloc System Waste

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Abstract. Cultivating catfish (*Clarias* sp.) with the biofloc system is the choice of some people during the Covid-19 pandemic. The objectives of this research include the density of bacteria and measuring the levels of macronutrients contained in the waste of biofloc system of catfish for liquid organic fertilizers in the future. This research was started by taking samples from the biofloc pond of POKDATAN (Fish Cultivation Group) "Ulam Mandiri" located in Temukus village, Banjar district, Buleleng regency. Then make variations of the Local Microorganism concentration of 10%, 20%, 30%, 40% and 50% which will be added to the biofloc waste. This research used Effective Microorganism 4 (EM 4) as a control. Furthermore, density measurements were carried out using the Total Plate Count (TPC) calculation technique and were continued by testing the macro nutrient content, namely the total N content using the Kjeldhal method, the available P and K content using the soil testing method and C-organic with Walkley and Black Method. Data analysis was tested statistically with one-way ANOVA and Wilcoxon test. The results showed that the addition of local microorganisms (consentration) for 30% (E3) gave the highest number of bacterial density, namely 16.0×10^7 CFU/ml. The addition of variations in the concentration of local microorganisms affected the density of bacteria ($p=0.001$, $p<5$) and the results of further tests stated that there was no significant difference between the density of bacteria seen from the number of colonies and the control (EM4). The highest macronutrients were found in treatment E4 (addition of local microorganisms at a concentration of 40%) successively such as C-Organic (0.272%), N (0.226%), P (352.07 mg/L), and K (423, 82 mg/L).

Keywords: bacteria, biofloc, *Clarias* sp., density, macronutrient, waste

Efectivity of Some Plant Leaf Extracts on Mortality of *Plutella Xylostella* L. in Cabbage

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Abstract. One of the factors that causes a decrease in cabbage production is the presence of pests and diseases. The main pest that attacks cabbage plants in the field is *Plutella xylostella* L. Because of the many negative impacts caused by the use of synthetic pesticides, it is necessary to have other control measures that can overcome the problem of the cabbage leaf caterpillar (*P. xylostella*) attack. One way that can be done by applying the concept of integrated pest control (IPM) which is more environmentally friendly is by using vegetable pesticides. The purpose of this study was to examine several plant leaf extracts that will be developed into vegetable pesticides, namely papaya, neem, pegagan, and kenikir leaves on the mortality of *Plutella xylostella* larvae. The research method used a completely randomized design consisting of five (5) treatments, namely control (KO / without vegetable pesticides), papaya (*Carica papaya*) leaf extract (PP), neem (*Azadirachta indica*) leaf extract (MB), kenikir (*Cosmos caudatus* leaf extract (KN), and pegagan (*Centella asiatica* (L.) leaf extract (PG). each treatment was repeated five (5) times. Spraying of plant leaf extract was carried out after 8 weeks old cabbage plants were planted in plastic pots. Larvae infestation of 5 larvae was carried out after pesticide application. The variable observed was the percentage of larval mortality. The results showed that the administration of papaya leaf extract showed significant differences with other treatments ($p < 0.05$). The treatment of neem leaf extract was not significantly different from the treatment of pegagan leaf extract and kenikir extract on the percentage of larval mortality, but it was significantly different from the control. The highest average mortality percentage for *P. xylostella* larvae mortality was found in the papaya extract treatment, which was 80.00%, then neem 56.00%, kenikir 44.00%, pegagan 44.00%, and the lowest was 16.00% in control.

Keywords: mortality, cabbage, pegagan, kenikir, neem, papaya

Distribution of Seagrass Species and It's Correlation with Aquatic Parameters in Urban Estuaries

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Abstract. Seagrasses provide key habitat for support numerous ecosystem functions and services. However, whether the function of seagrass habitat is influenced by estuary ecosystems located in urban areas, it is still unclear. To that end, we sought to investigate the specific seagrass characteristics such as species diversity, persen cover and it's correlation with environmental parameters. There are 7 research stations which are areas affected by river dynamics. The study was conducted from January to October. Seagrass species were identified using the seagrass watch guide. percent cover data and correlation with environment were analyzed using PCA Identified 6 species of seagrass, i.e: *Halophila ovalis*, *Halodule uninervis*, *Halodule pinifolia*, *Cymodocea rotundata*, *Thalassia hemprichii* and *Syringodium isoetifolium*. The highest percent cover was H. ovalis, at 66.4%. *T. hemprichii* and *C. rotundata* predominated in areas where coral rubble was found on the bottom and in front of drainage canals. Percentage of seagrass cover compared to coral reefs and sandy bottoms changes with the seasons. This is influenced by sediment stability, especially in the type of waters with a sandy bottom.

Keywords: seagrass, diversity, urban estuary

Abstract Topic : Mathematics Education

IConMNS 2

Why Fraction is Difficult to be Learned in Elementary School ?

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Abstract. Teaching fraction concept is a challenge for teachers in elementary schools. Providing deep understanding to students regarding with the concept is difficult to be done because it is known as a single concept, namely a part-whole. The introduction of a part-whole concept is not wrong but it creates many misconceptions because this concept has limitation and affects students' understanding and skills in performing arithmetic processes in fraction. This review article aims to outline the concept of fraction comprehensively which includes problems experienced by students in understanding the concept of fraction, the complexity concept of fraction and alternative designs to introduce the fraction.

Keywords: complexity, fraction, learning, difficulty

The Impact of Covid-19 on The Management of Mathematics Learning

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Abstract. This study aims to obtain information about: (1) the management of mathematics learning at junior high schools in Buleleng sub-district during the Covid-19 pandemic, especially from the dimensions of context, input, process and product as well as, (2) constraints faced in the management of Mathematics learning at Junior High Schools in the Buleleng sub-district during the Covid-19 Pandemic, especially from the dimensions of context, input, process and product. This research was conducted at 4 junior high schools in the city of Singaraja including: SMP Negeri 1 Singaraja, SMP Negeri 2 Singaraja, SMP Negeri 3 Singaraja and SMP Negeri 6 Singaraja. The instruments used in this study were: observation sheets, documentation sheets, questionnaires, and interview guidelines. There were 21 informants/respondents involved in this study. The determination of the informants/respondents was carried out using a purposive sampling technique targeting the principal, vice-chairman of the curriculum and mathematics teachers in each school. Based on the results of data analysis, it can be concluded that the management of Mathematics learning in Junior High Schools in the Buleleng sub-district during the Covid-19 pandemic in terms of context variables, inputs, processes and products based on the Glickman Quadrant is in the quite effective category. Some of the obstacles faced in the management of Mathematics learning at Junior High Schools in the Buleleng sub-district during the Covid-19 Pandemic in terms of context, input, process and product variables including: (1) network/internet which is sometimes unstable, (2) some students do not have supporting devices for cellphones or laptops to take part in online learning, (3) student activity and enthusiasm in online learning is still low, (4) some students are late in doing and submitting assignments, and (5) the pure results of many students have not met the Minimum completeness criteria (KKM).

Keywords: learning management, mathematics, context, input, process and product.

Learning Mathematics Meaningfully During The Covid-19 Pandemic Through The Implementation of The PMbKGOP Model

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Abstract. The research objective is to produce a Mathematics Learning Model oriented on the Collaboration of Teachers, Parents, and Students (PMbKGOP Model), THK insightful which gives students the opportunity to understand mathematical concepts in a meaningful way during the Covid-19 pandemic. The type of this research is research and development (R & D) education of Plomp. The research subjects are the 5th grade students of Elementary School No. 1 Baktiseraga Singaraja as many as 28 people. The result shows that the PMbKGOP model is effective in helping students during the Covid-19 pandemic to learn mathematics meaningfully. This is evidenced by the average change in student learning outcomes of the first meeting is 56.96 to 90.18 (scale 100) at the end of the sixth meeting. The effectiveness of the model is caused by the collaboration between teachers, parents, and students who work together to help students construct the mathematical concepts learned. Teachers take on the role of compiling digital materials that have the following characteristics: in accordance to the level of the development of students, the material is presented in Zone of Proximum Development (ZPD) and problem based, contain instructions for parents and students. This digital materials help teacher in online learning, assist students in constructing concepts and character development, and assist parents in accompanying students while students are studying.

Keywords: collaboration, tri hita karana, covid-19, and learning mathematics

Modeling school zone border using geoGebra

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Abstract. Indonesia education is changing very dynamically. A lot of changes occurs intended to improve the quality of our youngsters education. However, very frequently those changes are not thought thoroughly, so that its results are not as expected. Recent changes occur in the area of the recruitment of new students. About 90% of new students at every level of schooling are now recruited through the so called school zonation system. In this system, students are recruited to a new school based on the distance of his/her house to the school site. But, every time a new academic year comes, a lot of students are dissatisfied to the system, a lot of dispute happens, a lot of students are not accepted to school they intended. This paper is not intended to investigate what actually happens in the process of determining who (students) get what (school), but to inform that there is cheap and easy way to determine the border of a school zone by using a free Dynamics Geometry Software called GeoGebra. It is hoped that this method can be used to help the society and the authority to determine where candidates should be accepted based on his/her location.

Keywords:

Development E-Module of Numerical Methods with Multiple Representation Approaches and Containing Contextual Problems

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Abstract. Most of the difficulties in learning mathematics experienced by students in college are difficulties in understanding mathematical ideas that have a high level of abstraction. Unfortunately, the available teaching materials have not been presented with an adequate representation to concretize these abstract ideas. With the development of ICT, presenting multiple representations has become easy and inexpensive. Therefore, the purpose of this research is to produce an e-module for numerical method lectures with innovations in the form of using a diverse representation approach and containing contextual problems. The research was conducted adopting the ADDIE model (analyze, design, development, implementation, evaluation). The feasibility of the resulting media is determined based on the results of expert validation, user practicality responses, and student learning completeness scores. The average score of the results of e-module validation by experts, namely material experts is 3.70 (92.5%), learning design experts is 3.55 (88.75%), and media experts are 3.50 (87.5%) so it can be said that e-modules meet the valid criteria. . The average practicality response score by student users is 3.2 (80%) so it can be said that the e-module meets the practical criteria. The average score of learning outcomes is 80.86 with the percentage of learning completeness that is 94.3% so that it can be said that the e-module has met the effective criteria. With the fulfillment of valid, practical, and effective criteria, it can be concluded that the resulting e-module has met the criteria for use in numerical method lectures. Further research is needed in the form of extensive trials to obtain empirical evidence of the effectiveness of e-modules in improving learning outcomes.

Keywords:

Visuospatial Reasoning Ability of The Papua Indigenous Learners in Constructing Three-Dimensional Objects

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Abstract. This aim of study was to describe characteristics of Papua Indigenous learner's visuospatial ability in constructing three-dimensional objects. Using qualitative approach, the study analysed the characteristic of visuospatial ability of 35 Papua learners. The results of study as follow. Learners in high level are able to identify and examine shapes containing in each scheme of views, able to transform two-dimensional objects into three-dimensional objects, able to identify spatial relationships between shapes and scheme of views, able to integrate elements of shapes and spatial relationships, and able to represent the correct object. Learners in middle level are able to identify and examine shapes containing in each scheme of views, able to transform two-dimensional objects into three-dimensional objects, able to identify spatial relationships between shapes and scheme of views, able to integrate elements of shapes and spatial relationships, but unable to represent the correct object. Learners in lower level are able to identify and examine shapes containing in each scheme of views, able to transform two dimensional objects into three-dimensional objects, unable to identify spatial relationships between shapes and scheme of views, unable to integrate elements of shapes and spatial relationships, so that unable to represent the correct object.

Keywords: visuospatial, ability, papua, learner

Initial Design of Multimedia Learning Mathematics Based on Cognitive Theory for Deaf Students Grade 8th

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Abstract. Along with the rapid development of computer and information technology, multimedia-assisted learning has become the preference of our students today because it can present material more concretely and interestingly so that it is easier to understand. Many learning multimedia are available today, but this is not the case with special multimedia for deaf students. The principles of multimedia development that are generally applied in multimedia development for students with audio and visual information channels are Mayer's Cognitive Theory. The application of this theory in the development of multimedia for deaf students or students with visual information channels, of course, must be examined again for its principal effectiveness. The purpose of this study was to make the general description of the initial design of multimedia learning mathematics based on cognitive theory for deaf students in class VIII. The research method used is 4D R&D (define, design, develop, disseminate), which focuses on design development stages. The research subjects involved were four experts: material experts, language experts, learning design experts, and media experts. Data were analyzed descriptively qualitatively. The results that have been obtained in this study are the initial design of multimedia learning mathematics for deaf students in class VIII by applying the principles of Mayer's Cognitive Theory.

Keywords:

Title Development of Digital Modul with Multi Representation Approach and Contain Contextual Problems for Students Grade 10th in Relation and Function Topic

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Abstract. The aims of this study are: (1) to produce a digital module design with multiple representations and contain contextual problems in “relation and function” material for X grade students; (2) to describe the prototype made with multiple representations and contain contextual problems in “relation and function” material for X grade students; (3) to determine the feasibility and usability of digital modules with multiple representations and contain contextual problems in “relation and function” material for X grade students. The model used in this study was the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. The digital module developed consists of a cover page, introduction, materials, learning videos, exploratory learning media, practice questions, summaries, evaluations, and bibliography. Product trials are carried out on a limited basis until they are Limited basis used a sample consisting of 8 people from ten grade students randomly, to give the same chances for the students. The product developed is still in the form of a final prototype with feasible criteria. The digital module already has feasible measures in terms of feasibility of the digital module with an average score of 2.95 and excellent criteria in usability with an average score of 4.7.

Keywords:

The “PAS” Learning Model as an Alternative to the Implementation of Mathematics Learning to Build Students' Positive Characters

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Abstract. One of the weaknesses of the implementation of online learning is the lack of attention to student character development. The aims of this study are (1) to identify valid learning resources to develop students' positive character; (2) produce appropriate learning models to facilitate the implementation of learning, both online and face-to-face with an emphasis on developing students' positive character. This research is a development research with 4D model (define, design, develop, and disseminate). The implementation of this research has only reached the design stage. The research subjects were students of SDN 1 Baktiseraga, teachers, parents, and education observers. Data were analyzed descriptively and qualitatively. The results of the research are (1) identified valid learning resources to develop students' positive character in the form of: types of local wisdom that develop in the community around students (ie: social and ecological local wisdom) and entomathematics; (2) produce a conceptual framework for the PAS (Proactive, Action, and Share) learning model, with valid and practical qualities. The resulting learning model still requires further testing in the form of an empirical test to determine its effectiveness in improving students' positive character and student learning outcomes in cognitive and psychomotor aspects.

Keywords:

Effect of *Active Learning Start with A Question Model* on Student Learning Outcome at State high School

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Abstract. The curriculum requires teachers to use a learning model that actively involves students. There are many active learning models, one of which is *Active Learning Model Start with a Question*. The purpose of this study is to report the effect of *Active Learning Start with a Question* model on student learning outcome at the State High School in Palu, based on sex. The study used a 2x2 factorial experimental posttest design. *Active Learning Start with a Question* was used in the experimental group and direct model learning in the control one. 64 students involved in the study. The results showed that there was a significant effect of *Active Learning Start with a Question* model on student learning outcome with an average score of 61.80 while the direct learning model was 37.11. It was also shown that there is no significant difference in the student learning outcome with *Active Learning Start with a Question* model based sex.

Keywords: active learning, learning outcomes, sex.

Development of Multi-Representation Learning Media Based on PEDATI Model

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Abstract. This study aims to develop multi-representation media based on the PEDATI model in trigonometry courses. The type of research is development research. The research subjects were students of the Mathematics Education S1 Study Program Universitas Pendidikan Ganesha. The media was developed based on the ADDIE model. Media quality is seen from three criteria, namely valid, practical, and effective to improve students' critical thinking skills. Research has succeeded in developing media with very good validity criteria. This is based on the assessment of three validators, namely one material expert and two media experts. The average assessment of material experts is 3.85, the average assessment of media-1 experts is 3.90, and the average assessment of media-2 experts is 3.7. The average total expert assessment is 3.83, including the category of very good validity. Furthermore, it is necessary to conduct a limited test to determine the practicality and effectiveness of the media.

Keywords: validity, multi-representation, PEDATI model

Investigation of Students' Mathematical Online Discussion: Experience of Online Learning Implementation in Yuniior High School During the Covid-19 Pandemic

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Abstract. This research is motivated by the very rapid development of online learning innovations in the last 5 years, both in Indonesia and internationally. Several online learning prototypes have been successfully developed and have had a positive impact on student learning outcomes (Sudiarta & Sadra, 2016; Sudiarta, Sukajaya, & Suharta, 2018; Sukawijaya & Sudiarta, 2018). However, there are still some important challenges and questions regarding the role and effectiveness of organizing online sessions, especially regarding how to hold effective online discussions, and how the online discussion influences and impacts both on student learning outcomes and on student character. The purpose of this study was to develop effective online discussion strategies in online learning and its relation to the improvement of mathematical proficiency and students' independence character. This study used a Design-Based Research (DBR) approach with 2 iteration cycles of retrospective analysis. Through DBR it is possible to carry out retrospective analysis and iterative refinement through several cycles to produce meaningful learning designs and theories.

Keywords: Online Learning, Online Discussion, DBR, Video Tutorial.

Development of Online Learning Model with Digital Multimodal Approach to Improve Mathematical Proficiency and Character of Junior High School Students in Bali

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Abstract. This research is motivated by the existence of problems in the school's online learning practice namely (a) the lack of experience and skills of teachers in creating and implementing digital learning models and their media, (b) the lack of availability of good digital media, modules that are rich in digital content and interactions. This resulted in the emergence of student complaints about online learning which tends to be boring, poor innovation, and low student interaction in this new normal era of Covid-19 restrictions. In this regard, this study aims to develop an Online Learning Model with Digital Multimodal Approach to improve the mathematical skills and character of 7th-grade junior high school students in Bali Province. This article is a report on the results of the first year of research on longitudinal instructional development for 3 years using the 4D (Define, Design, Develop and Disseminate) method by Thiagarajan et al., (1974). Some activities that have been carried out in this first year are (a) needs analysis activities, field surveys, literature studies, (b) drafting models and tools, followed by (c) expert and user validation. The research data at this stage consisted of qualitative data namely (1) multimodal digital online learning objects, (2) online learning scenarios, (3) learning interactions that increase students' engagement, such as the use of discussion forums, quizzes, and interactive videos. The validation of the object and learning design gave a score of 3.75 ; 3.7 and 3.6 for each of Design of Effective Learning Videos, Interactive Learning Videos, and Design of Discussion Forums. All of these scores belong to the very good category. The mandatory research output that has been achieved is a draft of an article that is planned to be published in a Scopus indexed international journal.

Keywords: Online Learning, Multimodal Approach, Digital Learning Objects, Online Interaction, Mathematical Proficiency, Student Character, Independence and Student Curiosity, New Normal Era Covid-19.

Balinese Sacred Building Ethnomathematics Study and How to Acquire Its Knowledge

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Abstract. This study aims to determine: (1) the ethnomathematics of the sacred building of Balinese *Meru*; and (2) how the Balinese *undagi* know and gain knowledge about the ethnomathematics of the sacred building of Balinese *Meru*. This research is qualitative research with the exploratory method, with data collection method using literature study, observation, and interviews. The subjects of this research are people who work as *undagi* and architects. The results of the exploration show that there are several ethnomathematics in the Balinese *Meru* building, namely the measurements and calculations used in the construction of the *Meru* Bali building that apply the concept of similarity. The ethnomathematics obtained in the Balinese *Meru* building is in the form of patterns, calculations, and comparisons. The process of the *undagi* gaining knowledge is by learning to imitate the more experienced *undagi*, learning basic concepts through literature, and learning from their own experiences.

Keywords: ethnomathematics, Balinese *undagi*, Balinese *Meru* sacred building, similarity.

Effectiveness of Authentic Problem-Based Learning Assisted by Maple Software on Linear Program Topics

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Abstract. This study aims to determine the effect of authentic problem-based teaching materials assisted by maple software in Linear Program learning on student learning outcomes and attitudes. The population of this study were all students of the Universitas Pendidikan Ganesha Mathematics Education Undergraduate Study Program who had programmed Linear Program courses in the even semester of the 2020/2021 academic year. The sample in this study was selected using cluster random sampling technique. This research is an experimental research with concurrent embedded design and analyzed using the Manova test. The results of the analysis get the value of $F_{count} = 13.479$ with a significant value of 0.00, this value is smaller than the alpha value (5%). It can be concluded that there are differences in learning outcomes and attitudes between students who are taught with authentic problem-based teaching materials assisted by maple software and those taught with conventional teaching materials. Thus, it can be concluded that authentic problem-based teaching materials assisted by maple software used have a positive impact on student learning outcomes.

Keywords: authentic problems, Maple software, concurrent embedded, learning outcomes, and attitudes.

Assessment for Learning of Students' Cognition in Solving Mathematics Problems Based on Cognitive and Psychomotor Domain

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Abstract. This research implements the use of forensic science in proving students' cognition in solving mathematical problems. Documents of solving mathematical problems that are used as facts in justifying the emergence or absence of errors in cognition include cognitive and psychomotor domains. Cognitive domain data in its operations uses a student's problem-solving ability document which is compiled in the form of a problem-solving ability test. As for the data in the psychomotor domain, it uses video screenshots when students solve problems that are solved using the help of the application. Data were collected from students of the Mathematics Education Department who programmed the ICT-Based Mathematics Learning Media course in the Even Semester of 2020/2021. The cognitive domain is collected through a learning achievement test in the form of an essay, in addition to observing the construction of teaching material knowledge completeness. While the psychomotor domain is collected through the Camtasia Studio application which is used to record the learning experiences of individual learners in solving problems. The collected data are grouped using the K-Means algorithm. By comparing each category of students from the results of the analysis of the cognitive domain and the characteristics that appear in each category, then the forms of errors that still appear in each category of students' abilities are formulated. The results obtained are expected to be recommended in improving problem solving cognitive processes, especially for students in the Department of Mathematics Education.

Keywords: Forensic Studies, K-Means Clustering, cognition, problem solving

Development of Learning Models Based on Mathematical Problem Posing to Improve Critical Thinking Skill

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Abstract. This research aims to produce a learning model based on the mathematical problems posing that can foster valid mathematical critical thinking skills of junior high school students. This study uses a research and development (R&D) approach which is the development stage as a continuation of the needs analysis stage. The results of the development stage produce a valid mathematical problem-based learning model. The conclusion of this study is that the learning model based on mathematical problems posing contains a syntax component consisting of 6 phases, namely (1) Preparation (2) Presentation of information (3) Giving Stimulus (4) Submission of questions (5) Guidance and (6) Evaluation. The social system that refers to this model is learning oriented on the process of submitting questions. The principle of reaction is that the teacher guides, evaluates and provides feedback on the process of submitting mathematical problems, the support system is a problem situation or questions that stimulate students to ask questions. The instructional impact is an increase in critical thinking skills, while the accompanying impact is self-confidence, the ability to control oneself, and motivate.

Keywords:

Implementation of Polya Theory in Problem Solving Operations of Algebra

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Abstract. This study aims to determine the level of difficulty of students and to determine the factors that cause students' difficulties in solving problems of operating algebraic forms through the use of Polya theory in class VII students of Muthmainnah Ende Islamic Private Junior High School. This study uses a descriptive research method with a qualitative approach. Research subjects were selected by purposive sampling. The research instrument used was an algebraic operation problem-solving test, interviews, and documentation. The results showed that the level of difficulty of students in solving problems of algebraic operations is largely determined by the level of students' abilities. The higher the ability of students, the lower the level of difficulty of students in problem-solving. According to Polya's theory, The difference in the level of difficulty of students in problem-solving is strongly influenced by the ability of students to understand problems, plan problem solving, solve problems, conclude work results, examine work results, and students' interest in Mathematics. These difficulties can be overcome by involving students, teachers, parents, and the learning environment.

Keywords: Student difficulties; Polya steps; Math problem solving.

Students Difficulties in Solving Limit of Function and Limit of Sequence

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Abstract. The concept of limits is very important in calculus. However, some students still experience difficulties in understanding the concept. This study aims to explore the difficulties of students in solving limit problems, both in limit of function and limit of sequence through survey research. The research subjects were 82 students of the Ganesha University Mathematics Education Study Program who had studied differential calculus and integral calculus. Data were collected with tasks related to both limits and analyzed descriptively and using t-test. The results showed that most of the students had difficulty in determining the value of delta in the definition of limit. The ability to solve the limit of sequence problems is lower than the limit of function.

Keywords: Difficulty, Limit of function, Limit of Sequence

The Effect of The Implementation of The Model Eliciting Activities on Productive Disposition

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Abstract. TThis research is aimed at (1) finding out whether the productive disposition of class VII students of SMP Negeri 1 Kuta who participate in learning with model eliciting activities are better than the students who take part in conventional learning, (2) finding out how the model eliciting activities can affect students' productive disposition. This research method is mixed methods using a concurrent embedded design, with the primary method is quantitative research to obtain the main data and the secondary method is qualitative research as supporting data. The population of this study was all students of Class VII SMP Negeri 1 Kuta in the academic year 2020/2021 (372 students). Sampling for quantitative data was carried out using cluster random sampling technique which resultted class VII 1 (33 students) as the experimental class and class VII 5 (34 students) as the control class. Sampling for qualitative data was carried out by purposive sampling technique which selected 6 student representatives based on the results of quantitative data. The qualitative research used descriptive research. Qualitative data using observation sheets, questionnaires, and interviews. Based on the results of qualitative research data analysis, on the observation sheet, it can be seen that the learning steps in the MEA have an effect on students. The steps for making mathematical solutions, revising solutions and presenting solutions train students to reason and communicate the results of problem solving. The results of the student questionnaire showed a positive response, students were more enthusiastic in participating in learning and completing LKS. The results of the interviews showed that students liked learning mathematics using model eliciting activities. The results of data analysis as a whole show that students become more enthusiastic in participating in learning activities, understand the problems given, and being able to communicate their understanding of a problem solving.

Keywords: Model Eliciting Activities, Productive Disposition, Mathematics Learning

Statistical Thinking Process in Solving Statistical Problems With Field Dependent Cognitive Style

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Abstract. The purpose of this research is to describe students' statistical thinking process which is cognitive field dependent (FD) styled in solving statistical problem. This is an explorative research with qualitative descriptive approach. The subjects of this research were VI grade students of SDI Roushon Fikr. This research started from giving competence pre-test and Group Embedded Figure Test (GEFT) to get two research subjects which were cognitive Field Dependent (FD) styled. The data collection was carried out through combination of interview and written assignment analysis. The data analysis involved procedures of data reduction, presentation, conclusion and verification. The data was validated by time triangulation. The research result showed that, in general, FD subjects had fulfilled four indicators of statistical thinking, including describing data presentation, organizing and reducing data, presenting, analyzing and interpreting data. The weakness was unable to make complete conclusion from given data.

Keywords:

Abstract Topic : Physics Education

IConMNS 11

The Effect of Inquiry-Based Learning Tools for Self-Efficacy and Physics Learning Outcomes

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Abstract. This study aims to determine the effectiveness of inquiry-based learning tools for increase students' self-efficacy and physics learning outcomes. The study used a pretest-posttest non-equivalent control group design. The research population was 790 students, and the research sample was 145 students taken with a multi-stage technique. The instrument consists of a self-efficacy questionnaire and a physics learning outcome test. The data were analyzed using descriptive and multivariate covariance analysis. The results showed: (1) the average value of self-efficacy in the experimental group was 80.3 with a standard deviation of 5.3 in the high category and the control group 77.3 with a standard deviation of 4.6 in the high category; (2) the average value of physics learning outcomes in the experimental group is 78.3 with a standard deviation of 5.1 in the high category and the control group is 73.3 with a standard deviation of 4.1 in the high category; and (3) there are differences in self-efficacy and physics learning outcomes both simultaneously and independently between students who were facilitated by inquiry-based learning tools and those facilitated by conventional learning tools. This means that inquiry-based learning tools are more influential than conventional learning tools to improve students' self-efficacy and physics learning outcomes.

Keywords: inquiry, self-efficacy, physics learning outcomes

The Influence of Context-Based Physics Problem Solving Learning Model on Students' High Order Thinking Skills in Physics Education Study Program

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Abstract. This study aimed at analyzing the influence of Context Based Physics Problem Solving Learning Model toward the students' high order thinking skills in Physics Education Study Program. This context-based physics problem-solving learning model facilitated students to develop aspects of high order thinking and problem-solving skills in accordance with 21st century educational goals. This research was a quasi-experimental study with a pre-test-post-test control group design that included two class groups. The experimental group (14 people) was treated with context-based physics problem solving learning model and the control group (12 people) was learn with conventional problem solving learning. The research data were analyzed descriptively and quantitatively using ANACOVA. The posttest average score of high order thinking skills in the group of context-based physics problem solving learning model was 38.24 (high category), and the average score of high order thinking skills in the control group was 32.48 (enough category). Based on the results of statistical analysis, the statistical value of $F^* = 2.359$ with a significance number of 0.038, which meant that the acquisition of a significance number was less than 0.05 ($p < 0.05$). The results of this analysis indicate that H_0 is rejected and H_a is accepted, which means that there are differences in students' high-order thinking skills between the students who learn with context-based physics problem-solving learning models and the students who learn with conventional problem-solving learning models.

Keywords: problem solving, context-based physics, higher order thinking skills

How Students Respond of Using PhET Simulation Interactive and Phyphox App in Physics Learning

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Abstract. This study aims to test the comparative advantage of experiential learning model with a virtual experiment assisted with conventional learning models on senior high school students' misconception. The study was categorized as quasi-experimental research used a non-equivalent pre-test post-test control group. The research instrument was a misconception test. The research data were analysed by covariance analysis (ANACOVA). The study results showed that the students' misconception who studied used experiential learning model with a virtual experiment assisted were lower than the students who were studied with the conventional learning model.

Keywords: experiential learning model, virtual experiment, students' misconception

Development of Project-Based Electronics Practicum Module with Virtual Lab to Increase Student's Creativity

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Abstract. One alternative source of learning physics can be a project-based practicum module with a virtual laboratory. This module can overcome the problem of the absence of adaptive and effective learning tools for increasing student creativity. The purpose of this research is to develop a valid and practical project-based electronics practicum module with virtual lab. The validity of the module is obtained from the validation results by three validators, namely content experts, learning experts, and media experts. The practicality of the module is obtained by giving response questionnaires to one lecturer in electronics course and 12 students in semester 5A of Physics Education study program. The developed module is very valid with an average validity of 3.7. The result of validation by content expert is 3.4 with valid category, validation result by learning expert is 3.8 with very valid category, and validation result by media expert is 4.0 with very valid category. The developed module is very practical with an average practicality of 3.76. These results were obtained from the practical value of the module by the lecturer of 3.80 in the very practical category and the practicality value of the module by the students of 3.71 in the very practical category. The results show that the developed module is very valid and very practical so that it can be used as one of the teaching materials in electronics lectures.

Keywords: creativity, electronics, practicum module, project, virtual lab

The Effectiveness of the Junior School Science Learning Model containing Indigenous Science to Develop Character Based on Local Wisdom and Students' Higher-Order Thinking Skills

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Abstract. Developing student's characters and improving their higher-order thinking skills are mandatory to be implemented in the science learning process. Students should be taught how to develop the habit of scientific thinking such as critical and creative thinking and build a positive attitude and character. This study aimed to examine the effectiveness of the junior high school science learning model containing indigenous science to develop characters based on local wisdom and increase higher-order thinking skills. The profile of students' higher-order thinking skills is analyzed from the results of their working on the HOTS category questions consisting of analyzing (C4), evaluating (C5), and creating (C6). This research is the second year (2021) research on the development of a junior high school science learning model containing indigenous science which was carried out for two years (2020-2022). This study involved students from 3 different schools, namely one school in the rural area, one which is on the border between the city and the rural areas, and a junior high school located in the city spread across the Bali region. From the results of the data analysis, there were significant differences in students' higher-order thinking skills between those who studied with science learning model containing indigenous science and those who studied with conventional learning model. The ability of students who study with science learning model containing indigenous science in answering HOTS category questions has a percentage of 60% at the level of analyzing (C4), 48.50% at the level of evaluating (C5), and 28% at the level of creating (C6). Meanwhile, students who study with the conventional learning model have a percentage of 48%, 38%, and 22%, for the level of analyzing (C4), evaluating. (C5), and create (C6) respectively. In addition, the implementation of science learning model containing the indigenous science also gave positive results in the development of the character of students based on local wisdom in which their character was evaluated on good criteria, while students in the control class who studied with conventional learning models were categorized as moderate.

Keywords. indigenous science, character based on local wisdom, higher order thinking skills

Effects of Emotional Intelligence on Students' Cognitive Ability in Internship Courses

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Abstract. The purpose of the study was to obtain information about the influence of students' emotional intelligence on their cognitive abilities in internship courses. The study used a quantitative approach with a survey method on 30 students of physics education study program who were taking internship courses. The data used in this study are secondary data collected through documentation studies, and primary data collected using a questionnaire. The results of data analysis using the t test, simple linear regression test and product moment correlation obtained a correlation coefficient of 0.75 with a t-count of 6.59. Thus it can be said that there is a strong positive correlation at the 0.05 significance level between emotional intelligence and student cognitive abilities in internship courses.

Keywords:

Analysis of Physics Question Items for The Comprehensive Exam

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Abstract. The purpose of this study was to obtain information on the quality of physics question items used for comprehensive examinations in the Physics Education Study Program, Faculty of Teacher Training and Education, Syiah Kuala University. The quality of the questions is based on data of validity, reliability, level of difficulty, discriminating power, and deceptive power. The study used a quantitative approach with survey methods and data analysis using descriptive statistics. The object of this research is a physics question with 35 items given to 30 students as a comprehensive exam. The results of data analysis showed that about 12 questions were of good quality, while the rest needed to be revised. Meanwhile, of the 140 distractors in 35 questions, only 21% of the distractors functioned very well, 16% of the distractors functioned well, while the rest were not functioning and needed to be revised or replaced.

Keywords:

The Relationship Between Social Attitudes, Spiritual Attitudes, and Cognitive Engagement On Students' Critical And Creative Thinking in Learning Physics in High School

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Abstract. The 2013 RI curriculum stipulates 4 Core Competencies (KI), namely KI-1 as spiritual attitude (SpA), KI-2 as social attitude (SoA), KI-3 as cognitive competence, and KI-4 as psychomotor competence. The construction process of KI-3 and KI-4 does not only depend on KI-1 and KI-2, but also students' cognitive engagement (CE) in learning. This study aims to analyze the functional relationship between SoA, SpA, and CE on students' critical thinking (CriT) and creative thinking (CreT). This study uses a correlational design with a population of 289 students of class X MIPA SMA Negeri 1 Tabanan, and a sample of 120 students with 5% Sep. SoA, SpA, and CE variables were measured by a Likert model questionnaire, CriT and CreT variables were measured by an essay test. Data analysis used parametric statistics with regression and correlation techniques. Hypothesis testing was carried out at a significance level of 5%. The results showed 1) SE SoA 32.8% to SpA, 2) SE SoA 41.5% to CE, 3) SE SpA 11.5% to CE, 4) SE SoA and SpA 39.1% to CE, 5) SE CE 4.8% to CreT, 6) SE CriT 32.2% against CreT, 7) SE SoA, SpA, and CE 59.68% against CreT. Empowerment and development of SoA, SpA, CE, CriT is very important to help students construct creative thinking in learning physics.

Keywords: social attitudes, spiritual attitudes, cognitive engagement, critical thinking, and creative thinking

The Effectiveness of The Probasinphys E-Module Assisted by Phet Simulation To Improve Critical Thinking Skills of High School Students

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Abstract. This study aimed at analyzing the effectiveness of the PhET-assisted Problem Based Interactive Physics (Probasinphys) e-module to improve students' critical thinking skills (CTS). This e-module was used in an online problem-based learning (PBL) model. The probasinphys e-module is a module that contains unstructured problems, physical phenomena, essential concepts, examples, and CTS practice questions. In this e-module, there was also animation assisted by PhET simulation. This e-module was said to be effective in increasing the CTS if it met the following aspects: (1) there was a significant increase in student's CTS at $\alpha = 5\%$, (2) the average N-gain was in the moderate and consistent category. This study involved 98 students spread over three groups of class X. This study used a one group pre-test and post-test design. Before learning with the PhET-assisted Probasinphys e-module, the students in three groups were given a CTS test (pre-test), and at the end of the lesson students were also given the same test (post-test). The collected data were analyzed by Paired Test, normalized gain (N-gain, t-test), and ANOVA. The results show that (1) learning with the PhET-assisted Probasinphys e-module in the online PBL model increases the students' CTS at $\alpha = 5\%$; (2) the average N-gain for the three groups is in the medium category; and (3) do not differ from each other.

Keywords: Probasinphys e-module, PhET simulation, critical thinking skills

Effect of Experiential Learning Model with Virtual Experiment Assisted in Physics Learning on The Senior High School Students' Misconception in Singaraja

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Abstract. This study aims to test the comparative advantage of experiential learning model with a virtual experiment assisted with conventional learning models on senior high school students' misconception. The study was categorized as quasi-experimental research used a non-equivalent pre-test post-test control group. The research instrument was a misconception test. The research data were analysed by covariance analysis (ANACOVA). The study results showed that the students' misconception who studied used experiential learning model with a virtual experiment assisted were lower than the students who were studied with the conventional learning model.

Keywords: experiential learning model, virtual experiment, students' misconception

Effect of Experiential Learning Model with Online Aided on Physics Achievement of The Students XI IPA SMAN 3 Singaraja

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Abstract. The aims of study was to describe the differences in physics learning achievement between students who study using experiential learning models and direct learning models in class XI IPA SMA Negeri 3 Singaraja. The kind of research was quasi-experimental, using a one-way pretest-posttest non-equivalent control group design. The research sample was taken by random assignment technique. The data were collected by means of test on the subject matter of sound and light waves. Data were analyzed using analysis of covariance. The result of study shown that the average physics learning achievement of the experimental class students were higher than the control class, and there was a significant difference in physics learning achievement for students who study with the experiential learning model and students who learn with the direct learning model ($F^* = 4.364$; $p < 0.05$)

Keywords: experiential learning model, direct learning model, physics learning, achievement

The Effect of Discovery Learning Learning Model on Critical Thinking Skills Physics Student Grade XI MIPA at SMA Negeri 1 Tabanan

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Abstract. This study aims to analyze the differences in critical thinking skills between students who study with Discovery learning and Direct Instruction models. This study is a quasi-experimental using pretest-posttest non-equivalent control group design. The population of this study was 8 classes (288 students) of class XI MIPA SMA Negeri 1 Tabanan for the academic year 2020/2021. The research sample consisted of 2 classes (72 students) which were determined by assignment random sampling, so that the students of class XI MIPA 5 were chosen as the experimental group and students of XI MIPA 1 as the control group. Data on critical thinking skills were collected by means of a critical thinking skills test consisting of 15 items in the form of an essay. Data were analyzed by descriptive analysis and one-way analysis of covariance (ANACOVA). Hypothesis testing was carried out at a significance level of 5%. The results showed that there was a significant difference in critical thinking skills between students who studied with the Discovery learning model and those who studied with Direct Instruction ($F^* = 10,614$ $p < 0.05$). The critical thinking skills of students who studied with the Discovery learning model ($M = 88.37$; $SD = 3.55$, very good category) were significantly higher than those who studied with the Direct Instruction model ($M = 86.43$; $SD = 3,65$, Very Good category). The implication is that in order to achieve students' critical thinking in learning physics in high school, they should be facilitated with discovery learning.

Keywords: online learning, discovery learning, direct instruction, critical thinking skills, physics learning

Application of Problem Based Learning (PBL) Model With Online Learning Media To Improve Critical Thinking Skills of Learners in Physics Learning in Grade X MIPA 3 SMA Negeri 1 Pupuan Year 2020/2021

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Abstract. The problem in this study is the lack of critical thinking skills of learners. The main purpose of this study is to improve critical thinking skills. This research is a class action study conducted in two cycles. The subjects of this study were all students in class X MIPA 3 SMA Negeri 1 Pupuan in the 2020/2021 school year totaling 35 students with 16 male students and 19 female learners. The object of this study consists of action objects, namely pbl models with online learning media and amatan objects, namely students' critical thinking skills and student responses. The research data was collected through critical thinking skills tests and student response questionnaires. The data is analyzed descriptively. The results showed 1) the value of critical thinking skills of learners in cycle I was 67.8 with classical completion of 57.14% and standard deviation of 12.36. In cycle II increased with an average value of 78 with classical completion of 88.57% and standard deviation of 10.52. 2) Students' response to learning is positive. Based on these results, it can be concluded that the application of PBL model with online learning media can improve students' critical thinking skills in class X MIPA 3 SMA Negeri 1 Pupuan in the 2020/2021 school year.

Keywords: problem based learning, critical thinking skills, response

Abstract Topic : Chemistry Education

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Encyclopedia of Chemistry Laboratory Equipment to Support Basic Chemistry Practicum Learning

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Abstract. First year students have problems in implementing Basic Chemistry practicums due to their low knowledge and skills in using chemical laboratory equipment. Such conditions can hamper the achievement of practicum objectives and potentially lead to work accidents. The purpose of this research was to produce an Encyclopedia of Chemistry Laboratory Equipment to support Basic Chemistry Practicum Learning. This research was a Research and Development (R&D) with a 4-D development model, consist of 4 main stages, Define, Design, Develop and Disseminate. The research was limited to the development stage, which ended in the legibility test. Based on expert assessment the results showed that the Encyclopedia of Basic Chemistry Laboratory Equipment was very valid in terms of content (3.86), language (3.94), and media (3.86) from a maximum score of 4. The results of the readability test from 9 students showed that all students gave clear assessments. They understand clearly information on laboratory equipment which is used as entry in the Encyclopedia of chemistry laboratory equipment. The conclusion of this study is Encyclopedia of Chemical Laboratory Equipment is valid to be implemented from the aspects of content, language, media, and readability to support the learning of Basic Chemistry Practicum.

Keywords: development of an encyclopedia, basic chemistry laboratory equipment

Developing Guided Inquiry Learning Modul Supported by Hypothesis Proving Videos on Buffer Solution Topic

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Abstract. This research and development of a media supporting learning module was to develop a guided inquiry science resource with support of hypotheses proving video segments for online learning. The R&D followed Luther's model involved several stages (1) conceptualizing to maintain student engagement on science experiment, (2) designing to keep science activities in basic inductive scientific reasoning consistency via observing, questioning, data collecting, data analysis (associating), and disseminating or 5M with suitable for majority students with inadequate scientific skills, (3) collecting material for core chemical learning contents which is feasible for hypotheses proving video segments for the majority students, (4) assembly with considers time allocation limit of effective learning video for a cluster of targeted core scientific conceptions cluster of every lesson, and (5) distributing product via online. A prototype module has been successfully developed and realized on buffer solution topic which characterizes the emerging worksheets for observing, questioning and design of hypothesis proving before display of linked hypothesis video segments. Most of the learning aspects of the module developed received good judgment with average score of 93.05 % on content given the content expert, 81.42% on media given by the media expert, 93.05% for the whole given by secondary school chemistry teachers as practitioners.

Keywords:

Experimental Method Use to Improve Scientific Skills and Learning Achievement of Undergraduate Students

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Abstract. This paper aimed at describing dan explaining the improvement of basic scientific skills and learning achievement of undergraduate teacher candidate students. This research was a research for improvement of instruction (RII) conducted at Chemistry Education Study Program, Faculty of Mathematics and Natural Sciences Universitas Pendidikan Ganesha. This research involved 20 people of first semester students in academic year 2021/2022. Four simple experiments were involved in this research, namely the solvation of salt (NaCl), urea (CO(NH₂)₂ in water, quicklime (CaO) in water, and the dilution of acetic acid (CH₃COOH) solution. The improvement of basic scientific skills was focused on observation skills including observation techniques, observation results writing, observation results description, and the description of change of matter occurred on experiment. Data were collected by written task and classroom discussion and analyzed through interpretive analysis. The results reveal that the basic scientific skills of undergraduate students enhance significantly from the first until the fourth experiment. However, several students find obstacle on describing the change of matter involved on experiment. The learning achievement of students in each cycle is good with the average score of 65,55; 85,53; 78,92; and 76,70 out of 100, respectively.

Keywords: experimental method, scientific skills, learning achievement, undergraduate students.

Tannin Levels in Chayote, Mung Bean, Flour and Biscuit based on Chayote (*Sechium edule*) and Mung Bean (*Vigna radiata*)

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Abstract. Tannins are active compounds of secondary metabolites that are known to have several properties, namely as astringent, anti-diarrhea, anti-bacterial and antioxidant, chayote and mung beans are natural ingredients that contain tannin, so they need to be served in the form of biscuits. Tannin levels in flour and biscuits based on chayote and mung bean can be analyzed using spectrophotometric methods with Ortho-Phenanthroline reagent. The results of the analysis showed that the levels of tannins in chayote, flour and biscuits based on chayote were $(1.143 \pm 0.043)\%$, $(4.308 \pm 0.022)\%$, and $(1.922 \pm 0.036)\%$, respectively, while the tannin levels in mung beans, flour and biscuits were based on mung bean $(4.464 \pm 0.050)\%$, $(3.250 \pm 0.036)\%$, and $(3.893 \pm 0.022)\%$ and the tannin content in the formulation (1:1) chayote flour and mung bean was obtained (3.436 ± 0.050) . The increase in tannin levels in the formulation biscuits (1:1) was sourced from mung bean flour because the tannin levels in mung beans were higher than chayote.

Keywords: biscuits, chayote, mung beans, tannin

Title Analysis of Saponins in Biscuits Formulation of Chayote (*Sechium edule*) and Green Beans (*Vigna radiata*)

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Abstract. Research has been carried out on the analysis of saponins in the Chayote (*Sechium Edule*) and Mung Bean (*Vigna Radiata*) Formulated Biscuits using the gravimetric method. This study aims to determine the levels of saponins in chayote biscuits and green beans. Sample extraction was carried out by maceration method with methanol as solvent. For the saponin compounds in the sample extract, analysis was carried out using Gravimetry. The results showed that the saponin content in chayote was 5.505%, chayote flour was 2.665%, mung bean was 6.818%, mung bean flour was 4.425%, chayote biscuit was 2.542%, mung bean biscuit was 4,000%, and Chayote biscuit siam 50% : 50% green beans by 1.203%. So that in mung bean flour and mung bean biscuits, the levels of saponins were higher than those of chayote flour and chayote biscuits.

Keywords: biscuits, chayote, mung bean, saponins, gravimetry.

Validity, Practicality, and Effectiveness of Electronic Chemistry Textbooks Based on Balinese Local Cultures

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Abstract. The rapid development of information and communication technology affects the world of education. On the other hand, this development has caused the flow of foreign cultures to penetrate Indonesian societies more quickly and undermine local cultures in Indonesia, especially Bali. Therefore, an effort is needed to anticipate all of this. The purpose of this study is to produce an electronic chemistry learning book based on Balinese local cultures to improve learning outcomes of high school students. The development of this book used the ADDIE model, which included the analysis, design, development, implementation, and evaluation stages. The result of this study was the electronic chemistry learning book based on Balinese local cultures that meets the criteria of being valid, practical, and effective in improving the learning outcomes of high school students. The learning book can be used by chemistry teachers to implement information technology-based education and to preserve Balinese culture as well as to improve students' learning outcomes.

Keywords: electronic chemistry textbook, local cultures, learning outcomes

Ethnochemistry of Zingiberaceae in Traditional Balinese Seasonings

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Abstract. This study aims to make an inventory of Zingiberaceae plant species in traditional Balinese cooking ingredients and explore their chemical content that is potentially beneficial for maintaining a healthy body. The research was designed using a qualitative approach and classified as an ethnographic research type. Data collection was carried out by using document study techniques and interviews involving Lontar Dharma Caruban, traditional Balinese cooking books, phytochemical books and scientific journals, as well as Balinese culinary practitioners as data sources. Literature studies were carried out at Gedong Kirtya Singaraja and digital library; interviews with resource persons were conducted at the informant's premises by adhering to health protocols. Data analysis was carried out descriptively with triangulation of data sources. The results showed that the Zingiberaceae's plant species used as ingredients for traditional Balinese cuisine. It includes *Alpinia galangal* L., *Zingiber Officinale*, *Curcuma longa*, *Kaemferia galangal* L., *Zingiber cassumana*, *Zingiber zerumbet* L., *Boesenbergia pandurata*, and *Curcuma Aeruginosa*. The chemical content of these plants is generally in the form of terpenoid, flavonoid, alkaloid, and phenylpropanoids compounds which have antibacterial, antiviral, anti-inflammatory, analgesic, and antioxidant properties so that they are beneficial for maintaining health.

Keywords: ethnochemistry, Zingiberaceae, traditional Balinese seasonings

Portrait of Chemistry Learning at SMAN Bali Mandara During The Covid-19 Pandemic

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Abstract. The COVID-19 pandemic situation has changed the learning process in schools, where previously learning was done through face-to-face meeting, then turned into online learning or e-learning. This study aims to describe and explain the process of learning chemistry at SMAN Bali Mandara which is carried out online. The research method used is a qualitative method with a phenomenological approach. Data were collected by means of document studies and interviews. Sources of data are documents and chemistry teachers, school principals and vice principals in the field of curriculum. Data analysis was done by interpretive descriptive, and search for meaning. The results showed that the learning preparation documents were in the form of lesson plans, learning modules, and learning videos. Learning modules and learning videos are only for one subject. Based on the results of learning interviews conducted with WA groups, Google Class Room, Google meetings. Learning with Google meetings is very limited, about 2-3 times in one semester. Practical learning in the form of project assignments with a very limited number. There are interesting learnings carried out with collaborative project models with other subjects with certain themes that are suitable for certain Basic Competencies. The main obstacle faced is that about 20% of students do not have cellphones, most students have difficulty with internet quotas, and many students have difficulty getting an internet signal in their homes. So the general conclusion is that online chemistry learning cannot achieve the expected maximum competence.

Keywords: portrait, chemistry learning, SMAN Bali Mandara

A Model of Balinese Cultural Value in Biology Learning

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Abstract. This is a research and development that aims to produce a biology learning model based on Balinese culture that is valid, practical, and accepted with a positive response by teachers and students. This study used the Plomp development design which consists of preliminary research phase, prototyping phase, and assessment phase. The products in this research were learning model books, syllabus, lesson plans, and student worksheets. This study involved 2 humanists, 2 biology teachers, 3 biology learning experts, and 72 senior high school students. Data analysis was carried out quantitatively and qualitatively. The results showed that the learning model was valid in content (91.11%) and constructs (88.33%). The syllabus and lesson plans were declared valid with percentages of 89.66% and 93.19%. Student worksheets were declared valid with a percentage of 95.76%. Based on the practicality test, the learning model was declared valid with a percentage of 90%. Furthermore, the products also received a positive response from students with a percentage of 81.51%. Therefore, the learning model developed is declared feasible to be used in biology learning. Further research is needed to test the effectiveness of the learning models developed for developing 21st-century skills in students on a broader scale

Keywords: Balinese cultural value, Biology learning, Learning model

Potentials and Strategies for Development of Forest Tourism in The Bukit Kangin Tenganan Pegringsingan Karangasem Bali

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Abstract. The purpose of this study was to determine (1) forest potentials and cultural potentials that can be used to support the development of forest tourism in Tenganan Pegringsingan village. (2) To find out the strategies that can be developed to make the Bukit Kangin forest a forest tourism object. The location of this research is in the traditional village of Tenganan Pegringsingan and Bukit Kangin Forest. The population of this research is all the indigenous villagers of Tenganan Pegringsingan, Keliang adat (traditional village leader), community leaders, and service villages. The sample includes 20 people from the general public, 3 people from Keliang adat (traditional village leader), 10 community leaders, and 3 village heads and staff. The total sample is 36 people. Data collection techniques on forest potential and tourism potential that exist in the Tenganan Pegringsingan traditional village use interviews, observations, questionnaires and literature studies. (2) Data collection on forest tourism development strategies uses SWOT analysis. Data were analyzed descriptively. The results showed that (1) the potential of the Bukit Kangin forest that had been explored in the study was the availability of a list of floristics, useful plants, body symbol plants, mapping of plant species, and socio-cultural conservation. The potential for tourism objects that exist in the village include the ritual culture of war of views, village spatial planning, handicraft products, religious ceremonies, and others. The results of the SWOT analysis show that the strategy for utilizing the Bukit Kangin forest development is at coordinates (2.00; 1.78) in quadrant I (+,+) meaning that it implements the S-O strategy, namely by utilizing strengths to seize existing opportunities. The results of the Bukit Kangin forest development strategy are: utilizing the results of research in the Bukit Kangin forest as a source of information, cultural tourism that already exists as a supporter of forest tourism development, making improvements and structuring the path to the Bukit Kangin forest, increasing human resources, and conducting promotion of Bukit Kangin forest tourism development.

Keywords: Potential, Strategy, Tourism Development, Bukit Kangin, SWOT

Research Contribution in The Gumi Banten Forest in The Perspective of Forest Tourism Development in Wanagiri Village, Buleleng

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Abstract. The purpose of this study was to determine the role of research in the forest of Taman Gumi Banten, Wanagiri village in the perspective of developing forest tourism. This type of research is descriptive research. The location of the research was carried out in the village of Wanagiri, Sukasada District, Buleleng Regency. The population of this research is the tourism awareness group (20 people), forest tourism manager (10 people), Village Head and staff (5 people), Bendesa adat and staff (5 people). The samples of this study included the tourism awareness group (10 people), forest tourism managers (4 people), the Village Head and Staff (3 people), and the customary village head and staff (3 people). Data were collected using interview instruments, questionnaires, and literature studies. Data were analyzed descriptively. From this study it can be concluded (1) that there have been many research results that have been carried out in the forest of Taman Gumi Banten, Wanagiri village and also other villages that have forest vegetation that can support the perspective of developing forest tourism in Wanagiri village. (2) The studies that have been carried out in the forests of Taman Gumi Banten have a very high role in supporting the perspective of forest tourism in the village of Wanagiri, Buleleng.

Keywords: Research, Forest Tourism, Taman Gumi Banten, Wanagiri Village

Community Development Through A Participatory Ergonomic Approach and Social Media Help to Improve Community's Understanding and Care Attitude on The Governance of Village Credit Institutions

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Abstract. The main objective of this research is to know the understanding and caring attitude of the community towards LPD governance. This quasi-experimental study used a randomized post-test only group design and involved 32 research subjects who were randomly selected. The treatment given is through the dissemination of the results of studies on LPD governance seen from monthly reports for a year by utilizing WhatsApp social media. The socialization and education of the results of the study was carried out in Period I with treatment in the form of posting the results of the analysis of the monthly reports compiled for one year and in Period II, education was conducted on subjects related to the results of the studies that had been socialized previously. Through the two treatment periods, data were recorded: (a) community comments related to the data, facts, and solutions offered, (b) community understanding of LPD governance, and (c) public care attitudes towards LPD governance. The data obtained were analyzed descriptively to determine the percentage of public opinion that was pro and contra on the data, facts, and solutions offered. Differences in understanding and caring attitudes of the community towards LPD governance between Periods I and II were tested with the dependent sample t test at a significance level of 5% ($\alpha = 0.05$). The results obtained are that there is a significant increase in public understanding of 42.9% and public caring attitudes increase by 38.2% ($p < 0.05$). The conclusion is that community empowerment through a participatory ergonomic approach assisted by social media can increase public understanding and caring attitudes towards LPD governance.

Keywords: Governance, LPD, Participatory Ergonomics.

Tukad Tourism Implementation with Tantri Character and Socio-Cultural Ergonomic Orientation Can Improve Community Care Attitude and Understanding on Environmental Governance in Peliatan Village Ubud Gianyar

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Abstract. The purpose of the study was to prove that the implementation of Tukad tourism with Tantri character and socio-cultural ergonomics oriented can increase the understanding and caring attitude of the community towards environmental management and clean and healthy living behavior. The method used is a quasi-experimental and combined with a Systemic, Holistic, Interdisciplinary, and Participatory (SHIP) approach. The research design used a post test only group design. The activities carried out begin with problem identification, then priority problems are made and then an action plan is made. This action plan is used as a research intervention in the form of developing Tukad tourism. The independent variable is community empowerment through the development of Tukad tourism with socio-cultural ergonomics oriented and the dependent variables are: (1) community understanding of environmental governance; (2) community care attitude towards environmental management; and (3) clean and healthy living behavior. The data obtained were analyzed descriptively by looking for the percentage change and continued with the t dependent test because the data were normally distributed. The results showed that there was a significant increase in public understanding of environmental governance by 49.76% and public caring attitudes towards environmental management by 40.98% and clean and healthy living behavior increased by 16.48% ($p < 0.05$). The conclusion is that the implementation of Tukad tourism with tantri character and oriented to socio-cultural ergonomics increases understanding, caring attitudes towards environmental governance, and clean and healthy living behavior in the community.

Keywords: Caring Attitude, Socio-cultural Ergonomic, and Tukad Tourism

Developing Virtual Laboratory to Improve Procedural Knowledge in Bacteria Learning Material of Tenth Grade Students

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Abstract. The use of virtual laboratory is as an alternative to practicum activities at school with limited facilities in the laboratory. The study aimed to find out the feasibility and effect of using virtual laboratory learning media on procedural knowledge in bacteria learning material of tenth grade students SMA Negeri 4 Bengkulu. The research method used was Research and Development with One Group Pretest-Posttest research design. In addition, the numbers of samples were 5 students for response testing and 15 students for product testing in tenth grade students of MIPA (majoring in Mathematics and Natural Sciences). Furthermore, the data collection techniques were doing interview with biology teacher of tenth grade students SMA Negeri 4 Bengkulu and distributing questionnaires with assessment scale, namely likert scale. The result of the study indicated that the feasibility of virtual laboratory assessed by the expert was 86.6 with a valid category and the response testing was 89.9 with a very good category. The result of trial knowledge of practical procedure obtained that the average of initial knowledge questionnaires on gram staining learning material was 37.4 and final knowledge was 88.03, while the average of initial knowledge on bacterial colony learning material was 31.1 and final knowledge was 84.44. The increase in procedural knowledge was shown by n-gain on gram staining learning material was 0.81 and the bacterial colony was 0.77 in high category. Based on the result of hypothesis testing, a significance value of $0.000 < 0.05$ was obtained, so H1 was accepted. There was a significant difference between the average questionnaire result of initial knowledge and final knowledge. Hence, the result of the study indicates that there is an influence of virtual laboratory learning media on students' knowledge of practical procedure.

Keywords: Virtual Laboratory, Articulate Storyline 3, Procedural Knowledge , Bacteria

Increasing Students Learning Interest by Using Tri Hita Karana Oriented Flipbooks

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Abstract. Learning during the COVID-19 pandemic is an obstacle and challenge, one of them is for selecting innovative learning media. This is caused by the low motivation of students to learn is because conventional learning media is dominated only by text and does not attract student's interest. One of the innovative learning media is *Flipbook* which is oriented towards Tri Hita Karana (THK). The aims of this study were to: 1) develop a THK-oriented *Flipbook* in human anatomy and physiology courses, 2) to determine the validity of a THK-oriented *Flipbook*, 3) to determine the practicality of a THK-oriented *Flipbook*. The product produced in this study is a *Flipbook* media oriented to THK in the Human Anatomy and Physiology Course. The research method used is R&D (Research and Development) using a 4D model, namely Define, Design, Development and Disseminate. The subjects of this research are Biology Education Study Program students and the object of the research is *Flipbook* with THK orientation and student's learning interests. The study began with the development of THK-oriented *Flipbooks* and then continued with the development of learning tools in research using the 4D model. The data collection method used in this study is a questionnaire of interest in learning and student responses to THK-oriented *Flipbooks*. The data analysis method uses qualitative and quantitative data. Qualitative data is the result of a THK-oriented *Flipbook* media quality assessment questionnaire from observations made by a team of experts and course lecturers. The results showed that the THK-oriented flipbook was valid and practical to use in teaching human anatomy and physiology. The use of THK-oriented flipbooks also increase the students learning interest.

Keywords: flipbook; Tri Hita Karana, student's interest in learning

Implementation of Case-Based Learning in Nutrition and Health Courses

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Abstract. The purpose of this study was to determine the participation and learning outcomes of students who were taught by case-based learning. The research was conducted at the Biology Education study program, Faculty of Mathematics and Natural Sciences Universitas Pendidikan Ganesha in Nutrition and Health Courses. The research subjects are 6th semester students who program the Nutrition and Health Course with a total of 24 people. The research design is a one short case study. The research instruments used were tests to access students' knowledge about nutrition and health, observation sheets and questionnaires to assess student participation in nutrition and health learning. The results showed that the average value of student knowledge about nutrition and adolescent health was 86.13 in the very good category, and student participation in learning activities was 86.04 in the very good category. From the results of this study, it can be concluded that case-based learning in nutrition and health courses can increase student participation and student learning outcomes in the very good category

Keywords: Case-based learning, nutrition and health

Effectiveness of Online Microteaching Using Supplementary Teaching Material

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Abstract. Online microteaching is learning about basic teaching skills using the internet. The study was conducted to determine the effectiveness of online microteaching by using supplementary teaching materials in the Biology Education Study Program, Universitas Pendidikan Ganesha. This study uses the One Shot Cased Study Design. The research sample is students who attend microteaching lecture taken by random sampling technique. Data were collected by testing and observing the 8 basic teaching skills, namely the skills of questions, giving reinforcement, using variations, explaining, set induction and closing lessons, managing classes, guiding small group discussions, and teaching small groups and individuals. The research data were analyzed descriptively and the effectiveness of learning were analyzed based on the learning effectiveness index (LEI). The findings of the study revealed that supplementary teaching material very effective in online microteaching (LEI 100%) with an average value of knowledge about basic teaching skills 86.42 ± 1.02 and basic teaching skills training 86.00 ± 1.63 .

Keywords:

Analysis of Learning Loss: An Insight From Biology Education Department

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Abstract. The process of transitioning face-to-face learning to online learning requires rapid adjustments by teachers and students to the learning process, and if not, it can lead to learning loss. Only view studies have been done related to learning loss, therefore this study aims to analyze a) differences in learning before and after the pandemic, b) learning loss during the pandemic, c) the factors that caused learning loss during the pandemic, d) efforts that can be applied to tackle learning loss. This research was a qualitative descriptive study with a phenomenological approach located at Universitas Mahasaraswati Denpasar with a sample of 65 participants including lecturers and students. Data collection techniques were carried out by observation, interviews, documentation, and triangulation. The result of this study is a complex description of learning loss analysis. The conclusion of the research shows that learning loss occurs in various aspects such as learning time, learning attitude, process ability, knowledge, and learning process.

Keywords: learning loss, biology teaching, online learning, covid-19

Abstract Topic : Natural Science Education

IConMNS 15

Development of Integrated Science Module Based on Guided Inquiry on The Theme of Gadgets in Life for Students Class VIII

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Abstract. This study aims to describe and analyze the characteristics, level of validity, and level of readability of the integrated science module based on guided inquiry on the theme of gadgets in life. The type of research was Research and Development with a 4D development model (Define, Design, Develop, and Disseminate), was carried out until the develop stage. The subjects were 2 science education experts, 5 science teachers in class VIII, and 6 students in class VIII. The objects are the assessment of the validity test and the readability test. The results of the qualitative data obtained were analyzed descriptively. The characteristics of the integrated science module developed, namely (1) using the theme of gadgets in life, (2) using the steps of the guided inquiry learning model, (3) containing instruction for using the modul, (4) each submaterial contains the let's do it feature, let's see, let's understand, let's practice, and a glimpse of information. The level of validity module is included in the very high validity category, seen from the score of the assessment questionnaire by 2 science education experts of 0.98. The level of the readability module is included in the very readable category, seen from the average score of the assessment questionnaire by 5 science teachers in class VIII and 6 students in class VIII, respectively 4.54 and 4.24. Based on the research data, an integrated science module based on guided inquiry on the theme of gadgets in life can be tested to the next stage, namely practicality testing, effectiveness testing, and product distribution.

Keywords: module, guided inquiry, gadgets

The Effectiveness of Project-Based Learning on the Professional Attitude of Preservice Science Teachers Through Andragogy Self-Assessment

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Abstract. This study presents a pre-experimental designs case study of a professional attitude of pre-service science teacher's one-shot instruction session conducted synchronously through project-based learning (PjBL). This modality is needed based on the needs analysis of the development of science learning planning products in schools based on education for sustainable development. This study provides an andragogy framework based on constructivism and active learning to build the professional attitude of 42 pre-service teachers. Data were obtained using observation, confirmed questionnaires, and interviews. The analysis of the significance of the impact uses the Pearson Product Moment Test and the consistency of self-assessment using Cronbach's Alpha. The results of the observations show that the implementation of PjBL is perfect. Through self-assessment and interviews, the professional attitude of pre-service science teachers shows complete criteria with several obstacles that they can overcome. PjBL is effective in developing the professional attitude of pre-service science teachers. It is recommended to apply this modality in developing various other learning competencies.

Keywords: project-based learning, professional attitude, self-assessment, pre-service teachers

Analysis of Student Science Literacy: Learning Studies Using Blended Learning-Based Laboratory Inquiry Learning Tools

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Abstract. One part of learning planning is developing learning tools. Improving scientific literacy can be done by developing learning tools that give students freedom, can facilitate the development of students' abilities and skills and involve students' active roles in the learning process. One alternative is to develop a laboratory inquiry learning device based on Blended Learning. This study aims to analyze the effectiveness of blended learning-based laboratory inquiry learning tools in improving students' scientific literacy. This type of research is research & development which refers to the 4D development steps. The test subjects in this study were class XI in one of the public high schools in Mataram City which consisted of two classes, namely the experimental class and the control class. The data collection technique uses a reasoned multiple choice instrument that refers to the students' scientific literacy indicators. Data analysis was performed using N-gain, Paired Sample T-Test and Independent Sample T-Test. The results showed that blended learning-based laboratory inquiry learning tools could improve students' scientific literacy. Based on the results of the T test there are significant differences. The first indicator of scientific literacy, which is explaining phenomena scientifically, has the highest increase compared to the second indicator, namely designing and evaluating scientific inquiry and the third indicator, namely interpreting scientific data and evidence. The second indicator, namely designing and evaluating scientific inquiry, obtained the lowest improvement compared to other indicators.

Keywords:

The Effect of The Flipped Classroom Learning Model on Problem-Solving Skills

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Abstract. This study aims to analyze the differences in problem-solving skills between students taught the Flipped Classroom (FC) model and the Direct Instruction (DI) model. This type of research is a quasi-experimental design with a non-equivalent pretest-posttest control group design. The research population is the fourth-semester students of the Science Education Study Program for the 2020/2021 academic year. The sample was determined by lottery method, with class B being chosen as the experimental group and class A as the control group, each consisting of 17 students. Data on problem-solving skills were collected using an essay test in the biophysics course with test reliability of 0.717. The data obtained were analyzed descriptively and anakova test at a significance level of 5%. The results of the analysis show: (1) the problem-solving abilities of students who apply the FC and DI learning model have high and medium qualifications (N-gain = 75.60; and 60.22); (2) There is a significant difference in problem-solving skills between students who are taught the FC model and the DI model (sig < 0.05). Students who study with the FC model have higher problem-solving abilities than the DI model.

Keywords: problem-solving skills, flipped classroom, direct instruction

Need Analysis for Developing on Yunion High School Science Teaching Materials Based on Science, Technology, Engineering, and Mathematics

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Abstract. This study aimed to analyze the need for developing on junior high school science teaching materials based on science, technology, engineering, and mathematics (STEM). This research is a qualitative research. The subjects were the 2013 curriculum and 30 science teachers in Buleleng Regency. The object was science basic competencies in junior high school which is relevant to the STEM approach, science learning problems, teaching materials and learning models used in learning, teaching materials innovation needed in learning, and students' characteristics. Data were collected through document analysis, questionnaires, and interviews. Data were analyzed descriptively and interpretively. The results showed that 80.6% science basic competencies were relevant to the STEM approach. Science learning problems, namely: inadequate laboratory facilities, difficulty in conducting online learning, integrating science materials, sorting and selecting materials that were relevant to the STEM approach, students' unpreparedness in learning and lack of mastery of e-learning. Teaching materials used by teachers in learning, namely: textbooks (96.7%), handouts (55.2%), modules (50%), learning videos (16.7%), Student Worksheets (10%) and Power Point Presentations (6.7%). The learning models used by the teachers were: DL (80%), PBL (83.3%), PjBL (43.3%), Guided Inquiry (10%), STAD (6.7%), Jigsaw (3.3%), TGT (3.3%), 2 Stay 2 Tray (3.3%), and DI (3.3%). The teaching materials innovation needed in learning was in the form of contextual, interactive, fostering students interest and motivation to learn, fun and challenging, one of which was STEM-based teaching materials. Characteristics of students vary from low, sufficient, and good if viewed from: students' interest in science learning, students' motivation in science learning, and students' understanding on science materials

Keywords: need analysis, junior high school, science materials, STEM

Use of PhET Simulation Assisted Adventure Educational Games and Their Effect of 4C Skills on Online Learning

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Abstract. Learners need several skills to learn and adapt to various forms of change that occur over time, such as critical thinking, creativity, communication, and collaboration (4C). This research aims to determine the effect of adventure educational game media assisted by PhET interactive simulation on 4C skills in online learning. This research is based on a hypothesis regarding the potential for learning using educational games and interactive PhET simulations to accelerate mastery of 4C skills. The method in this research is pre-experimental with One Group Pretest-Posttest Design. The research subjects were 36 students of class IXE SMPN 1 Tegallalang. Data collection to access 4C skills is essay tests for critical and creative thinking skills and observation sheets for communication and collaboration skills. Based on the results of the normality test, the data is normally distributed on critical and creative thinking skills. Whereas communication and collaboration skills are not normally distributed. Based on the results of hypothesis testing, it can be concluded that there is a significant effect on the use of interactive PhET assisted by adventure educational game media in online learning on critical and creative thinking skills, but there is no significant effect on communication and collaboration skills in class IXE students of SMPN 1 Tegallalang.

Keywords: adventure educational game, simulation, and 4C skills

Learning Foundation and Option of Assessment Type for Critical Thinking Skill in Science Instruction

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Abstract. The basic principle of science instruction that carried out in schools, both at the elementary, junior high, and senior high school levels should be rooted in the constructivism paradigm, which leads to the process and achievement of learning outcomes for logical thinking skills (critical and creative thinking). In this regard, it is necessary to strive for the science learning process for thinking skills as an important component in school reform. The implementation of science learning reform is directed at developing learning designs to improve the quality of learning processes and outcomes. The development of learning designs for improving the quality of the process can be developed from (1) active learning theory; (2) Holmes' three stories and Beyer's model, which consists of 3 phases of thinking skills development journey, namely skill acquisition, making meaning, and thoughtful application; and (3) the enculturation model, which fully emphasizes the learning environment to empower thinking skills, namely cultural exemplar, cultural interaction, and direct instruction. Learning techniques that can be used during the process of empowering critical thinking skills are questioning technique, writing technique, and general information processing strategies. Based on these three techniques, a test or assessment to measure critical thinking skills must be developed based on several criteria, namely (1) based on a certain goals; (2) based on the aspects that will be developed; and (3) based on the criteria for the material or content, whether subject-specific area or general-content based. Therefore, the types of assessment that can be used are Multiple Choice with Written Justification, Essay Testing of Critical Thinking, and Performance Assessment.

Keywords: type of assessment, critical thinking, science instruction

Ethnoscience Study of Balinese Weaving and Its Integration Into Science Curriculum For Junior High School

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Abstract. This study was qualitative research with an ethnographic approach. The purpose of this study was to describe and explain: (1) the tools used in Surya Indigo weaving craftsmen in Pacung Village; (2) natural materials used in Surya Indigo weaving craftsmen, Pacung Village; and (3) ethnoscience knowledge of Surya Indigo weaving craftsmen in Pacung Village which can be reconstructed into scientific knowledge in science curriculum for junior high school. The subject was Surya Indigo weaver, while the object of the research was ethnoscience knowledge of Surya Indigo weavers which can be reconstructed into scientific science in the junior high school curriculum. Data were collected through active participatory observation, interviews, and literature studies. The results showed that the tools used in Surya Indigo looms were non-machine looms, i.e. *jantra* for spinning, *pliksan* for winding yarn, and *cagcag* for weaving. The natural materials used in Surya Indigo weavers were *taum* leaves for blue color; noni root for an orange to red color; jackfruit wood, tamarind leaves, bamboo leaves, and turmeric for yellow color; mahogany bark for brown; and *jelawe* leaves, *ketapang* leaves and fruit for gray to black colors. Ethnoscience knowledge of Surya Indigo weaving craftsmen which can be reconstructed into scientific knowledge in science curriculum for junior high school is for competency standards to understand various properties in physical and chemical changes (Grade VII, 1st semester), to understand the use of chemicals in life (Grade VIII, 1st semester), and to understand the role of work, force, and energy in everyday life (Grade VIII, 2nd semester).

Keywords: ethnoscience, Balinese weaving, science curriculum