FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

PROGRAM BOOK

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
And International Seminar of Sciences Education

"New Thought, Research, and Practice of Mathematics and Science Education in the Post-Pandemic Era"

November 11th-12th, 2022

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

ABOUT INTERNATIONAL JOINT SEMINAR 6TH ISIMMED – 8TH ISSE 2022

The Technological Pedagogical Content Knowledge (TPACK) is a rapidly growing framework for developing the professionalism of mathematics and science teachers. This framework encourages teachers to be able to integrate knowledge about content, pedagogy and technology and apply them to teach certain topics appropriately. On the other hand, the development of the industrial revolution that has an impact on the economic, social and environmental life of the community demands better student competence in overcoming these problems through science and technology. The demands of these competencies have changed the views of students on how to learn, the communication system and interact with the surrounding environment. One of them is the implementation of STEM (science, technology, engineering, & mathematics). STEM empowers individuals with the skills to succeed and adapt to this changing world, including changes due to natural events. Therefore, the development of TPACK related to STEM-based learning is very necessary for teachers and prospective teachers of mathematics and science. In this year Faculty of Mathematics and Natural Sciences Universitas Negeri Yogyakarta held the International joint seminar of 6th international of mathematics and mathematics education (6th ISIMMED) and 8th international seminar on science education (8th ISSE). It provides a platform for international education practitioners, teaching staff, researchers, and other stakeholders to learn the major science and mathematics education trends for achieving quality mathematics and science education. Therefore, the seminar intent to keep abreast of the current development and innovation in the mathematics and science education area as well as providing an engaging platform for the participant to share knowledge and expertise in related disciplines.

List of scopes for 6th ISIMMED:

1. Algebra
2. Geometry
3. Analysis
4. Statistics
5. Applied Mathematics & Computer
6. Innovative Mathematics Teaching and Learning
7. Evaluation and Assesment in Mathematics Education
8. Using Technology in Mathematics Education

List of scopes for 8th ISSE:

1. Science Education
2. Chemistry Education
3. Biology Education
4. Physics Education
5. Pure sciences content areas (all branches including interdisciplinary)
6. Teacher Education in sciences

BRIEF CONTENT

6TH ISIMMED – 8TH ISSE 2022 COMMITTEE

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FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
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Welcoming Speech

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

WELCOMING SPEECH OF THE CHAIRPERSON

Salam. Assalamu'alaikum.

Good morning everyone. Welcome to the 8th International Seminar on Science Education (ISSE) 2022. I am Sabar Nurohman, a lecturer in the department of science education at Yogyakarta State University (UNY) as the chair committee of this Seminar.

First of all, let us thank God, who has given His grace and guidance so that the Seminar (ISSE) with the theme "New thought, research, and practice of mathematics and science education in the post-pandemic era" can be held successfully.

In this Seminar, we ensure it through review for full paper acceptance. Full paper were selected by – outstanding reviewers from different universities. We collaborating with many quality national and international journal. The journal that partnering with us are AIP Conference proceeding, JIPI, Phytagoras, JRPM, JSD, JPMS, JSER, JPMMP, IjoCE, which evidently belong to diverse field and in turn.

This Seminar is the result of hard work, support, and dedication of a number of parties. We wish to thank all the committee members who together make the conference possible. The committee has been working throughout the year to propose sessions, arrange the schedule, record number of submissions, etc.

We also want to thank UNY, Helsinki University, Yildiz Technical University,University of Western Sydney, and Loughborough University for their contribution as speaker. Last but not least, we thank all the submitter and reviewer who are the backbone of this Seminar.

Thank you for being here with us. Enjoy the Seminar!

Wassalamu'alaikum.

Best regards,

Dr. Sabar Nurohman, M.Pd

WELCOMING SPEECH
THE DEAN FACULTY OF MATHEMATICS AND NATURAL SCIENCES

Assalamu'alaikum wr.wb.

May peace and God's blessings be upon you all.

On behalf of the Committee, first of all allow me to extend my warmest greeting and welcome to the "6th International Seminar of Innovation in Mathematics and Mathematics Education (5th ISIMMED) and the 8th International Seminar on Science Education (8th ISSE)" 2022, organized Faculty of Mathematics and Natural Sciences (FMIPA) Universitas Negeri Yogyakarta.

The development of learning began to shift from online learning during the pandemic era to face-to-face learning which schools in Indonesia have now implemented. The need for preparation in the form of learning follows the learning of the post-pandemic era. In the development of learning, the latest ideas that can support learning at this time need to be discussed in depth so that the objectives of learning can be achieved optimally and effectively.

With the theme "New Thought, Research, and Practice of Mathematics and Science Education in The Post-pandemic Era", this conference aims to bring together researchers, educators, policymakers, and practitioners to share their critical thinking and research results. Thus, we can understand and study the development of basic principles, knowledge, and technology to integrate technology, pedagogy, and subject matter in learning and prepare a quality generation. Thank you for being here with us.

The scope of this conference covers all topics and is grouped into sub-themes that cover the scope of mathematics and science education, including algebra, geometry, analysis, statistics, applied mathematics and computer, innovative mathematics teaching and learning, science education, chemistry education, biology education, physics education, pure science content areas (all branches including interdisciplinary) and teacher education in science, as well.

Distinguished guest, ladies, and gentlemen, this conference will be far from success and we could not accomplish what we do without the support from various parties. So let me extend my deepest gratitude and highest appreciation to all committee members. I would also like to thank each of participants for bringing their expertise and experience around the table and engaging in such fruitful, constructive and open exchanges throughout the two days of conference. While not as effective in terms of lead capture and networking as an in-person event, please accept my sincere apologies for any inconveniences and shortcomings.

We look forward to welcoming you again at the next coming conferences. To conclude, let me wish you a blooming discussion and an impressive virtual conference.

Wassalamu'alaikum wr.wb.

Yogyakarta, 11th November 2022
Best regards,

Prof. Dr. Ariswan M.Si
Dean FMIPA

WELCOMING MESSAGE
THE RECTOR OF UNIVERSITAS NEGERI YOGYAKARTA

Assalamu'alaikum wr.wb.

In the name of Allah, the Most Merciful. May peace, mercy, and blessings of Allah be upon you.

Dear colleagues, professors, lecturers, researchers, ladies and gentlemen. On behalf of Yogyakarta State University, I would like to express my sincere gratitude and welcome you to the 8th International Seminar on Science Education (ISSE) 2022. Moreover, I honorably welcome our keynote and invited speakers Prof. Dr. Maija Aksela from Helsinki University, Prof. Dr. Bayram Costu from Yildiz Technical University, Dr. Jose Hanham from University of Western Sydney, Ian Jones, Ph.D. from Loughborough University, Dr. Slamet Suyanto from Universitas Negeri Yogyakarta, Dr. Hartono, M.Si. from Universitas Negeri Yogyakarta.

Hopefully, that the 8th International Seminar on Science Education (ISSE) and 6th international seminar of innovation in mathematics and mathematics education (6th ISIMMED) 2022 would be able to achieve its objective in providing an effective forum for academician, researchers, and practitioners to advancing knowledge, research for humanity.

Through this event, i hope this seminar can help to exchange ideas about education issues and make the best contribution. It is pleasing to note that the agenda of this seminar covers a wide range of interesting topics related theoretical and practical aspects.

Last but not least, my deepest gratitude goes to the Advisory Board, ISSE and ISIMMED Committee, institutions, who have directly and indirectly supported the success of this seminar. The committee has organized a vibrant scientific program and is working hard to present highly respected and internationally notorious speakers to lead it. Although we try our finest to be professional, on behalf of Universitas Negeri Yogyakarta, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event. 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 for humanities.

May God bless us all with good health to make this event a successful and enjoyable one!

Wassalamu'alaikum wr.wb.

Yogyakarta, 11th November 2021

Best Regards,

Prof. Dr. Sumaryanto, M.Kes., AIFO.

Rector of Universitas Negeri Yogyakarta

FACULTY OF MATEMATICS AND NATURAL SCIENCES
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INTERNATIONAL JOINT-SEMINAR
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International Seminar of Innovation in Mathematics and Mathematics Education
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Technical Guidelines

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

GENERAL TECHNICAL GUIDELINE
6th ISIMMED and 8th ISSE 2022
Universitas Negeri Yogyakarta

Zoom Virtual Meeting

All events in this conference, including the opening ceremony, keynote sessions, parallel session, and closing ceremony, will be conducted in the ZOOM virtual meeting. Please find the ZOOM virtual meeting link for the parallel sessions in the app.

ZOOM virtual meeting link for Presenter and Participant:

Date	Session	ZOOM ID, Passcode, and Link	Operator
11th Nov 2022	Opening Ceremony, Keynote Session, and Closing Ceremony	Link:https://uny.id/internationaljointseminar-isimmed-isse-2022	

OFFICIAL LANGUAGE

The official language on 6th International Seminar of Innovation in Mathematics and Mathematics Education and 8th International Seminar on Science Education is English. All presentations including questions and answer (Q&A) must be delivered in English.

CERTIFICATE

1. The only author who presents the appear will receive a **"Presenter"** certificate
2. The only participant who attends all sessions at the conference will receive as a **"Participant"** certificate.

PRESENTER TECHNICAL GUIDELINE
6th ISIMMED - 8th ISSE 2022
Universitas Negeri Yogyakarta

A. The Opening and The Main Seminar Session

1. The application used for the international conference is the ZOOM Closed Meetings. Therefore, please make sure your computer/laptop has the ZOOM Closed Meetings application installed. If you have not the application in your device, please click the link below to download:
   https://zoom.us/download
2. The conference access link will be on the Program Book 6th ISIMMED and 8th ISSE that we sent to the email that you have registered on The 6th ISIMMED and The 8th ISSE 2022
3. The access login for all presenters will be opened 30 minutes earlier before the opening ceremony starts at 07.30 AM (GMT+7).
4. Rename your account to the format according to these scope codes:
   Room Number_Scope Code_Your Name_Institution
   For EXAMPLE: 1_LWP_Syifana Ayu_UNY

6th International Seminar of Innovation in Mathematic and Mathematic Education ISIMMED 2022		
No	**Scope**	**Code**
1	Algebra	ALG
2	Geometry	GEO
3	Analysis	ANL
4	Statistics	STS
5	Applied Mathematics & Computer	AMC
6	Innovative Mathematics Teaching and Learning	IMT
7	Evaluation and Assessment in Mathematics Education	EAM
8	Using Technology in Mathematics Education	UTM

8th International Seminar on Science Education ISSE 2022		
No	**Scope**	**Code**
1	Science Education	SED
2	Chemistry Education	CED
3	Biology Education	BED
4	Physics Education	PED
5	Pure Science Content areas (all branches including interdisciplinary)	PSC

5. Please change your virtual background by download the official background from the following link:
   For ISSE: http://isse.uny.ac.id/virtual-conference
   For ISIMMED: http://isimmed.uny.ac.id/virtual-conference
6. When the conference is running, you can ask the keynote speakers by using the Q&A features at the ZOOM chat box with this format: **Name_Institution_Question**
7. The moderators will choose questions to be given to the keynote speakers
8. The moderators have the full rights to run the conference

B. The Parallel Seminar Session

1. Upload your PowerPoint and video presentation files maximum 10 minutes in your account (mandatory)
2. You have to join your respective rooms according to the scope that has been determined by the committee
3. The information related to your ZOOM room can be seen on the Program Book 6th ISIMMED and 8th ISSE 2022 that had been uploaded on the website
4. Rename your account to the format according to these scope code:
   Room Number_Scope_Your Name
   For Example: 1_LWP_Syifana Ayu

6th International Seminar of Innovation in Mathematic and Mathematic Education ISIMMED 2022		
No	**Scope**	**Code**
1	Algebra	ALG
2	Geometry	GEO
3	Analysis	ANL
4	Statistics	STS
5	Applied Mathematics & Computer	AMC
6	Innovative Mathematics Teaching and Learning	IMT
7	Evaluation and Assessment in Mathematics Education	EAM
8	Using Technology in Mathematics Education	UTM

8th International Seminar on Science Education ISSE 2022		
No	**Scope**	**Code**
1	Science Education	SED
2	Chemistry Education	CED
3	Biology Education	BED
4	Physics Education	PED
5	Pure Science Content areas (all branches including interdisciplinary)	PSC

5. Your video presentation will be played by the committee and the Q&A session is about 5 minutes for each presenter after all the video presentation played
6. Presenter must be present in the room parallel. If the presenter is absent and is called still not present until three times so the video will not be played
7. The moderators have the full rights to run the conference

PARTICIPANT TECHNICAL GUIDELINES
6th ISIMMED and 8th ISSE 2021
Yogyakarta State University

A. The Opening and The Main Seminar Session

1. The application used for the international conference is ZOOM Closed Meetings. Therefore, please make sure your computer/laptop has the ZOOM Closed Meetings application installed. If you do not have the application on your device, please click the link below to download it:
   https://zoom.us/download
2. The conference access link will be on the program Book ISIMMED and ISSE that we sent to the email that you have registered on The 6th ISIMMED and The 8th ISSE 2022
3. The access login for all presenters will be opened 30 minutes earlier before the opening ceremony starts at 07.30 AM (GMT+7).
4. The non-presenter participant can choose the room parallel session on the website by clicking the link below:

5. Rename your account to the format :
   Room Number_Your Name_Institution
   For EXAMPLE: 1&9_Syifana Ayu_UNY

Day 2: November 12th 2022	
Room Parallel Session	**Scope**
1	Applied Mathematics & Computer, Statistics
2	Evaluation and Assessment in Mathematics Education
3	Evaluation and Assessment in Mathematics Education
4	Innovative Mathematics Teaching and Learning
5	Innovative Mathematics Teaching and Learning
6	Using Technology in mathematics education, Mathematical Analysis, Algebra

Day 2: November 12th 2022	
Room Parallel Session	**Scope**
7	Biology Education
8	Chemistry Education
9	Chemistry Education
10	Physics Education
11	Physics Education
12	Physics Education

13	Physics Education
14	Physics Education
15	Science Education

6. Please change your virtual background by downloading the official background form the following link:
   For ISSE: http://isse.uny.ac.id/virtual-conference
   For ISIMMED: http://isimmed.uny.ac.id/virtual-conference
7. You are requested not to active the microphone feature during the conference
8. When the conference is running, you can ask the keynote speakers by using the Q&A features at the ZOOM chatbox with this format:
   Name_Institution_Question
9. The moderators will be choosing the questions to be given to the keynote speakers
10. The moderators have the full rights to run the conference

B. The Parallel Seminar Session

1. The parallel seminar is divided into two sessions. Session one consists of 6 rooms that have a different scope, and session two consists of 9 rooms that also have a different scope. Each room limited only to 10 participants.
2. Rename your account according to these format:
   Room Number_Your Name_Institution
   For EXAMPLE: 1&9_Syifana Ayu_UNY
3. The presenter's video presentation will be played by the committee and the Q&A session is about 5 minutes for each presenter after the video presentation is played.
4. You can give the question while the video presentation is played by writing it down in the ZOOM chat box with this format:
   Name_Instutitions_Qusetion
5. The moderators will be choosing the questions to be given to the presenter
6. The moderators have the full rights to run the conference

FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
And International Seminar of Sciences Education

Full Rundown

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

International Joint-Seminar
6th ISIMMED – 8th ISSE
"New Thought, Research, and Practice of Mathematics and Science Education in The Post-Pandemic Era"
Friday-Saturday, 11st-12th November 2022

DAY 1: Friday, 11th November 2022

Time Schedule	Agenda	Time Allocation	Venue
07.30-08.00	Registration Day 1	30 min	Zoom Plenary Session
08.00-08.30	Opening ceremony by Master of Ceremony	5 min	
	National Anthem (Indonesia Raya)	5 min	
	Welcoming speech by Chairperson	5 min	
	Welcoming speech by Rector UNY	5 min	
	Traditional Dance	10 min	
08.30-09.15	**Dr. Jose Hanham, University of Western Australia, Australia** Moderator: Dr. Agung Wijaya S, M.Pd	45 min	
09.15-09.30	Discussion	15 min	
09.30-10.15	**Dr. Slamet Suyanto, M.Ed., Universitas Negeri Yogyakarta, Indonesia** Moderator: Paramita Cahyaningrum Kuswandi, S.P., M.Sc., Ph.D.	45 min	
10.15-10.30	Discussion	15 min	
10.30-13.00	**Break**		
13.00-13.45	**Prof Dr Maija Aksela, Helsinky University, Finlandia** Moderator : Widodo Setiyo Wibowo, S.Pd.Si., M.Pd.	45 min	Zoom Parallel Session
13.45-14.00	Discussion	15 min	
14.00-14.45	**Ian Jones, Ph.D, Loughborough University, England** Moderator : Endah Retnowati, Ph.D	45 min	
14.45-15.00	Discussion	15 min	

International Joint-Seminar
6th ISIMMED – 8th ISSE
"New Thought, Research, and Practice of Mathematics and Science Education in The Post-Pandemic Era"
Friday-Saturday, 11st-12th November 2022

DAY 2: Saturday, 12th November 2022

Time Schedule	Agenda	Time Allocation	Venue
07.30-08.00	Registration Day 2	30 min	Zoom Parallel Session
08.00-11.00	Parallel Session Day 2	3 hours	
11.00-13.00	**Break**		
13.00-13.45	**Dr. Hartono, M.Si., Universitas Negeri Yogyakarta, Indonesia** Moderator: Kismiantini, S.Si., M.Si., Ph.D.	45 min	Zoom Plenary Session
13.45-14.00	Discussion	15 min	
14.00-14.45	**Prof. Dr. Bayram Costu, Yildiz Techincal University, Turkey** Moderator: Isti Yunita, Ph.D.	45 min	
14.45-15.00	Discussion	15 min	
15.00-15.30	Closing Ceremony	30 min	

FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
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The Schedule of the Parallel Session

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

Room 1
Scope : Applied Mathematics & Computer, Statistics
Time : 08.00 -10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room1**
Moderator : Pratama Wahyu Purnama, M.Pd **ID : 974 6634 5759**
Operator : Melda Datu Kalu, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	AMC01	Gamarina Isti Ratnasari	Why Should Mathematics Teachers Know Types of Knowledge?
2	AMC02	Elisa Nur Yuliantika Ardani, Nughthoh Arfawi Kurdhi	Optimal Refurbishing Decisions Considering Process Innovation, Different Power Structures, and Constrained Remanufacturable Product Supply
3	AMC03	Ade Adam Nisa Sabrina, Nughthoh Arfawi Kurdhi	Refurbishing Supply Chains with Tax and Tariff Regulations and Constrained Used Product Supply
4	AMC04	Setiyo Daru Cahyono; Tomi Tristono; Retno Iswati; Seno Aji; Rochidajah; Pradityo Utomo; Moh. Sidqon	Eco-Friendly Traffic Lights Setting for Pedestrians
5	AMC05	TB SOFWAN HADI	Contribution Of Mathematical Critical Intelligence Toward Mathematical Logical Intelligence In E-Learning Assisted Learning
6	AMC07	Fitriani Agustina	European Put Option Model Up-and-Out Constant Barrier and Exponential Barrier with Fuzzy Parameters
7	IMT21	Kuswari Hernawati	Implementation of a project-based mathematics mobile learning model with the TPACK framework
8	STS01	Maylita Hasyim; Nur Chamidah; Toha Saifudin	Estimation of Uniresponse Ordinal Logistic Nonparametric Regression Model Based on Multivariate Adaptive Regression Spline
9	STS02	Edi Supriyadi; Jarnawi Afgani Dahlan	A Bibliometrics Analysis on Big Data Research with Affiliation from Indonesian (2015–2022)
10	STS03	Retno Subekti; Abdurakhman; Dedi Rosadi	Performance Index of Black Litterman SCAPM in Indonesian Stock Market

Room 2
Scope : Evaluation and Assessment in Mathematics Education
Time : 08.10-10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room2**
Moderator : Tsania Nur Diayana, M.Pd **ID : 524 879 5234**
Operator : Ana Muliyana, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	EAM01	Wahyu Hartono; Samsul Hadi; Raden Rosnawati; Heri Retnawati	Obstacles to Learning Mathematics: Qualitative Analysis of Teachers' Perceptions
2	EAM02	Umi Arismawati, Syukrul Hamdi, Wahyu Setyaningrum	How Are Students' Mathematical Disposition Post-COVID-19 Pandemic?
3	EAM03	Ana Muliyana; Ariyadi Wijaya; Wahyu Setyaningrum	Students' Interest in Learning Mathematics: Literature Review
4	EAM04	Ika Surtiani; Kismiantini	Does Teacher Roles and School Types Affect Student's Mathematics Literacy Ability?
5	EAM05	Fifi Khairun Nisa; Elly Arliani	Analysis of Students Ability in Solving Mathematical Literacy Problems Based on Process, Content, and Context Domain
6	EAM06	Dini Liya Meirani Simatupang; Kismiantini	PISA Indonesia: Examining The Influence of Teaching Practice and Math Professional Development on Achievements in Mathematical Literacy Processes
7	EAM07	Agustina Setiawati; Sudiyatno; Nur Hidayanto Pancoro Setyo Putro	EVALUATION OF SEKOLAH PENCETAK WIRAUSAHA PROGRAM AT MUHAMMADIYAH 2 VOCATIONAL SCHOOL OF MUNTILAN
8	EAM09	Sayyidah Umma Rahmawati; Kana Hidayati	Learning Mathematics With Reciprocal Teaching Assisted by Mind Mapping, How Does It Affect the Ability to Understand Concepts?
9	EAM08	Astri Widyasari; Zuhdan Kun Prasetyo	Preliminary Analysis of Basic Science Process Skills of Post-Pandemic Era Elementary School Students
10	EAM10	Zulfa Maziidah; Kana Hidayati	Analysis of Difficulties of Class VIII Students in Solving Numeration Problems with Minimum Competency Assesment Types of Geometry Content Based on the Stages of Van Hiele's Thinking
11	EAM22	Syukrul Hamdi; Kana Hidayati; Yoppy Wahyu Purnomo; Nurul Mukminin	Instrument Design of Numeration Minimum Competency Assessment Using Testlet Model Based On Local Wisdom At Elementary School Level

Room 3
Scope : Evaluation and Assessment in Mathematics Education
Time : 08.00 – 10.45 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room3**
Moderator : Ezra Putrananda S., M.Sc **ID : 965 8519 2189**
Operator : Ramadian Radite, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	EAM11	Desy Fitriani; Kana Hidayati	Meta-Analysis: The Effectiveness of Authentic Assessment in Mathematics Learning in Junior High School
2	EAM12	Khairunnisa Harahap; Elah Nurlaela	Analysis of Realistic Mathematics Approach to Improving Mathematical Communication Ability of Junior High School Students.
3	EAM13	Fanisa Dina A. D. U; Yaya S. Kusumah; Sufyani Prabawanto	Students' Mathematical Reflective Thinking Ability Viewed from Their Learning Style
4	EAM14	Khairini Atiyah; Nanang Priatna	Students' Mathematical Literacy Ability Profile For The Change and Relationship Problem on The PISA During Covid-19 Pandemic.
5	EAM15	Cita Dwi Rosita; Ika Wahyuni; Dian Andriyani; Yaya S. Kusumah	Lecturer Perception Of Learning Problems Microteaching Students' Prospective Teachers
6	EAM16	Assabiq Yudhy Avanda; Raden Rosnawati	Evaluation of the Implementation of Semester Credit System (SCS) in Mathematics Learning in Muhammadiyah Senior High School Wonosobo
7	EAM17	Hapsari Wikan Pangastuti; Elly Arliani	An Analysis Of Junior High School Students' Errors In Solving Mathematical Literacy Questions Oriented To Hots
8	EAM18	Adhar Rizki Mustafa ; Kismiantini	The Effects of Teachers' Motivation and Supports, Parents' Motivations and Digital Learning on Students' Mathematics Achievement: Indonesian case from PISA 2018
9	EAM19	Endar Chrisdiyanto; Kana Hidayati	Analysis of Mathematics Daily Examination Questions on the Topic of Statistics for Class VIII SMP
10	EAM20	Hisyam Ihsan	The Effectiveness of Learning Packages Integrated Computational Thinking Skills on Elementary School Students' Abilities in Thinking Computationally and Solving Mathematics Computational Problems
11	EAM21	Ramadian Radite, Kana Hidayati, Jeffri Tri Agung Prakosa	Analysis of Student's Mathematics Communication and Reasoning Ability Assessment Instruments Oriented to High Order Thinking Skills

Room 4
Scope : Innovative Mathematics Teaching and Learning
Time : 08.00 – 10.45 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room4**
Moderator : Rizki Zakwandi, M.Pd **ID : 956 6018 9582**
Operator : Rilo Pengastuti, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	IMT01	Pardimin; Dafid Slamet Setiana; Didi Supriadi	Integrating Javanese Ethnomathematics Approaches into the Geometry Learning of Junior High School
2	IMT02	Ardani; Ilham Rizkianto	Mathematical justification skill of student in mathematics learning with Realistics Mathematics Education (RME) approach
3	IMT03	Rifnatul Fauziah Megawati; Muhammad Nuh; Sajaratud Dur	Development of Tangram-Based Geometry Teaching Aids to Improve Mathematics Learning Creativity
4	IMT04	Heni Novianti	The Effectiveness of Realistic Mathematics Education (RME) on Learning Outcomes Mathematics : Experimental Study on Comparison of Trigonometric Special Angles in Class X MIA SMAN 3 Palu
5	IMT05	Lalu Wahyu Rizaldi; Wahyu Setyaningrum, M.Ed.,Ph.D	Pendekatan Problem Based Learning Melalui Model Pembelajaran Kooperatif Tipe Numbering High Together (NHT) Untuk Meningkatan Kemampuan Kolaborasi, Literasi Matematis Dan Kemampuan Berpikir Kritis Matematis Siswa Di Kelas X SMA Negeri 1 Wiwirano
6	IMT06	Phoa Wily Angpujana; Wahyu Setyaningrum	Managing Risk in Mathematics Learning: How to Improve Confidence?
7	IMT07	Manggala Wihasta Jagat Wicaksana; Wahyu Setyaningrum	The Effect of the STAD type Cooperative Learning Model assisted by LKPD and e-Module on Students' Mathematics Learning Outcomes
8	IMT08	Yuhasriati; Elizar; Anwar; Siti Fatimah; Yulinar Safitri	Statistical Reasoning Skills of Elementary School Students on Data Collection and Presentation Through Realistics Mathematics Education
9	IMT09	Selvina Harefa; Djamilah Bondan Widjajanti	Relational Understanding: How to Teach Mathematics for Understanding?
10	IMT10	Labibah Arih Rahayu;	Adversity Quotient (AQ) in Mathematics Learning: How to develop students who have low AQ in Reflective Intelligence

Room 5
Scope : Innovative Mathematics Teaching and Learning
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room5**
Moderator : Hadi Nurahman, M.Pd **ID : 968 1241 4845**
Operator : Laila Marfirah, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	IMT11	Ratna Puspitasari; Sugiman	Student Creativity in Solving Unique Mathematical Problems with Contextual Approach
2	IMT12	Siti Zahra Zahrona; Djamilah Bondan Widjajanti	Can Emotional Intelligence in Mathematics Learning be Improved Through the TPS Model? Literature Review
3	IMT13	Peni Fauziah Puadah;Elah Nurlaelah	Student's Metacognitive Ability ini Mathematical Problem-Solving : A Systematic Literature Review
4	IMT14	Septian Henry Riswandha; Budi Usodo; Riyadi	Does Van Hiele Level of Geometric Thinking Ability Affect Students'Mathematics Learning Outcomes?
5	IMT15	Rahma Budiasti;Djamilah Bondan Widjajanti	Building a Positive Attitude towards Mathematics: Its Impact on Reducing Student Phobia
6	IMT16	Andita Putri Sulistyawati;Djamilah Bondan Widjajanti	The Importance of The Synergy of Parents and Teachers as A Student's External Factor in Overcoming Dyscalculia in Learning Math
7	IMT17	Gladys Heinz Niviavitry;Djamilah Bondan Widjajanti	Self-Concept: What and How Does It Affect Students' Persistence and Learning Outcomes in Mathematics
8	IMT18	Atifa Kamila Zeba;Djamilah Bondan Widjajanti	Cheating Behavior: Causes and Relationship to Students' Math Anxiety
9	IMT19	Muchamad Subali Noto; Tarmidzi; Mohammad Dadan Sundawan	Ability to Understanding and Construction of Mathematical Proof of Prospective Mathematics Teachers Based on Mathematical Prior Knowledge
10	IMT20	Adri Nofrianto, Elfa Rafulta, Mira Amelia Amri	In-service Mathematics Teachers: Toward Understanding Their Initial Concepts of Higher Order Thinking Skills
11	IMT22	Yohanis Ndapa Deda	ETHNOMATHEMATICS EXPLORATION IN THE TRADITIONAL GAME PIO INSANA

Room 6
Scope : Using Technology in mathematics education, Mathematical Analysis, Algebra
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room6**
Moderator : Fika Fauzi, M.Sc **ID : 5798875004**
Operator : Herlina Sari Br Sitepu, S. Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	ANL01	Thabitha Oktavianasta Pakpahan; Nughthoh Arfawi Kurdhi	A Profit Allocation Strategy of a Refurbishing Model with Fairness Concerns Based on Shapley Value
2	ANL02	Alan Rifqi Kamal; Edi Istiyono; Widihastuti	The Differences in Productive Disposition in Mathematics for Students of the Science and Social Sciences Department Class 12 Budi Mulia Dua High School Yogyakarta
3	ANL03	Fitri; Kana Hidayati	ANALYSIS OF MATHEMATIC REASONING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS MATERIALS OF NUMBER PATTERNS
4	UTM01	Yurniwati Yurniwati; Cecep Kustandi	Impact of Web-Based Knowledge Building on Professional Identity of Prospective Teachers
5	UTM02	Martin Bernard, Herman Dwi Surjono, Sri Andayani	Visual Basic Application for Excel Learning Media with Synthesis Program Method on Mathematical Problem Solving Ability of Prospective Teachers
6	UTM03	Nilza Humaira Salsabila; Baidowi; Syahrul Azmi; Ulfa Lu'luilmaknun	Instructional Multimedia with Local Context oriented to Numeracy Skills: Practicality and Effectiveness
7	UTM04	shinta agustina putri; agus maman abadi	Development of E-lkpd Based Guided Inquiry Oriented to Mathematic Problem Solving For Junior High School
8	UTM05	Fardatil Aini Agusti; Afifah Zafirah; Refenia Usman; Irwan; Defri Ahmad; Suherman	Developing Mobile Application using Augmented Reality to Introduce Three-Dimensional Object in Geometry
9	AGL01	Teduh Wulandari Masoed ; Sugi Guritman	Determinant and Invers of Skew Circulant Matrices with Arithmetic Sequence
10	AGL02	Zulfia Memi Mayasari; Mulia Astuti; Rasdiana Windarti; Melzha Amanda	Characteristic Identity Graph of Integer Modulo p Group, p Prime
11	ANL04	Agus Widodo; Marsudi; Dwija Wisnu Brata; Nahlia Rakhmawati; Pramudya Adi Wardana	ANTICIPATING THE SCARCITY OF FOOD COMMODITY TO SUFFICIENT AVAILABILITY FOR THE COMMUNITY IN EAST JAVA WITH A COMPARISON APPROACH TO FORECASTING ARTIFICIAL NEURAL NETWORKS AND EXPONENTIAL SMOOTHING

Room 7
Scope : Biology, Biology Education
Time : 08.00 – 09.45 (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room7**
Moderator : Dr.Anggi Tyas Pratama, M.Pd **ID : 943 6985 2858**
Operator : Eviellia, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PSC01	Annisa Latifa, S.Si., M.Sc.	Comparison of the Environmental Balance of Plankton at the Beginning of the Dry Season and the Beginning of the Rainy Season in Two Reservoirs
2	PSC02	Rina Budi Satiyarti	Desain Primer Untuk Amplifikasi Gen Nd2 Pada Penderita Diabetes Melitus Tipe 2
3	BED01	Aditia Pramudia Sunandar	The Potential of 21st Century Biology Learning Resources Based on Local Potential from Insect Diversity in Nglanggeran Ancient Volcano, Yogyakarta
4	BED02	Irani Hoeronis	Virtual Reality Design as Teaching Material for Local Potential Biodiversity in Tasikmalaya
5	BED03	Neli Dwi Septi Anggraeni	Analytical Ability in Biology at Senior High School Level: A Review
6	BED04	Rizqa Devi Anazifa	The Development of Online Flipped Classroom using Problem Based Learning based on Socio-scientific Issue to Enhance Student's' Scientific Literacy and Biological Ethic Awareness
7	BED05	Tutiek Rahayu; BM Wara Kushartanti; Novita Intan Arovah	Urgency Of Physical Activity For Elderly
8	BED06	Dwi Kameluh Agustina	Knowledge of Villagers about the Bioecology of Fruit Flies (Bactrocera spp) Based Learning Development Citizen Science

Room 8
Scope : Chemistry Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room8**
Moderator : Dr.Dyah Purwaningsih, M.Si **ID : 976 1194 6195**
Operator : Restu Utami, S.Si **Pass : UNY2022**

No	Article Code	Presenter	Title of Paper
1	PSC05	AK Prodjosantoso	Solidification of Copper In CaO-CuOx-SiO4 . Composites
2	CED01	Ajeng Nurmalita Kusumastuti	Development of Problem Based Learning-Student Worksheet Assisted by Video on Colloid
3	CED02	Dina	Development of SSI-Oriented Chemistry Learning Videos with Controversial Issues in ESD
4	CED03	Dini Wahyuni	Teaching Intervention of Learning Cycle 5E Models in Science Education: A systematic Review
5	CED04	Elisabeth Rukmini	The Indonesian Adapted Measurement Tool: A Valid and Reliable Tool to Measure Classroom Emotional Climate
6	CED05	Enzelina Smith Turnip	Visualization Of Chemical Equilibrium Material Through Multiple Representation-Based Comics
7	CED06	Evan Nurdian Witanti	How are Students' Attitudes Toward Video Podcast of Buffer Solution in Chemistry Learning?
8	CED07	Lia Yuniarti	Assessing Students' Motivation During Online Learning by Using Thinkific Platform
9	CED08	Roudhotul Fitria	Teaching Intervention Of REACT Strategy In Science Learning: A Systematic Review
10	CED09	Yessi Prihartina	Literature Review of Learning Media on Chemical Bonding Material

Room 9
Scope : Physics and Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room9**
Moderator : Rita Prasetyowati, M.Pd **ID : 983 7207 0157**
Operator : Aida Nur Azki, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PSC08	Dini Anggreini	Pengembangan LKPD Berbasis Problem Based Learning Untuk Pembelajaran Fisika Dalam Peningkatan Berpikir Kritis Siswa Meliputi Sikap Ilmiah Dan Hasil Belajar Materi Momentum dan Impuls
2	PSC09	Heru Kuswanto	Relative Humidity Sensing using Optical Reflection
3	PED01	A. RIHLA ANNISA	Effectiveness of E-LKPD Using Quizizz Application Learning Media to Improve Students' Critical Thinking Ability
4	PED02	Afrida Dwi Rahmayanti	Development of Physics STEM Project Based Learning E-Worksheet to Enhance Student's Creative Thinking Skills and Learning Motivation
5	PED03	Ahmad Muwafiq Abdillah; Jumadi Jumadi	Effectiveness E-Worksheet Of Problem Based Learning (PBL) Model On Progressive Wave And Stationary Wave Materials To Improve Critical Thinking Ability Students
6	PED04	Aida Nur Azki Utami	The Implementation Electronic Students' Worksheet Based On Pogil To Improve Analytical Thinking Skills On Global Warming
7	PED05	Albina Jehira Sulu Dura	Developmentof Physics E-Books For Straight Motion Materials to Improve Critical Thinking Skill Of Students in Smk
8	PED06	Alia Rizky	Development of Flipbook-Assisted Digital Teaching Materials on Momentum and Impulse Materials to Improve Students' Concept Understanding
9	PED07	Ana Helisa Rosianti	Animation Video Development Assisted by Powtoon in the TPS Type Cooperative learning model in Straight Motion Materials to Improve Students' Concept Understanding
10	PED08	Angela Gusti Ayu Gita Sukmadewi	Literature Review: Effectiveness Of Physics Comic To Upgrade Student's Mathematical Representation and Critical Thinking Skills In Physics Learning

Room 10
Scope : Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room10**
Moderator : Purwoko Haryadi Santoso, M.Pd **ID : 939 5189 8279**
Operator : Antoni Pieter M D, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PED09	Anna Christi Poreni	Inquiry-Discovery Physics Electronic Worksheet with TeacherMade-Assisted Productive Questions to Improve Science Process Skills for Reflection of Light in Mirrors and Lenses
2	PED10	Antoni Pieter Mauritz Dare	Electronic Physics Worksheet Using liveworksheets with the Problem-Solving Method to Improve Verbal Representation Skills on collision topics
3	PED11	Arimbi Rachmayani	Development of Simple Harmonic Motion Module Based on Flip Book to Improve Mathematical Representation Ability of Students
4	PED12	Arum Wulandari	The Development of Quizizz Integrated Physics E-Worksheet to Improve Students' Critical Thinking Skills
5	PED13	Briliant Novitasari Miranda	Development Of Ulatic Electronic Media To Improve Science Process Skills And Student Concept Understanding
6	PED14	Christa Triana Dewi	The Effectiveness of Electronic Student Worksheet Assisted by Liveworksheets to Improve Data Literacy Ability in Momentum Learning
7	PED15	Dewi Nurulhasni	Development of Parabolic Motion Practicum Tool as a Concept Visualization Media
8	PED16	Dwi Indah Pangesti Cahya Ningrum	Development of Physics Websites Based on STEM Assisted of Google Sites on Momentum and Impulse Materials to Improve Creative Thinking Skills
9	PED17	Eka Ayu Nurbaiti	DEVELOPMENT OF SELF-ASSESSMENT INSTRUMENTS TO MEASURE THE SELF-CONCEPT AND THE MORAL OF STUDENTS IN PHYSICS LEARNING
10	PED18	Fadillah Rahmayani	Android Physics e-Module on Newton's Gravity and Planetary Motion Materials to Improve Students' Concept Understanding

Room 11
Scope : Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room11**
Moderator : Irvany Nurita Pebriana, M.Pd **ID : 973 9561 0517**
Operator : Hidayat Tullah, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PED19	Febriani	Modification of Team Games Tournament Learning Strategy for Collaboration and Communication Skills in Physics Learning
2	PED20	Frenky Suseno Manik	The Effect of STEM-Based Vertical Downward Student Worksheet Application on Students' Self Efficacy and Cognitive Learning Outcomes
3	PED21	Hafizana Tiara Amir	Meta-Analysis of The Use of Augmented Reality in Physics Learning
4	PED22	Hidayat Tullah	Application of Integrated PhET E-LKPD Material for Simple Harmonic Vibration to Improve Students' Physics Learning Output
5	PED23	Ifatul Khasanah	Simulation of Uranium-238 Radioactive Decay with Virtual Basic Application of Microsoft Excel
6	PED24	Iza Alfi Rohmatin	Implementation of Augmented Reality Learning Media: Its impact on the problem-solving ability of direct current electricity
7	PED25	Liza Septia Ahmad	Development of Electronic Student Worksheet Integrated PhET on Simple Harmonic Motion Materials to Improve Learning Outcomes
8	PED26	LL. MUH. BAIDUI	Development Of The “5E” Learning Cycle E-Module On Momentum And Impulse Materials to Increase Motivation And Cognitive Learning Outcomes
9	PED27	M.Ibnusaputra	Development of Simple Physics WorkBoard as Contextualization of Moment of Force Theory
10	PED28	Maria Fransiska Tunga	Development of Physics Electronic Students Worksheet Using Problem Based Learning Model Assisted by Phet to Improve Students' Mathematical Representation

Room 12
Scope : Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room12**
Moderator : Desy Purwasih, M.Pd **ID : 922 5835 0991**
Operator : M. Arif Nur Rokhman, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PED29	Mu'ad Irmawan	Application of the Snowball Throwing Learning Model to MTSN Students to Increase Activeness and Science Cognitive Learning Outcomes on Substances and Their Characteristics
2	PED30	Muh. Ridwansyah	Implementation Of Digital Camera Software To Determine Liquid Viscosity Value
3	PED31	Nunung Azizah	Effectiveness e-Modules based Mit Inventor on Momentum and Impulse Materials to Improve Concept Understanding
4	PED32	NUNUNG SETIATI	Development of E-Student Worksheet Problem Based Learning Model on Work and Energy to Improve Cognitive Physics Ability of Students
5	PED33	Nur Safitri Ulfa	Development Physics E-Book Straight Motion Material to Improve Problem Solving Ability of Class X SMK
6	PED34	Nur Wahyuni Idris	Development of Mind Mapping Worksheet Topics of Momentum and Impulse to Improve Critical Thinking Skills of High School Students
7	PED35	nurfazliana	Development of E-LKPD Based on PROBLEM BASED LEARNING (PBL) Assistant Live Worksheets Model On Wave Materials to Improve Concept Understanding Of Class XI SMA
8	PED36	Nurlina	Integrating Merdeka Belajar Curriculum in Physics Context to Developing Scientific Literacy of Senior High School
9	PED37	NURYATI	Efforts to Improve Physics Learning Outcomes by Applying Numerical Literacy Based on Guided Inquiry Worksheets on Work and Simple Planes Learning
10	PED38	Pani Veronika Mahulae	Development of Interactive Video on Straight Motion Materials to Improve Concept Understanding of High School Students

Room 13
Scope : Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room13**
Moderator : Bayu Setiaji, M.Pd **ID : 956 1738 3767**
Operator : Lutfiah Nurhidayati, S. Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PED39	Pramudya Wahyu Pradana	Review on Research and Development of Physics Assessment Instruments on Momentum and Impulse Topic
2	PED40	Qamariah	The Validity of Fister Apps based on Augmented Reality for Electrical Enggineering Students
3	PED41	rema yuszahra	Pengembangan LKPD Untuk Pembelajaran Fisika Dalam Peningkatan Sikap Ilmiah dan Hasil Belajar Materi Momentum dan Impuls
4	PED42	Ricky Armando Putra	Learning Media for Straight Motion on Flat Planes and Sloping Planes Based on Arduino with Infrared Sensors E18-D80NK
5	PED44	Rina Winarni Nuraisyah	Pengembangan LKPD Berbasis Problem Based Learning Pada Pembelajaran FIsika untuk meningkatkan Sikap Ilmiah dan Hasil Belajar Materi Momentum dan Impuls
6	PED45	Rista Dwi Murtiningtyas	Development of Higher Thought Business (HOTS) test questions for liquid materials for SMA/MA
7	PED46	Rosa Safirotun Nabilah	The Use of STEAM-Project-Based Learning to Enhance Students Critical Thinking Skills in Physics Magnifying Glass Project
8	PED47	Serly Anggraini Listyaningrum	Training Numerical Skills of Student Using Electronic Modul in Distance Learning Activities
9	PED48	Siti Meisaroh	Effectiveness of e-Worksheet assisted by PhET Simulation with Problem Based Learning Model to Improve Problem-Solving Skills in Light Waves

Room 14
Scope : Physics Education
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room14**
Moderator : Dr. Rida Siti Nur'aini Mahmudah, M.Si. **ID : 942 6604 5764**
Operator : Anggi Datiatur Rahmat, S.P **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	PED49	Sunardi	Analysis of Physcs Teaching Subjects That Can Be Potentially Taught Using Bifocal Modeling Practicum
2	PED50	Suryani	Efforts To Improve Activeness And Learning Outcomes Of Students Of Class X IPA 1 SMA Negeri 1 Pundong Using Stad-Type Cooperative Learning Model
3	PED51	SUSAN YONA MATULESSY	Application Of Phsyics Crossword Assisted E-Book Media On Learning Interest
4	PED52	Syahrul Ramadhan	Improving Teachers' Ability to Create Higher Order Thinking Skill Questions Through the PHOTFIS Training Model
5	PED53	Tim Abyan Syah	Implementation Of Project Based Learning (Pjbl) Learning Model In Improving 21st Century 4c Skills
6	PED54	Tirtandro Meda	The Effect of Reciprocal Teaching Learning in Achieving Students' Critical Thinking Ability on Parabolic Motion Material at SMAN 2 Wates
7	PED55	Vina Serevina	Efforts To Improve Physical Learning Outcomes With a Problem-Solving Learning Model in Students Of Class XI Science 1 Public Senior High School 107 Jakarta
8	PED56	Wildan Navisa Barra	The Effectiveness of PhET-Assisted Inductive Thinking Learning Model on Students' Critical Thinking Skills and Curiosity Attitudes
9	PED57	Yona Riska Amalia Ritonga	Development of LKPD Based on Mind Mapping Subject Momentum and Impulse to Improve Students' Concept Understanding
10	PED58	YULIANUZHA	Development of E-LKPD Based on Kvisoft Flipbook Maker to Improve Concept Understanding of Class X Students on Global Warming Materials
11	PED59	Zulaikha Ummul Arafah	Development of Physics E-Module Integrated with the Values of Pancasila During the Covid-19

Room 15
Scope : Science Education and Others
Time : 08.00 – 10.30 WIB (GMT+7) **Link : https://s.id/ISIMMEDISSE-Room15**
Moderator : Dr. Laifa Rahmawati, M.Pd **ID : 995 5019 8017**
Operator : Arina Zaida Ilma, S.Pd **Pass : UNY2022**

No	Article Code	Presenters	Title of Paper
1	SED01	Aisah Wiendiarti	Critical Thinking Analysis in Natural and Social Science Books
2	SED02	Astri Widyasari	Preliminary Analysis of Basic Science Process Skills of Post-Pandemic Era Elementary School Students
3	SED03	Desy Purwasih	Multi-Rater Analysis for Learning Instruction Webbed Models based on Local Potential "Pulau Kembang" Validation: An Innovative Means to Assess Product Quality
4	SED04	Nina Khaerunnisa	Science Learning and Technology: Teachers and Students Perspective on Virtual Reality Learning Media Development in Junior High School in The Post Pandemic Era
5	SED05	Sariyah	Science Mobile Learning: The Need Analysis of Junior High School Students in The Post-Pandemic Era
6	SED06	Susilowati	Analysis of Teaching Models for Preservice Science Teachers in Indonesia.
7	PSC10	Paramitha Nerisafitra	The Combination of CSI And IPA Analysis To Measure The Service Quality of Undergraduate Students Using The SERVQUAL Model Approach
8	PSC11	Wening Primaestri	Wening Primaestri - Developing Mathematic Studies-Digital Game to Increase Student's Self-Regulated Learning Time Management: A Literature Study
9	SED07	Muhamad Arif Nur Rokhman	The Influence Of Guided Inquiry Learning Based On The Socio-Scientific Issues Model On Students Critical Thinking Skills
10	SED08	Arina Zaida Ilma	STEM Based Module with Crosscutting Concepts for Science Learning: Context Feasibility

FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
And International Seminar of Sciences Education

Abstract
of Keynote Speakers

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

FLIPPED LEARNING IN SCIENCE EDUCATION: WHAT IS THE EFFECT ON STUDENTS' ACHIEVEMENT?

Prof. Dr. Bayram COSTU
Yildiz Technical University
Faculty of Education

Content of the speech:
In my keynote speech, firstly I will focus on the overview the flipped learning model and four pillars of the flipped learning. Secondly, a meta-analysis method is used to see the effect of the flipped learning model applied in science courses in elementary schools on students' achievement. In the context of the meta-analysis method, the study is confined to applications submitted in Turkey and studies published between the years 2012 and 2022. Lastly, according to meta-analysis findings, I will discuss the results on the following the six research questions:
RQ1. Is there any significant difference in academic achievement in science lessons in classrooms where the flipped learning model is applied when compared to the traditional classroom layout?
RQ2. Is there any significant difference between the effect sizes of the publications in the literature on the effects of the courses in which the flipped education model is applied in science education on the academic achievement of students in science, according to the discipline?
RQ3. Is there any significant difference between the effect sizes of the publications in the literature on the effects of the courses in which the flipped education model is applied in science education on the academic achievement of students in science, according to the application duration of the applications?
RQ4. Is there any significant difference between the effect sizes of the publications in the literature on the effects of the courses in which the flipped education model is applied in science education on the academic achievement of students in science, according to the grade levels of the students?

RQ5. Is there any significant difference between the effect sizes of the publications in the literature on the effects of the courses in which the flipped education model is applied in science education on the academic achievement of students in science, according to the sample sizes.
RQ6. Is there any significant difference between the effect sizes of the publications in the literature on the effects of the courses in which the flipped education model is applied in science education on the academic achievement of students in science, according to the application region?

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Comparative judgement for assessing learning outcomes in mathematics and science

Dr Ian Jones, Department of Mathematics Education, Loughborough University, UK

Abstract.
Comparative judgement methods involve making holistic, pairwise decisions about the quality of students' work. Such methods have been gaining traction for the past decade because they enable the reliable and efficient assessment of important learning outcomes such as problem solving and understanding of concepts. In this talk I will present evidence from a programme of research conducted at Loughborough University in which we have used comparative judgement to assess learning outcomes in a wide range of educational contexts. Key to the success of comparative judgement methods is the use of geninunely open-ended tasks, and enhancing student learning through peer assessment activities. I will present evidence that peer assessment methods based on comparative judgement can produce outcomes that are valid and reliable enough for summative assessment applications. The talk will involve a workshop component where delegates can have a go at judging students' work, and reflect on the types of tasks and peer learning activities that comparative judgement can enable in their own contexts.

Applying Social Cognitive Theory to Group Learning in Schools: Can efficacy beliefs develop prematurely?

Dr. José Hanham
School of Education
Western Sydney University

Abstract

This presentation focuses on the application of Bandura's Social Cognitive Theory (SCT) to the study of group-based earning in school settings. SCT has been very informative about how individuals' beliefs in their abilities to successfully perform tasks, known as self-efficacy, impacts motivation and achievement in educational environments. This presentation elaborates on two efficacy constructs, collective efficacy and proxy efficacy, that are salient for understanding motivational processes and achievement outcomes at the group level. Collective efficacy refers to shared beliefs amongst members of a group that they can successfully execute group-based tasks (e.g., share ideas between group members). Proxy efficacy refers to beliefs about each group member's ability to successfully perform their assigned roles (e.g., coordinator, recorder). In this presentation, I will discuss the sources of these efficacy beliefs. I will then present some findings from recent school-based studies that have been applied to a specialised form of group work, known as Project-Based Learning. Notably, I will discuss some findings which suggest that collective and proxy efficacy beliefs may develop too soon during group projects, which result in negative effects on group achievement outcomes.

FACULTY OF MATEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI YOGYAKARTA

INTERNATIONAL JOINT-SEMINAR
6th ISIMMED and 8th ISSE

International Seminar of Innovation in Mathematics and Mathematics Education
And International Seminar of Sciences Education

Abstract
of Oral Presenters

UNIVERSITAS NEGERI YOGYAKARTA
YOGYAKARTA
INDONESIA

[AMC01]
Mengapa Guru Matematika Harus Tahu Jenis-Jenis Pengetahuan?

Gamarina Isti Ratnasari[1,a)] and Ponco Handayawati [2,b)]

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Abstract. Psikologi kognitif telah membagi pengetahuan menjadi tiga kategori yaitu pengetahuan deklaratif, pengetahuan procedural, dan pengetahuan kondisional. Ketiga pengetahuan tersebut memliki tujuan dan fungsi masing-masing. Artikel ini bertujuan untuk mengetahui alasan guru matematika harus mengetahui jenis-jenis pengetahuan. Peneltian ini menggunakan metode literatur review. Berdasarkan hasil literatur review diperoleh bahwa alasan guru matematika harus mengetahui jenis-jenis pengetahuan siswa adalah untuk mengoptimalkan tiga kategori pengetahuan yang dimiliki siswa

Scope: Applied Mathematics & Computer

[AMC02]
Optimal Refurbishing Decisions Considering Process Innovation, Different Power Structures, and Constrained Remanufacturable Product Supply

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Abstract. Since pricing strategies that take advantage of the lower refurbishment costs will result in a higher market demand for refurbished items, innovation in the refurbishing process will benefit those in the supply chain. The manufacturer may ask the retailer to split the cost of creating a refurbishing procedure. The manufacturer's Research and Development (R&D) costs to create an innovative refurbishing procedure are another incentive for the retailer to participate. Therefore, while creating a cost-sharing contract, the supply chain should be coordinated. This work creates a closed-loop supply chain that incorporates a cost-sharing mechanism and an innovative refurbishing technique. However, the cost-sharing mechanism is impacted by the power structures in the supply chain. We examine how power structures impact the cost-sharing agreement and the ideal. The manufacturer-led under investigation. We develop and assess the optimal cost-sharing strategy for the retailer in manufacture-Ied structure with many parameter to maximize its financial success. There are two market segments: high end and low end. In this paper, we propose a construct that bases company decision-making on an estimation of the proportion of customers that switch for a specific price difference. Because our approach doesn't rely on a Willingness to Pay (WTP), it can handle such complex and realistic scenarios. Furthermore, the remanufacturable product supply is constrained. The retailer only has limited access to used products and may not be able to collect enough them to satisfy refurbished product demand.

Scope: Applied Mathematics & Computer

[AMC03]
Refurbishing Supply Chains with Tax and Tariff Regulations and Constrained Used Product Supply

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Abstract. In the current global refurbishing supply chains, whether an original equipment manufacturer (OEM) performs refurbishing activities in-house or contracts them out to a third party (3P) depends on tax and tariff restrictions. The tax and tariff laws of the importing country, and more specifically the disparity between the sales tax on used goods and the unit product import duties on new goods, have a significant impact on the best refurbishing model. Therefore, in this study, we create a single period model for an OEM from an exporting nation to make decisions. We look into how tax and tariff laws impact outsourcing decisions in the context of modeling. We investigate the effects of global trade tariff and tax rate differential legislation on the social welfare of importing nations as well as the cross-border refurbishing decisions of OEMs. This topic has not gotten much attention in the literature to this point, current deglobalization developments have increased its importance. There are two market segments: high end and low end. The market demand for new and refurbished products is the constraint on the supply of remanufactured goods. The 3P can pick up a fraction of the used goods. In this paper, we propose a construct that bases company decision-making on an estimation of the proportion of customers that switch for a specific price difference. Furthermore, the remanufacturable product supply is constrained. The firm only has limited access to used products and may not be able to collect enough them to satisfy refurbished product demand.

Scope: Applied Mathematics & Computer

[AMC04]
Eco-Friendly Traffic Lights Setting for Pedestrians

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Abstract. The traffic lights are essential as a control system for traffic flow in urban road networks. Traffic lights can improve intersection performance, reduce travel delays, and unravel congestion if the setting is appropriate. Its traffic lights are installed at the intersection of the north gate of Madiun City. All vehicles wishing to go to the cities in the southern of Madiun City must enter this intersection first. It consists of four arms. This study aims to discuss the intersection's Level of Service (LoS) based on the volume of traffic flow when the traffic lights set is added with the pedestrian signal. The observation method is used to find out the daily traffic volume. For representing the behavior of the traffic light signal states, the Petri net modeling is required. The study stated that implementing traffic light settings with fixed order of four phases was feasible. The green signal allocation for the four arms is correct. However, the travel delays must be high due to the massive intersection and so for travel safety. The Level of Service (LoS) index of performance intersection in the morning, afternoon, and evening are E. The traffic light settings slightly lowered the intersection's Level of Service (LoS) index due to having pedestrian signals. For pedestrian solutions and the eco-friendly traffic lights setting, the massive intersection must provide a temporary transit area for pedestrians at the road's median for travel safety.

Scope: Applied Mathematics & Computer

[AMC05]
CONTRIBUTION OF MATHEMATICAL CRITICAL INTELLIGENCE TOWARD MATHEMATICAL LOGICAL INTELLIGENCE IN E-LEARNING ASSISTED LEARNING

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Abstract. *Mathematical logical intelligence is very important to be noted since it can improve students' learning. However, according to some opinions, there are still shortcomings in the indicators of logical mathematical intelligence because learning begins with the classification process. One indicator that can complement logical intelligence is mathematics which is an indicator of critical thinking skills. The purpose of this study is to analyze students' mathematical critical thinking skills in e-learning-assisted mathematics learning, analyze students' mathematical logical intelligence in e-learning-assisted mathematics learning, and analyze the contribution of critical thinking skills to students' logical mathematical intelligence in e-learning-assisted mathematics learning. This research method is quantitative research using experimental methods. Some results were showed related to students' critical thinking skills in e-learning assisted learning. The process of answering questions got percentage of 100, identification got percentage of 85.71 and the next was the analysis process in answering questions which got percentage of 71.25. The students' mathematical logical intelligence was measured by indicators for 48.57%, the hypothesis indicator was 31.43%, but for the classification indicator was 17.14% and generalization was with a value of 14.29%. For the contribution of critical thinking skills to mathematical logical intelligence, identification indicators gave a good influence and contribution to mathematical logical intelligence in e-learning assisted learning*

Scope: Applied Mathematics & Computer

[IMT21]

The effectiveness of the implementation of the Pj-B Mob Math Learning Model with the TPACK Framework on student learning outcomes

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Abstract. This study aims: 1) to determine whether the implementation of the Pj-B MobMath learning model with the TPACK framework is effective in achieving student learning outcomes; 2) to compare student learning outcomes before and after using the Pj-B MobMath learning model with the TPACK framework; 3) to find out how the response of teachers and students when using the Pj-B MobMath learning model with the TPACK framework. The subjects of this study were 214 grade 12 students at one of the senior high schools in Yogyakarta. Collecting data using pretest, posttest, and questionnaire sheets for teachers and students. The results showed that the Pj-B MobMath learning model with the TPACK framework was effectively used and students experienced an increase in learning outcomes by comparing pretest and posttest scores. In addition, the average positive and supportive response from teachers and students towards the model developed for general use in schools.

[STS01]
Estimation of Uniresponse Ordinal Logistic Nonparametric Regression Model Based on Multivariate Adaptive Regression Spline

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Abstract. One of the adaptive methods in nonparametric regression that is able to accommodate interactions between predictor variables is the Multivariate Adaptive Regression Spline (MARS) method. MARS modeling has been developed based on the types of response variables involved in regression modeling, one of which is categorical (qualitative) response variables. The MARS method with categorical responses (both binary and order) can be used as a modern statistical classification method, where the classification in MARS by using ordinal logistic regression approach. Estimation of function in ordinal logistic regression is assumed smooth based on the ordinal MARS model, namely as the MARS ordinal logit model. The development of previous studies only discussed binary responses, while for cases with responses of more than two categories, the MARS method was needed that could analyze ordinal responses. This study estimates the parameters for an ordinal category response using ordinal logistic nonparametric regression model based on MARS. This study aims to estimate the cumulative probability of ordinal logistic nonparametric regression model using the MARS estimator. Maximum Likelihood Estimation (MLE) method is used to obtain parameter estimation. The distribution of the ordinal scale response variable with three categories in the MARS model is multinomial distribution, that the log-likelihood function of the ordinal response random variable will be maximized to obtain the parameter value.

Scope: Statistics

[STS02]
A Bibliometrics Analysis on Big Data Research with Affiliation from Indonesian (2015–2022)

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Abstract. MGI and McKinsey's Business Technology Office say big data analysis will become a crucial basis of competition. Big data analysis demands a massive computational infrastructure and a lot of time. Despite its operational and strategic consequences, empirical research on big data's business value is scarce. MGI: Big data could transform management. This study intends to conduct a bibliometric analysis of Big Data publications in Indonesia. Who are the most prolific Big Data writers in Indonesia. We use Scopus data to examine Indonesian big data with bibliometrix between 2015 and 2022. This study found that Big Data research in Indonesia is growing each year. The increased number of papers released each year shows this. Affiliated institutions including the University of Indonesia and Bina Nusantara University publish many authors and papers in reputable publications.

Scope: Statistics

[STS03]
Performance Index of Black Litterman SCAPM in the Indonesian Stock Market

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Abstract
The Black Litterman model is one of the strategies for compiling optimal portfolios. This model begins with a CAPM return and is combined with investor predictions. In order to conform to Islamic principles for sharia stock portfolios, the BL-SCAPM model was introduced as an alternative model that adheres more to Islamic principles. This study aims to determine the results of the Islamic portfolio with the BL-SCAPM model, which is seen from two performance indices, namely Sharpe and Treynor. BL-SCAPM is implemented on Sharia stocks in the Indonesian stock market and shows Sharpe's higher performance than BL-CAPM. Meanwhile, it is quite similar between the Treynor index of BL-SCAPM and BL-CAPM. Sharpe and Treynor index, the BL-SCAPM strategy can be used as an alternative to portfolio modeling with several Sharia principles to obtain an optimal allocation of Sharia-compliant stocks.

Scope: Statistics

[EAM01]
Obstacles to Learning Mathematics: Qualitative Analysis of Teachers' Perceptions

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Abstract: Learning in the classroom is a complex process because it involves various skills. Information about the obstacles of mathematics teachers in carrying out that process will be helpful for better learning. This study aims to explore the obstacles of mathematics teachers in carrying out learning in the classroom and find solutions to prevent these obstacles. This research is a qualitative study with a phenomenological approach. Data sources are the results of interviews with five mathematics teachers from different schools. We analyze the data by looking for themes, then determine the relationship between the themes to gain understanding. The study found that students were a lack of attitudes, interests, and motivation to learn at school. Students lack prerequisite skills. Students' self-confidence is low. The zoning system causes students' abilities to vary so that teachers find it difficult to implement the learning process according to the 2013 curriculum. The diagnosis of student learning difficulties has not been carried out through a diagnostic test. Economic conditions, health, facilities, and infrastructure are the key factors that hinder the learning process. On the other hand, there is an even distribution of student abilities and the economic level of students' parents in schools after implementing the zoning system.

Keywords: *A zoning system, math teacher obstacles, phenomenology.*

Scope: Evaluation and Assessment in Mathematics Education

[EAM02]
How Are Students' Mathematical Disposition Post-COVID-19 Pandemic?

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Abstract. One of the emotive spheres that affects how children learn mathematics is their mathematical disposition. The COVID-19 viral pandemic, on the other hand, began attacking the planet in 2020. The process of teaching and learning must take place online. The duration of the online learning is close to two years. Schools will be permitted to use only face-to-face instruction starting in 2022. The transition from online to face-to-face instruction will undoubtedly have an effect on students, one of which is how they feel about mathematics. The researcher is interested in knowing about students' attitudes toward the disposition when they are learning mathematics both face-to-face and online as well as their mathematical dispositions when doing so.

Both quantitative and qualitative research are used in this study. The goal of this case study is to assess students' aptitude for mathematics. 54 students from Yogyakarta participated in this survey as responders. Gathering data, reducing data, presenting data, and generating conclusions are all steps in data analysis.

There are several conclusions that can be drawn from the analysis' findings, including that face-to-face instruction in mathematics is more likely to produce students who are comfortable using mathematics, have a curiosity for mathematics, appreciate its value, and think flexibly to explore different alternative problem-solving strategies than online instruction, and that the range of students' mathematical disposition abilities falls within the average of the 95% confidence intervals is 66.91–71.94 on average and indicate that the students' dispositional mathematics skills fall into the high category.
Keywords: *Mathematical Disposition, Face-to-face, Online*

Scope: Evaluation and Assessment in Mathematics Education

[EAM03]
Students' Interest in Learning Mathematics: Literature Review

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Abstract. Interest in the learning process is very important for every student, because if students are not interested in one of the lessons at school, it will be difficult for students to follow each lesson that takes place, especially in mathematics learning where students' interest in learning mathematics still requires more attention. Thus, this literature review was conducted to find out what factors influence students' interest in mathematics. This study reviewed 80 articles to analyze interest in learning mathematics viewed from three contexts, namely; level of education, instruments used, and factors that influence interest in learning such as methods/approaches/models or media used in learning, the role of teachers and the role of parents. research results show that; a) increasing students' interest in learning mathematics has started from elementary school to high school; b) the instruments used in assessing student interest in learning are several, namely, test instruments, multiple choice test, questionnaires, observations and interviews; c) students' interest in learning can be influenced by the methods/ approaches as well as the media used in learning, gender, teachers, and parents. This finding is expected to be useful for researchers and teachers, to help increase students' interest in learning mathematics.

Scope: Evaluation and Assessment in Mathematics Education

[EAM04]
Does Teacher Roles and School Types Affect Student's Mathematics Literacy Ability?

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Abstract. Teacher takes an important role during the teaching and learning activities. The aim of this study is examining the relations among teacher roles and school types on student's mathematics literacy ability. Mathematics literacy was the major domain of PISA 2012. Using a multilevel model on the PISA 2012 data with a sample size of 3,601 from 208 schools, teacher roles and school type effect on students' mathematics literacy are being observed. The teacher roles in this study will be seen from two perspectives, which are: teacher supports and the cognitive activation given by the teacher during teaching and learning activities. This study examined the relationship between selected student-level (level 1) and school-level (level 2) variable that affected mathematical literacy ability. As results, teacher supports had a significant effect to all student's mathematics literacy processes (employ, formulate, and interpret) with $\rho < 0.001$. The cognitive activation given by the teacher also became the significant predictors for formulate and interpret processes ($\rho < 0.001$) but not for employ process ($\rho > 0.05$). In contrast, the school type predictor was not significant for all mathematics literacy processes. Compared to the other models, the random intercept model that used all predictors from level 1 and level 2 and assumed all the predictors were fixed, has the lowest AIC and BIC so it can be said that this model came out as the best model and can be used for further data analysis.

Scope: Evaluation and Assessment in Mathematics Education

[EAM05]

Analysis of Students Ability in Solving Mathematical Literacy Problems Based on Process, Content, and Context Domain

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Abstract. Currently, the ability of mathematical literacy is one of the important things and is very concerned in the world of education, one of which is in learning mathematics. The development of mathematical literacy skills in education has a very positive impact. Mathematical literacy skills are very important to practice math problem solving skills in real life. This research was a survey using quantitative design. This study aims to describe students ability to solve mathematical literacy problems based on process, content, and context domain. The results of the study showed that the ability of Grade VIII Junior High School students in D.I.Yogyakarta students in solving mathematical literacy problems was in the medium category. The better the school strata, the better the average ability of these students. These results show that the level of achievement of students' abilities in solving mathematical literacy problems is also influenced by school strata. The students' ability in solving mathematical literacy questions is based on the highest to lowest process domain, namely, the first is the Interpert process (53%), Employ (23%), and the last is Formulate (11%); based on the content domain with the highest to lowest order, namely Space & Shape (45%), Change & Relationship (41%), Uncertainty & Data (31%), and the last Quantity (18 %); based on the content domain is in the highest-lowest order, namely Scientific (51%), Personal (46%), Societal (23%), and the last is Occupational (13%).

Scope: Evaluation and Assessment in Mathematics Education

[EAM06]
PISA Indonesia: Examining The Influence of Teaching Practice and Math Professional Development on Achievements in Mathematical Literacy Processes

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Abstract. The educational perspective on the level of mathematical literacy allows for reflecting and evaluating the mathematical processes that are important in everyday life. The verbs employ, formulate, dan interpret indicate the three cognitive processes which students will engage with when completing mathematical literacy task. The major domain of PISA 2012 is mathematical literacy, so the various content and mathematic teaching/learning practice in the classroom are dominant in the test and questionnaire background. This study aims to examine gender relations, teaching practice, math professional development, and achievements in the mathematical literacy process (employ, formulate, interpret). Using a multilevel model on PISA Indonesia 2012 with a sample size was 3397 students from 197 schools, this study explored the relationship between selected student-level (level 1) and school-level (level 2) variable that contributed to mathematical literacy processes. The results of statistical analysis show that boys have higher achievements in three cognitive processes than girls. Two of three teaching practice indicators (teacher-directed instruction and student orientation) and math professional development were statistically significant predictors of the mathematical literacy process. When teacher-directed instruction and math professional development increase, so does mathematical literacy achievement. While student orientation use during mathematics lessons was negatively linked to the mathematical literacy process.

Scope: Evaluation and Assessment in Mathematics Education

[EAM07]

EVALUATION OF SEKOLAH PENCETAK WIRAUSAHA PROGRAM AT MUHAMMADIYAH 2 VOCATIONAL SCHOOL OF MUNTILAN

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Abstract. The study aims to evaluate of *Sekolah Pencetak Wirausaha* (SPW) program for Vocational Schools (*Sekolah Menengah Kejuruan* or SMK). This study uses an evaluative method, the CIP model. This research involved the SPW team, entrepreneurship teachers and students. Data were collected by observation, documentation and in-depth interviews. The results of this study indicate that the aspects of the background context and legal basis of the SPW program are clear. It means that the suitability of program objectives with the needs of schools and students is good. Besides, in the input aspect, SMK already has laboratories in the fields of printing, sewing, operating computers and supplying food. In addition, Lack of funding from the government which does not exist every year, so the implementation costs are from schools. In the process aspect, the students have their own business including food business (chocolate bananas, snacks, spring roll skins, and fried cuttlefish), online shop and fashion sector. They have 5 working partners including the Directorate of Vocational High School Development (SMK), PT Indomarco Primatama Jogjakarta, PT Anugerah Abadi Magelang (AAM), Micro Madani Institute (MMI) Magelang, and PT Busana Remaja Agracipta (BRA) Jogjakarta. The students also need to be accompanied by entrepreneurship guidance teachers for business development carried out by the students.
Keywords: *Entrepreneurial Printing School*(*Entrepreneurial Printing School), Vocational High School, Evaluation, CIP*

Scope: Evaluation and Assessment in Mathematics Education

[EAM08]
Learning Mathematics With Reciprocal Teaching Assisted by Mind Mapping, How Does It Affect the Ability to Understand Concepts?

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Abstract. This study aims to describe the effect of reciprocal teaching assisted by mind mapping on students' conceptual understanding abilities. This research was conducted in the academic year 2021/2022 in class VIII. This research is using experimental method. The sampling technique used is simple random sampling. The research sample was VIII A who was given the treatment of reciprocal teaching assisted by mind mapping and VIII C who was given the treatment of reciprocal teaching. The data collection technique used posttest to measure the students' conceptual understanding ability. The results showed that reciprocal teaching assisted by mind mapping had an effect on students' conceptual understanding abilities.

Scope: Evaluation and Assessment in Mathematics Education

[EAM09]
Preliminary Analysis of Basic Science Process Skills of Post-Pandemic Era Elementary School Students

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Abstrak: Tujuan dari penelitian ini adalah mengetahui tingkat kemampuan dasar proses sains siswa sekolah dasar setelah penyelenggaraan pembelajaran jarak jauh pada masa pandemik covid-19. Penelitian ini menggunakan teknik survey dengan memberikan tes pada subyek penelitian. Subyek penelitian adalah 50 siswa kelas 4 sekolah dasar di Yogyakarta. Tes yang diberikan merupakan tes berbasis kemampuan dasar proses sains. Butir tes memiliki Reliability coefficient was found 0.68. Tes tersebut memiliki indicator observing, questioning, experimenting, associating, dan communicating. Uji survey tes dilaksanakan secara serentak pada kedua kelas tersebut. Hasil dari penelitian menunjukkan bahwa kemampuan dasar proses sains memiliki skor 49.2 yang artinya berada pada level medium. Pada skor tersebut setiap indicator memiliki persentase sumbangan sebagai berikut, observasi 40.8%, menanya 40.8%, eksperimen 36.8%, menalar 37.6%, dan mengkomunikasikan 41.6%. keseluruhan indicator kemampuan dasar proses sains siswa sekolah dasar berada pada tingkat medium. Dengan demikian dapat disimpulkan bahwa kemampuan dasar proses sains siswa sekolah dasar pasca pandemic covid-19 berada pada tingkat medium.

Kata Kunci: kemampuan dasar proses sains, pandemic covid-19.

Scope: Evaluation and Assessment in Mathematics Education

[EAM10]
Analysis of Difficulties of Class VIII Students in Solving Numeration Problems with Minimum Competency Assesment Types of Geometry Content Based on the Stages of Van Hiele's Thinking

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Abstract. *This descriptive study with qualitative and quantitative approaches aims to identify and describe students' difficulties in solving geometrical numeracy problems and their causal factors. Students' difficulties were analyzed based on Van Hiele's thinking stages consisting of stage 0 (visualization), stage 1 (analysis), stage 2 (informal deduction), and stage 3 (deduction). Data was collected through a numeration test of the Minimum Competency Assessment (MCA) type for geometry content, closed questionnaires, interviews, and documentation. The results showed that the percentage of students' difficulties at the visualization stage for the level of understanding was 64.8%, applying was 51.5%, and reasoning was 54.5% with difficulty 50.2% for personal context and 61.6% scientific. At the analysis stage, students' difficulty for understanding level was 64.8%, applying was 59.9%, and reasoning was 81.8% with difficulty 62.7% for personal context and 66.7% scientific. Difficulty in the informal deduction stage with the level of understanding is 54.5% and personal context is 75.8%. At the deduction stage, 72.5% difficulty for applying level and 94% reasoning with 91.9% difficulty for personal context and 67.4% scientific. The factors that cause student difficulties include internal and external factors, both of which have a strong influence, especially external factors from the family. Based on the results of the interview, another factor that was found to have a strong influence was the pedagogical factor in the form of the teacher's incompleteness in conveying the geometry material being studied.*

Keywords: student difficulty, numeracy, minimum competency assessment, geometry, Van Hiele thinking stages.

Scope: Evaluation and Assessment in Mathematics Education

[EAM11]
Meta-Analysis: The Effectiveness of Authentic Assessment in Mathematics Learning in Junior High School

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Abstract. The learning process cannot be separated from an assessment or assessment. Learning mathematics requires students' ability to examine, analyze, interpret and construct mathematical concepts in life so that a system evaluation is needed in the form of an authentic assessment. Therefore, the purpose of this study was to find out how much effective, authentic assessment is in teaching mathematics in junior high school. The method used in this study is a meta-analysis with stages; 1) problem formulation, 2) data collection, 3) data coding, 4) analysis and 5) data interpretation. The results of this study obtained 34 articles that can support this research, and the research sample was as many as 12 articles that met the research category. Results Based on the research, it was found that the effectiveness of authentic assessment on mathematics learning in junior high school was 0.888, which was included in the high category. This indicates the positive impact of the use of authentic assessments on mathematics learning in junior high schools, such as learning outcomes, learning motivation, mathematical representation, and problem-solving abilities of students.
Keywords: authentic assessment, mathematics, junior high school

Scope: Evaluation and Assessment in Mathematics Education

[EAM12]

Analysis of Realistic Mathematics Approach to Improving Mathematical Communication Ability of Junior High School Students

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Keywords:
literature study, realistic mathematics approach, mathematical communication ability

ABSTRACT

The purpose of this study was to determine the effect of a realistic mathematics approach on the mathematical communication skills of junior high school students and to describe the improvement in students' mathematical communication skills after the implementation of a realistic mathematics approach in learning as a whole and to determine the advantages of the realistic mathematics learning approach from the analysis of several literatures. library literature so that the data collection method used is documentation, which is like tracking written sources that contain the same themes and topics as this research, namely the application of a realistic mathematics learning approach to improve the mathematical communication skills of junior high school students. This type of research is in the form of qualitative data. The findings of this study revealed that the students' responses to the realistic mathematics learning approach were positive. The results of this study are that there is an influence on realistic mathematics learning on the mathematical communication skills of junior high school students in mathematics learning and the realistic mathematics learning approach can improve students' mathematical communication skills.

Scope: Evaluation and Assessment in Mathematics Education

[EAM13]
Students' Mathematical Reflective Thinking Ability Viewed from Their Learning Style

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Abstract. Reflective thinking is one of higher-order thinking skills for students, which has an essential role in the problem-solving process by helping students to think about what they are doing and why they are doing it. This ability, however, is still in the low category. As a matter of fact, every student has their learning style associated with the way they assimilate and process information received, resulting in the difference in their way of thinking. This research aims to comprehensively describe students' mathematical reflective thinking ability viewed from their learning style. The method used in this research is qualitative with a phenomenological approach. The subjects were three students in grade X at one of the senior high schools in Banten Province, consisting of one student with visual style, one with auditory style, and one with kinesthetic style. Data were collected using a mathematical reflective thinking ability test, a learning style questionnaire, and an interview. This research shows that the visual student can meet the reacting and comparing phases of reflective thinking, which are characterized by identifying the problem well, explaining the answer correctly, and relating the problems that have been faced with the problems obtained. The auditory student can only meet the reacting phase of reflective thinking, which is characterized by identifying the problem well. Meanwhile, the kinesthetic student can complete all phases of reflective thinking, namely reacting, comparing, and contemplating. In addition, the kinesthetic student can identify the problem well, explain the answer correctly, relate the problems that have been faced with the problems obtained, and check and revise the answer.

Scope: Evaluation and Assessment in Mathematics Education

[EAM14]

Students' Mathematical Literacy Ability Profile For The Change and Relationship Problem on The PISA During Covid-19 Pandemic.

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ABSTRACT: This study aims to determine the profile of students' mathematical literacy ability in solving mathematics problems using PISA on change and relationship content during Covid-19 and to describe the difficulties experienced by students in solving problems based on Fong's schematic model error for analysis. This type of research is descriptive qualitative research. The research data was taken through mathematical literacy skills, interviews, and documentation. The subjects of this study were 30 students of class VII at one of the Junior High Schools in Medan. Based on the result of the study showed that students' mathematics literacy skills are still in the medium to low category. The students' errors were analyzed using Fong's schematic model to find out stage II errors for categories E1, E3, and E4. From the results of the analysis and interview with students, the causes of students making errors are not mastering the steps in answering questions, not writing out what is known and asked, incomplete in writing the formula, incorrect writing symbols, not writing conclusions, and wrong in interpreting the problem in the form of mathematical sentences.
Keywords: Mathematical Literacy Ability; PISA; Change and Relationship

Scope: Evaluation and Assessment in Mathematics Education

[EAM15]

LECTURER PERCEPTION OF LEARNING PROBLEMS MICROTEACHING STUDENTS' PROSPECTIVE TEACHERS

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Abstract

This study aimed to determine lecturers' perceptions of prospective teacher students' problems with microteaching learning. This type of research is qualitative descriptive research. The subjects in this study were microteaching lecturers at private universities in West Java, Indonesia. Data collected through interviews covered the following topics: (1) prospective teacher students' problems with microteaching learning; (2) microteaching facilities available; (3) digital skills possessed by prospective teacher students; and (4) suggestions for improving microteaching learning in preparing prospective digital teachers. The results showed that the problems faced by prospective teacher students include the lack of media utilization in learning practices; the use of inappropriate learning models or strategies; not utilizing technology in teaching practices to the fullest; and a lack of creativity in designing and implementing learning. The condition of microteaching facilities available in most universities is complete with various equipment that supports lectures. Still, the space for practice is less extensive, and supporting facilities for lectures on digital teaching materials are not yet available. The digital skills of prospective teacher students in designing digital content are still lacking, mostly in the form of PowerPoint. The level of students' ability in utilizing technology is not yet at a skilled stage. Suggestions for improvements to microteaching learning in preparing digital teacher candidates include a multimedia laboratory that can develop students' digital skills and adding content to learning achievements to focus on developing students' digital skills.

Keywords: **digital skills, microteaching, students, prospective teachers**

Scope: Evaluation and Assessment in Mathematics Education

[EAM16]
Evaluation of the Implementation of Semester Credit System (SCS) in Mathematics Learning in Muhammadiyah Senior High School Wonosobo

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Abstract. The implementation of the semester credit system in mathematics learning still requires continuous improvement efforts so that the implementation is in accordance with the standards set by the government. The implementation of the semester credit system can be seen from the aspects of readiness, implementation and results. In accordance with these objectives, an evaluation study of the implementation of mathematics learning was carried out with a semester credit system. The type of research used is evaluation. The evaluation model used is the CIPP evaluation (context, input, process, product). The approach used is the mix method. The place of research was carried out at Muhammadiyah Senior High School Wonosobo and the time of the research was carried out in the 2019/2020 school year. Data collection techniques were carried out by observation, interviews, questionnaires and documentation. Qualitative data analysis was carried out by data reduction and data presentation, while quantitative data analysis was carried out by statistical descriptive analysis. The results of this study indicate: 1) The results of the evaluation of the context and input obtained conclusions towards good, in other words the preparation for the implementation of the SKS system learning towards good 2) In the component of the learning process towards good, and 3) In the component results fall into the category towards good.
Keywords: CIPP Evaluation, Mathematics Learning, Semester Credit System

Scope: Evaluation and Assessment in Mathematics Education

[EAM17]
AN ANALYSIS OF JUNIOR HIGH SCHOOL STUDENTS' ERRORS IN SOLVING MATHEMATICAL LITERACY QUESTIONS ORIENTED TO HOTS

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Abstract
This study aims to describe (1) students' mathematical literacy skills, (2) types of student errors in solving HOTS-oriented mathematical literacy questions, and (3) the causes of students making mistakes. This research is qualitative research with a descriptive method. The participants in this study were 32 students from class VIII G at Junior High School in Bantul Regency. Data were collected through tests, interviews, and documentation. Furthermore, the data obtained were then analyzed using the steps of data reduction, data presentation, and concluding. The results of the study include: (1) The achievement of mathematical literacy abilities of class VIII G students at level 1 to level 6 are 6.25%, 28.125%, 12.5%, 3.125%, 37.5%, and 12, respectively. 5%; (2) types of errors made by students, namely incorrect data, incorrect procedures, missing data, missing conclusions, response level conflicts, indirect manipulation, skill hierarchy problems, and in addition to the seven categories above. The most mistakes made by students were missing conclusions by 25.8%; (3) the causes of students making mistakes are that students are not careful in understanding the questions, students do incorrect calculations, students do not focus on seeing data, students use formulas incorrectly, and lack of time management in solving problems.
***Keywords**: Literacy ability, Error analysis, HOTS-oriented mathematical literacy questions, Statistics, Watson's Criteria*

[EAM18]
The Effects of Teachers' Motivation and Supports, Parents' Motivations and Digital Learning on Students' Mathematics Achievement: Indonesian case from PISA 2018

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Abstract. Many learning theories say that raising students' cooperative attitudes, competitive attitudes, and paying attention to the teacher's teaching style in every lesson are appropriate actions in learning that may improve the student achievement. This study uses data from the PISA 2018 Indonesia to investigate the factors that influence the mathematics achievement of 15-year-old students. The hierarchical linear model was used to examine the factors from the perspective of students and schools. At the student level, the results showed that the students who studied cooperatively, students with a highly competitive spirit, students with high self-efficacy, and students who were taught by creative teachers had a significant effect on students' mathematics achievement. Female students had higher mathematics achievement than male students on average. At the school level, the findings revealed that differences in mathematics achievement can be explained by school status, with public schools outperforming private schools.

Scope: Evaluation and Assessment in Mathematics Education

[EAM19]
Analysis of Mathematics Daily Examination Questions on the Topic of Statistics for Class VIII SMP

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Abstract. Education is one of the processes to improve the quality of human resources. Improving the quality of education is done by improving the quality of learning and the quality of the assessment system. Improving the quality of learning and the assessment system is carried out by evaluating the learning activities. One form of evaluation is a daily test. Daily test is a form of assessment of student learning outcomes which is carried out to see how far students understand the material. So that the questions used for daily tests are of high quality, item analysis is carried out. Item analysis is used to improve the quality of the questions that have been prepared by the teacher. The purpose of this study is to analyze the items so that the questions that have been prepared have good quality so that the objectives of the learning activities carried out can be achieved properly. The research method used in this research is descriptive qualitative to analyze multiple choice questions on statistical material for class VIII SMP. Data analysis conducted in this study consisted of analysis of questions based on Bloom's taxonomy, validity, reliability, effectiveness of distractors, analysis of difficulty level, and analysis of discriminating power. The results of the analysis carried out show that the daily questions made by the teacher have good quality and are suitable for use as an assessment of student understanding and achievement of learning objectives.

Keywords: Learning Quality, Daily Test, Item Analysis,

Scope: Evaluation and Assessment in Mathematics Education

[EAM20]
The Effectiveness of Learning Packages Integrated Computational Thinking Skills on Elementary School Students' Abilities in Thinking Computationally and Solving Mathematics Computational Problems

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Abstract. This study aims to determine the effectiveness of the learning packages integrated computational thinking skills on elementary students' ability in thinking computationally and solving mathematics Computational Problems. This research is pre-experimental research with the design of one group pre-test and post-test. 92 Elementary School Students actively participated in this research. The research gathered data in the form of the test result of the students both in the pre-test and post-test. The data was collected by using test, observation, and interview techniques. The study suggests that the application of the model is able to improve students' abilities in solving Mathematics Computational Problems. The Effectiveness of the model study method is seen from the results of the pretest and posttest by using the Paired test Samples T-Test with the help of SPSS 24.0 for windows. The analysis results obtain the value of Sig. (2-tailed) is equal to 0.000 or less than 0.05, so it can be suggested that there is a significant difference between the learning outcomes in pre-test and post-test implying that students' abilities in thinking computationally and solving mathematics computational problem significantly increase.

Scope: Evaluation and Assessment in Mathematics Education

[EAM21]

Analysis of Student's Mathematics Communication and Reasoning Ability Assessment Instruments Oriented to High Order Thinking Skills

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Abstract. Mathematical reasoning and communication skills are important aspects as additional skills in learning mathematics. The assessment instrument for these two aspects in the form of multiple choice can be an alternative based on aspects of validity, reliability, effectiveness, and processing time. The purpose of this study was to describe the level of validity, reliability, difficulty, and discriminating power of the multiple choices form of assessment instrument to measure mathematical reasoning and communication skills oriented to higher order thinking skills in trigonometry material. Research with a qualitative approach was analyzed using descriptive analysis techniques. The test instrument in the form of multiple choice is the result of the Mathematics Learning Innovation Practicum lecture which was developed with 1 high school teacher in Yogyakarta. The sample was selected by random sampling from the entire population of class X IPA in one of the public high schools in Jetis District, Yogyakarta. The results showed that the instrument had good validity with a valid number of items 72%. The instrument is also reliable for reuse with a reliability level of 0.771. Based on the results of the difficulty test, 40% of the items are in the easy category, 24% in the medium category, and 36% in the difficult category. Items with moderate and poor distinguishing power are used as a reference for making revisions. Therefore, by revising invalid and moderate discriminatory items and replacing poor discriminating items, the test instrument on HOTS-based trigonometry material can be used to measure students' mathematical reasoning and communication skills in a valid and reliable manner.

Keyword. Reasoning, mathematics communication, HOTS, instrument, analysis

[IMT01]

Integrating Javanese Ethnomathematics Approaches into the Geometry Learning of Junior High School

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Abstract. This study investigates the use of an ethnomathematical approach by mathematics teachers for mathematics learning. The main purpose of this article is to explore mathematics teachers' perception of integrating Javanese ethnomathematics approaches into geometry learning in Junior High School. The sample of this research is mathematics teachers from 12 junior high schools from DI. Yogyakarta Province, Central Java Province, and East Java Province. The data collection instrument is an ethnomathematics opinion survey questionnaire. A questionnaire to measure the application of the model integrating Javanese ethnomathematics approaches into the geometry learning of Junior High School. Focus Group Discussion was also conducted in this study to explore user assessment of the model. The data collected were analyzed using descriptive analysis. The analysis results show that mathematics teachers have a positive perception of ethnomathematics. The teacher's perception of ethnomathematics is shown by awareness, prior learning, evaluation of the activity design process, evaluation of the activity implementation process, use in professional life, and student evaluation. The acceptance indicator for integrating Javanese ethnomathematics into the geometry learning model is reasonable based on an assessment of the introduction, content, evaluation, and closing aspects.
Keywords: *Javanese ethnomathematics, learning model, geometry learning*

[IMT02]
Mathematical justification skill of student in mathematics learning with Realistics Mathematics Education (RME) approach

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ARTICLE INFO

Article history
Received:
Revised:
Accepted:

Keywords
Mathematical justification, leraning tools, Realistic Mathematics Education (RME), Learning Trajectory

Scan me:

ABSTRACT

This research is a research and development (R&D) that aims to describe the quality of mathematics learning tools developed based on the Realistic Mathematics Education (RME) approach which refers to learning trajectory in junior high school students class VIII and describes how the mathematical justification skill of students in RME learning can be developed by using these learning tools. Learning tools are developed with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. The results showed that the learning tools developed met the criteria of being valid, practical, and effective in mathematical learning. With the guided reinvention syntax of RME, the mathematical justification skill of student can be developed through RME learning with developed tools which are indicated by increasing the percentage of aspects of CLEAR assessment (Calculation, Label, Evidence, Answer the Question, and Reason why). Based on the results of pretests and postest, the Calculation aspect rose from 72% to 89.8%, the Label aspect rose from 60% to 78.8%, the Evidence aspect rose from 77% to 84.06%, the Answer the Question aspect rose from 65% to 92.9%, and the Reason why aspect rose from 34% to 65.6%. In addition, the mathematical justification skill of students has a significant influence on student learning outcomes. The magnitude of the relationship is determined by the determinance correlation coefficient of 79.5% in other words it can be explained through the equation $\hat{Y} = 34.365 + 0.671X$.

Scope: Innovative Mathematics Teaching and Learning

[IMT03]

Pengembangan Alat Peraga Geometri Berbasis Tangram untuk Meningkatkan Kreativitas Belajar Matematika

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ARTICLE INFO

Article history
Received:
Revised:
Accepted:

Keywords
Alat Peraga, Geometri, Tangram, Kreativitas Belajar

ABSTRACT

Learning that is still teacher-centred, the unavailability of teaching aids, and the low value of learning creativity make the classroom atmosphere less pleasant and eventually sleepy. This study aims to develop a tangram-based geometry teaching aid to increase creativity in learning mathematics. The procedure in this study refers to Research and Development with a 4-D development model, which goes through the following stages: Define (defining stage), Design (design stage), Develop (development stage), and Disseminate (deployment stage). Data collection techniques used observation, interviews, questionnaire content and limited tests to 29 students in class VII-C Mawaridussalam Islamic Boarding School. All instruments used have gone through the validation stage by experts. The results showed that the assessment of tangram-based geometry aids by experts obtained an average of 3.7 and 3.8 so that they were included in the "very good" category. Based on the percentage of classical learning completeness of 75.86%, it falls into the "completed" category. While the level of effectiveness using the N-Gain reached a score of 0.3 with the "medium" category. Thus the development of tangram-based geometry teaching aids is effective in increasing creativity in learning mathematics.

Scope: Innovative Mathematics Teaching and Learning

[IMT04]
The Effectiveness of Realistic Mathematics Education (RME) on Learning Outcomes Mathematics : Experimental Study on Comparison of Trigonometric Special Angles in Class X MIA SMAN 3 Palu

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Abstract. The purpose of this research is to know the effectiveness of Realistic Mathematics Education (RME) on mathematics learning outcomes on trigonometric ratios of special angles in class X MIA of SMAN 3 Palu. The hypothesis of this research is the effectiveness of Realistic Mathematics Education (RME) on mathematics learning outcomes on a trigonometric ratios of special angles in class X MIA of SMAN 3 Palu. This research is quantitative research experiment with a research design by using The One Group Pretest-Posttest Design. The population of this research was all of class X MIA in SMAN 3 Palu which registers in the 2018/2019 school year and consists of 7 classes. The sampling technique was done by Nonprobability sampling. The class that became the sample of the research was class X MIA 1 that became of 30 students. The results of the post-test data analysis obtained a percentage of students' completeness as much as 80%. Based on the calculation of testing hypothesis by using the students' post-test then got the $z_{counted} = 1.73$ and $z_{table} = 1.65$ with level of significant 0.05, it shows that the $z_{counted} > z_{table}$ which means H_0 rejected and H_a accepted. So, it can be concluded that Realistic Mathematics Education (RME) learning is effective on mathematics learning outcomes on trigonometric ratios of special angles in class X MIA of SMAN 3 Palu. z_{table} which means H_0 rejected and H_a accepted. So, it can be concluded that Realistic Mathematics Education (RME) learning is effective on mathematics learning outcomes on trigonometric ratios of special angles in class X MIA of SMAN 3 Palu. z_{table} which means H_0 rejected and H_a accepted. So, it can be concluded that Realistic Mathematics Education (RME) learning is effective on mathematics learning outcomes on trigonometric ratios of special angles in class X MIA of SMAN 3 Palu.

Scope: Innovative Mathematics Teaching and Learning

[IMT05]

Pendekatan Problem Based Learning Melalui Model Pembelajaran Kooperatif Tipe Numbering High Together (NHT) Untuk Meningkatan Kemampuan Kolaborasi, Literasi Matematis Dan Kemampuan Berpikir Kritis Matematis Siswa Di Kelas X SMA Negeri 1 Wiwirano

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ARTICLE INFO

Article history
Received:
Revised:
Accepted:

Keywords
Problem Based Learning, *Numbering High Together* (NHT) , Collaboration skills, Mathematical Literacy, and Critical Thinking Skills

ABSTRACT

This study aims to improve students' collaborative working skills, mathematics literacy, and mathematics critical thinking skills through a collaborative learning model, Numbering High Together (NHT), using a problem-based learning approach. Significant values were <100% in this study. A p-value (0.05) indicates a significant difference between pretest and posttest scores for collaborative ability, mathematical literacy, and critical mathematical thinking skills. Based on the results of the research conducted, the following conclusions can be drawn:

Mathematics learning applying the NHT-type collaborative learning model and the PBL approach can support the communication skills of students in the 21st century. 2. Applying the NHT-type collaborative learning model and the PBL approach to learning mathematics can support the critical thinking skills of 21st century students. 3. Mathematics learning by applying the NHT collaborative learning model with a PBL approach can support 21st century mathematics literacy skills. 4. Applying the NHT collaborative learning model and PBL approach to learning mathematics can support the collaborative skills of students in the 21st century.

Scope: Innovative Mathematics Teaching and Learning

[IMT06]
Managing Risk in Mathematics Learning: How to Improve Confidence?

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Abstract. Every activity contains risks including in learning mathematics. However, it is not a physical risk but a psychological one such as shame, anxiety, and insecurity. This risk has a negative impact on the achievement of students' mathematical abilities. This risk can be controlled by improving students' self-confidence in learning mathematics. The purpose of this paper is to find out what teachers should do to improve students' self-confidence. The method used in this paper is a literature review. From the results of the previous researches, there are several factors that affect the self-confidence of students. By looking at these factors the teacher can find out what should be done to improve the confidence of students when learning mathematics.

Scope: Innovative Mathematics Teaching and Learning

[IMT07]
The Effect of the STAD type Cooperative Learning Model assisted by LKPD and e-Module on Students' Mathematics Learning Outcomes

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Abstract – This study aim to determine the effect of the STAD type cooperative learning model assisted by LKPD and e-module on students' mathematics learning outcomes. This research includes quantitative research with the type of quasi-experiment research. The research design used is the Pretest-Posttest Group Design. The independent variable in this study is the STAD type cooperative learning model assisted by LKPD and e-module and the dependent variable is the student's mathematics learning outcomes. Based on research conducted using paired sample t-test, the results obtained that the p-value is less than the specified significant level, namely= 0.05. This means that Mathematics learning in class XI IPA 1 at SMA Negeri 1 Kuripan by applied the STAD type cooperative model assisted by LKPD and e-module affects mathematics learning outcomes according to KD achievement, critical thinking skills, students' mathematical communication, and student collaboration abilities.

Scope: Innovative Mathematics Teaching and Learning

[IMT08]
Statistical Reasoning Skills of Elementary School Students on Data Collection and Presentation Through Realistics Mathematics Education

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Abstract. Statistics is necessary and applicable for everyday life. In accordance with the Indonesian curriculum, statistics is taught at every level of education, from elementary school to university level. Since 2021, statistics is taught, especially in data collection and data display in accordance with the Minimum Competency Assessment Standard (AKM). However, students' reasoning ability in understanding statistics remains low. Therefore, a meaning learning strategy is crucial, one of them is Realistic Mathematics Learning (RME). This research employed a mixed-method approach, with explanatory sequential design. It aims to examine the students' statistical reasoning ability on the topic of data collection and data display through RME. Data collection involved a test of 10 multiple choice questions and 4 short answer questions that met the indicators of statistical reasoning abilities. The subjects were 25 Year 3 students from one of the primary schools in Banda Aceh, Indonesia. The data was analyzed quantitatively and strengthened by qualitative data. The results found that 16 students were in the very good category, meaning that 64% students meet the minimum criteria of mastery learning at the school. Based on statistical reasoning indicators from 16 students, it was found that the indicator representing data had the highest occurrence, 14 students (87.5%). Meanwhile, the indicators of analyzing and interpreting data had the lowest occurrence, 10 students or 63%.

Scope: Innovative Mathematics Teaching and Learning

[IMT09]
Relational Understanding: How Mathematics for understand?

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Abstract. Mathematics teacher have a responsibility to guide their students to understand mathematics. However, in practice teachers rarely notice understanding student to content mathematics that is taught correctly. This study aims to examine how to teach mathematics for understand student using relational understanding. This type of research uses literature review with research steps, namely: formulating problems, collecting data, determining locations, analyzing and interpreting relevant data and presenting results. The results showed by compiling student activity sheets and using various innovative learning method or approaches in learning students were able to understand their understanding. Relational relationship that encourages students not only to know what method is used to get answers but also to know why the method is used, so that will allow student for connect method the with problem new "knowing what to do and why".

Scope: Innovative Mathematics Teaching and Learning

[IMT10]
Adversity Quotient (AQ) in Mathematics Learning: How to develop students who have low AQ in Reflective Intelligence

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Abstract. In learning mathematics, Adversity Quotient (AQ) is very important to be developed in students. AQ will determine the student's actions in a condition that is not okay, and how to control it. Through good AQ, students can not only master everyday problems, but students can have intelligence that every action in solving problems will think first. This will appear reflective intelligence in students whose actions are based on reasons and goals. For this reason, it is necessary to conduct a more in-depth study on how to develop students who have low AQ in learning mathematics in reflective intelligence, what is meant by Adversity Quotient and reflective intelligence.

Keywords: Adversity Quotient, Reflective Intelligence

Scope: Innovative Mathematics Teaching and Learning

[IMT11]

Student Creativity in Solving Unique Mathematical Problems with Contextual Approach

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ARTICLE INFO

Article History:
Received: xx-Nov. 2020
Revised: xx-Nov. 2020
Accepted: xx-Des.2020

Keywords:
Student Creativity, Contextual Approach, Unique Mathematical Problems
Kreativitas Siswa, Pendekatan Kontekstual, Masalah Matematika yang Unik.

ABSTRACT

Creativity is the ability to make new combinations, or see new relationships between elements, data, or things that already exist. Mathematics plays an important role not only in educating students but also in shaping the characteristics of students, including training them to be creative. The application of a contextual approach to the learning process provides opportunities for students to explore their creativity in solving mathematical problems. This study aims to show students' creativity in solving unique mathematical problems with a contextual approach. The research method used is qualitative research which is a study of literature or literature. Sources of data in the form of journals and related books. The data analysis technique used in this study is qualitative data analysis, which in this study is in the form of opinions expressed by experts. The results of the study show that the contextual approach is one approach that can make students use their creativity during the learning process, especially in solving unique mathematical problems.

Scope: Innovative Mathematics Teaching and Learning

[IMT12]

Can Emotional Intelligence in Mathematics Learning be Improved Through the TPS Model? Literature Review

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ARTICLE INFO

Article History:
Received: xx-Nov. 2022
Revised: xx-Nov. 2022
Accepted: xx-Des.2022

Keywords:
Emotional intelligence, mathematics learning, TPS model, kecerdasan emosional, pembelajaran matematika, model TPS.

ABSTRACT

Emotional intelligence is one of the neglected aspects in learning mathematics. However, many studies reveal that emotional intelligence is a factor that affects student academic achievement. Emotional intelligence is a person's ability to manage emotions related to oneself and others. Aspects of emotional intelligence include self-awareness, self-regulation, motivation, empathy, and social skills. Emotional intelligence needs to be improved so that students can obtain optimal learning outcomes. One way that can be done is to use the Think Pair Share (TPS) cooperative learning model in the teaching and learning process in th`e classroom. TPS is a teaching strategy that can help students construct their minds and make students actively involved in discussing activities and sharing results with their friends in class. At the Think stage, it can potentially show the ability to recognize one's strengths and limitations. At the Pair stage, it has the potential to show an accepting and open attitude to new views, showing an attitude of responsibility for their actions, showing confidence to be better to achieve optimal results, showing the ability to understand and respect other people's opinions, and showing the ability to work together with others for a common goal. At the Share stage, you have the potential to show confidence in your own abilities and show an attitude of responsibility for your actions.

Scope: Innovative Mathematics Teaching and Learning

[IMT13]
Students' Metacognition in Mathematical Problem-Solving: Systematic Literature Review

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Abstract. Metacognition is one of the important abilities possessed by students in the learning process to improve their mathematical abilities. This research is Systematic Literature Review research that summarizes the results of research related to metacognition in mathematics learning. This study was conducted to describe how research on metacognition in mathematics learning and its role in improving the mathematical ability of junior high school students is viewed from the year of publication, demographics, and the type of research in the 2012-2021 period. The search results show that research on metacognition in mathematics learning for junior high school focuses on three mathematical abilities: problem-solving, critical thinking, and mathematical communication.

Keywords: Metacognitive Ability, Mathematical Competencies, Systematic Literature Review

Scope: Innovative Mathematics Teaching and Learning

[IMT14]

Does Van Hiele Level of Geometric Thinking Ability Affect Students' Mathematics Learning Outcomes?

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Abstract. The research is aimed to find out and analyze: (1) the effect of learning models on mathematics learning outcomes, (2) the effect of van Hiele level of geometric thinking ability on mathematics learning outcomes; (3) the interaction effect of learning models and van Hiele level of geometric thinking ability on mathematics learning outcomes; and (4) the learning model which provide better mathematics learning outcomes among transformative learning, Real Mathematics Education, and Direct Instruction model in each van Hiele level of geometric thinking ability among Junior High School students. The research employs quasi experimental design. The population of the research is 8th grade students in 41 public Junior High Schools in Sukoharjo Regency. Sample of the research consist of 281 students from 9 classes and 3 schools selected using stratified cluster random sampling. The data collected using document and test. Data analysis is done using two ways ANOVA. The research concludes that: (1) there's a positive and significant effect of learning model on mathematics learning outcomes; (2) there's a positive and significant effect of van Hiele level of geometric thinking ability on mathematics learning outcomes; (3) there's a positive and significant interaction effect of learning models and van Hiele level of geometric thinking ability on mathematics learning outcomes; and (4) the transformative learning model is the one which provides best mathematics learning outcomes among transformative learning, Real Mathematics Education model, and Direct Instruction models.

Keywords: *mathematics learning outcome, van Hiele level of geometric thinking, learning model*

Scope: Innovative Mathematics Teaching and Learning

[IMT15]

Building a Positive Attitude towards Mathematics: Its Impact on Reducing Student Phobia

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Abstract. Mathematics phobia is a psychological disease in the form of excessive anxiety about things related to mathematics due to the inability of students to understand the mathematics lessons taught by their teachers. A positive attitude towards mathematics, for example, thinking that anyone can learn mathematics, will be able to reduce students' phobias. This literature review article discusses ways to build students' positive attitudes towards mathematics to reduce their phobia. Our study concluded that to create a positive attitude in students, mathematics teachers must first develop a positive attitude toward mathematics. Teachers with a positive attitude towards mathematics lessons will be able to create a fun, enthusiastic class atmosphere that all students can follow. Students will learn mathematics more comfortably in such a class to reduce their phobia.

[IMT16]

The Importance of The Synergy of Parents and Teachers as A Student's External Factor in Overcoming Dyscalculia in Learning Math

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Abstract The term Dyscalculia is used when children have difficulty learning basic or specific mathematical concepts such as counting. Dyscalculia is essential to overcome because it can cause math anxiety. This article discusses the importance of the synergy between parents and mathematics teachers as an external factor for students dealing with children with Dyscalculia. The results of our literature review concluded that the critical thing that can be used to overcome students' Dyscalculia is that parents and mathematics teachers work together if needed and can be assisted by a doctor or psychologist to design appropriate learning strategies for a child who has Dyscalculia. This right strategy also depends on the cause of the child's Dyscalculia. Learning mathematics with concrete examples, learning while playing, numbers/math symbols are displayed in full color to make it attractive, and instilling confidence in students can be a choice of mathematics learning strategies.

[IMT18]

Cheating Behavior: Causes and Relationship to Students' Math Anxiety

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Abstract. Cheating behavior in students, especially in mathematics, is a classic problem and not a trivial problem. The habit of cheating shows a lousy character, namely dishonesty. This article examines the causes of cheating and its relationship with students' anxiety about mathematics. The data collection method uses a literature review by analyzing research results from various sources. It is concluded that cheating behavior positively correlates with math anxiety. Several things can cause students to cheat. The causes include students being unprepared for exams, lack of confidence, opportunities for cheating, and excessive math anxiety. Therefore, better preparation of exams and conditioning of exam administration by teachers will reduce the potential for students to cheat. Furthermore, math teachers should carry out mathematics learning with a humanist approach that allows for a harmonious relationship between teacher-students and students to reduce math anxiety and eliminate the habit of cheating.

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[ANL01]

A Profit Allocation Strategy of a Refurbishing Model with Fairness Concerns Based on Shapley Value

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ABSTRACT. This paper takes into account a refurbishing model where an original equipment manufacturer (OEM) authorizes a retailer and a third-party to sell and refurbish his products, respectively. We study the optimal (equilibrium) decisions and profits for cooperative and non-cooperative games. We focus on how to optimally share maximum profit in a cooperation model. We use an allocation strategy—the Shapley value—to coordinate this refurbishing system. We apply the Shapley value approach. This strategy is an efficient and easily integrated way that enables decision makers to reassess using various coalition forms and marginal contributions from various parties, according to the cooperative game theory framework. This strategy clearly shows tremendous advantages for managing multi-party supply chains with a variety of different coalition forms, especially for generating win-win outcomes and optimum system performance. The market is divided into two segments: high-end and low-end. The high-end customers are willing to purchase new products, whereas the low-end customers purchase only refurbished products at lower prices. In this study, we suggest a construct where firm choice is guided by estimating the fraction of customers that switch for a given price difference. Our model does not rely on a willingness to pay (WTP) and is therefore able to accommodate such complex and realistic consumer behaviour. We derive some interesting insights. The models provide the optimal solutions, and a numerical example is presented for illustrative purposes

Scope: Mathematical Analysis

[ANL02]

Perbedaan *Productive Disposition* Matematika Siswa Jurusan IPA dan IPS Kelas 12 SMA Budi Mulia Dua Yogyakarta

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Abstract. Mathematics is a science that must be mastered by every individual. In addition, by studying mathematics, students are able to face the progress of science and technology, therefore mathematics needs to be taught from the time students enter elementary education. It is proper for students to view mathematics as something logical and useful. This study aims to determine the difference in the mathematical productive disposition of students majoring in social studies and social studies in class 12 SMA Budi Mulia Dua Yogyakarta. This research is a quantitative research with survey method. The samples of this study were 30 students of class 12 science and 27 students of class 12 social studies. The research data was collected by using a questionnaire on the productive disposition of students' mathematics. Data analysis was carried out by testing independent sample t-test and continued with descriptive analysis. The results showed that (1) there was no difference in the productive disposition of mathematics students majoring in science and social studies class 12 SMA Budi Mulia Dua Yogyakarta, (2) majoring in science there were students who still lacked learning schedules and targets so that students' interest in learning mathematics was still some are lacking, and (3) there are still students in the social studies department who feel hopeless when they are confused in solving math problems, this is because there are still students who are not confident in learning and solving problems.

Key Words : *Department of Science and Social Sciences, Mathematics, Productive Disposition*

Scope: Mathematical Analysis

[ANL03]

ANALYSIS OF MATHEMATIC REASONING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS MATERIALS OF NUMBER PATTERNS

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Abstract. Learning mathematics in schools to improve thinking patterns, reasoning in making generalizations, improve problem -solving abilities. This study, using qualitative (descriptive) research by applying a simple random sampling technique to determine the subject, aims to determine the students' difficulties in answering the description questions related to the mathematical reasoning ability of Tarakan City Junior High School students on number pattern material. Based on the results of the analysis, the average value of the percentage of reasoning ability in the first indicator is 89%, the second indicator is 73%, and the third and fourth indicators are 56% and 47%, respectively. Therefore, it can be concluded that the mathematical reasoning ability of Tarakan City Junior High School students is only 24% including the low category, so teachers need to improve students' reasoning abilities.

Keywords: *Difficulty, mathematics learning; mathematical reasoning.*

Scope: Mathematical Analysis

[UTM01]
Impact of Web-Based Knowledge Building on Professional Identity of Prospective Teachers

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Abstract. Prospective teachers need to developed professional teacher in their initial teacher education cause solid teacher identity that would support and sustain them in their future profession. Educators must pay attention to developing prospective teachers' professional identity. This study aims to determine the impact of web-based knowledge building on professional identity of prospective teachers. The study methods were quasi-experiment post-test only, conducted in primary teacher education in Jakarta, Indonesia. There was 150 prospective teachers get involved; 75 students for experiment group and 75 students in control group. Experimental group learned through Web-based knowledge building, and a control group learned through traditional teaching approaches. Teacher identity data was collected by Likert using 5 scalas, and data is analyzed using independent T-test. The research found that Webbed based knowledge building developed professional identity of prospective teachers. WBKB play role constructs psychological such as self belief, self efficacy, and identity besides knowledge for teaching.

Scope: Using Technology in mathematics education

[UMT02]
Visual Basic Application for Excel Learning Media with Synthesis Program Method on Mathematical Problem Solving Ability of Prospective Teachers

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Abstract. Abstract. College students or prospective teachers are the most important sources of knowledge to improve the quality of students' abilities in schools in preparing students to face industrial technological advances at the time and in the future. Prospective teachers must be able to master technology which changes continuously every day, which is currently leading to the development of digital technology. from a prospective teacher is to utilize technology into a medium that helps understand students to solve mathematical problems, where a media is in the form of several images created through several stages that must be solved through the preparation of a language program systematically from the ideas of a prospective teacher. The method used for making media is the Program Synthesis method with 4 stages, namely Specification, Synhesizier, Verification, and feedback. This method will show the effect on the problem solving indicators when using Visual Basic for Application Excel until the creation of a media. In the results of the study, it was found that making learning media using VBA for Excel through the synthesis method was better than making VBA for Excel learning media using the usual way.

Scope: Using Technology in mathematics education

[UTM03]
Instructional Multimedia with Local Context oriented to Numeracy Skills: Practicality and Effectiveness

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Abstract. The aim of this research is to develop instructional multimedia with local context of Lombok Island for junior high school students. The development of instructional multimedia is oriented towards numeracy skills on the probability topic. This research is development research based on the design research model by Plomp which consists of 3 phases, namely Preliminary Research, Development or Prototyping, and Assessment. The subjects in this research were grade IX junior high school students consisting of 24 students. The data were collected using practicality questionnaire to determine the practicality of multimedia and numeracy skills test to determine the effectiveness of multimedia. The results showed that instructional multimedia met the practical and effective criteria. The results of the teacher's assessment showed a total score is 32 in practical classification. Then 83% of students gave an assessment of being in the very practical classification and 17% were in the practical classification. The results of the effectiveness of the numeracy skills test showed that 79% of students achieved the Minimum Completeness Criteria score. Therefore, instructional multimedia is practical and effective for mathematics learning oriented to students' mathematical numeracy skills.

Scope: Using Technology in mathematics education

[UMT04]
Development of E-lkpd Based Guided Inquiry Oriented to Mathematic Problem Solving For Junior High School

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Abstract. This study aims to develop a *Guided Inquiry* oriented to solving mathematical problems with valid, effective and practical provisions. This type of research is descriptive quantitative using development (R&D).-based E-LKPD *Guided Inquiry* carried out with the stages of ADDIE namely analysis, design, developt (development), implementation and evaluation. The subjects used in this study were seventh grade students of junior high school in Yogyakarta. The data collection instruments used consisted of product validation questionnaires by media experts and material experts to test the validity, pretest and posttest mathematical problem solving were used to test the effectiveness of the product, student response questionnaire sheets to test the practicality of the product. The results of this development are: 1) the e-LKPD developed with the ADDIE model meets the valid category with an average score of 63 media experts and an average score of 83 material experts, 2) E-LKPD is declared effective in improving problem solving abilities. mathematical problems obtained from the average score of posttest problem solving is 78.56 which is stated to be greater than the average pretest score of 37.78, 3) the results of the average score of student response questionnaires are 59.62 in the practical category. Thus based E-LKPD is *Guided Inquiry* oriented towards solving mathematical problems can be declared worthy as a mathematics learning media because it meets the valid, effective and practical categories.

Scope: Using Technology in mathematics education

[UMT05]
Developing Mobile Application using Augmented Reality to Introduce Three-Dimensional Object in Geometry

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Abstract. Technological developments have occurred so rapidly in the last two decades. These developments impact digital transformation that combines information, communication, and AI. The world of education must be able to deal with technological changes that occur immediately. Augmented Reality shows significant developments from year to year in the world of education, including in learning mathematics, especially in visualizing three-dimensional and abstract objects. This study aims to build an Augmented Reality-based mobile application for the material of solid geometry. The method used to develop the application is a prototype model consists three stages, namely listening to the customer, customer test drives mock-up, and build-revise mock-up. Applications have been constructed using Unity 3D, created user interfaces with Photoshop and Corel Draw, modeled objects using Blender, and developed AR-based markers through Vuforia. This research produces android-based learning media that is interactive and easy for students to use anywhere and anytime. The test results meet the "very feasible" criteria in several tests that involve functionality, maintainability, portability, and black box testing

Scope: Using Technology in mathematics education

[ALG01]
Determinant and Invers of Skew Circulant Matrices with Arithmetic Sequence

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Abstract. In this paper, we worked with the skew circulant matrices. For the entry of this matrices, we chose an arithmetic sequence. We will present a determinant and invers of this matrices. We will obtain by applying a series of elementary row operations and elementary column operations based on the structure of the entry of matrices.

Scope: Algebra

[ALG02]
Characteristic Identity Graph of Integer Modulo *p* Group, *p* Prime

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Abstract. Given a group $(Z_p\backslash\{0\}, \bullet_p)$ for p prime. This group can be represented in a diagram known as graphs. There are several kinds of graphs which are group representation, in this paper it will be represented as an identity graph. In an identity graph, all vertices are connected to an identity element of the group, and two vertices will be connected where the two vertices are inverses each other. In this paper, we investigate the characteristic of identity graph of integer modulo p group, for p prime.

Scope: Algebra

Bifurcation analysis on Interaction model of 2 predators and a prey

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Abstract.

In this manuscript, the interaction of 2 predators and a prey is studied in the form of a dynamical system. Both predators have many similar preys, and it makes, sometimes, the 2nd predator snatch the 1st predator's prey. Meanwhile, human also plays a rule that disserve the 1st predator. The bifurcation analysis on the interaction model is conducted to see whether the first predator has any chance to survive.

The model consists of Holling functional response type II which applied for both predators. The variation made over 2 parameters that stand for the successful snatch proportion and the number of predators killed by human over time. The bifurcation over the system is analyzed using manifold center theory. And the phase portraits of the system are drawn using Maxima.

The results show that the first predator has some save area. If the successful snatch proportion and the number of predators killed by human over time lie on the save area, the first predator will survive.

Keywords: bifurcation, predator-prey, center manifold theorem, Holling type II

[PSC01]

Comparison of the Environmental Balance of Plankton at the Beginning of the Dry Season and the Beginning of the Rainy Season in Two Reservoirs

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Abstract

This experiment aimed to compare the environmental balance seen from the composition of plankton species, primary productivity, abundance of plankton, plankton diversity index, plankton dominance index, and plankton saprobic index in Potorono and Imogiri reservoirs at the beginning of the dry season and the beginning of the rainy season. This experiment was conducted from April 2021 to July 2022. The design of this experiment was descriptive exploratory with the observation method. Sampling was carried out at 5 stations (4 stations on the edge and 1 station in the middle) with 5 repetitions. Furthermore, measurements of the physical and chemical conditions of the waters in Potorono and Imogiri reservoirs were carried out. The results showed that the composition of plankton species at the beginning of the dry season in Potorono Embung was 70 species and in Imogiri Embung was 45 species while at the beginning of the rainy season in Potorono Embung was 67 species and in Imogiri Embung was 45 species. The value of primary productivity, abundance of plankton, plankton diversity index, plankton dominance index, and plankton saprobic index at the beginning of the dry season in Potorono Embung were 70.830 (Mesotrophic), 731.092.04 Individual/Liter, 2.698 (moderate), 0.078 (low), and 0.510 (β-Mesosaprobic) compared to the beginning of the rainy season, were 63.350 (Mesotrophic), 150.232.89 Individuals/Liter, 2.999 (moderate), 0.073 (low), and 0.340 (β/α-Mesosaprobic). The value of primary productivity, abundance of plankton, plankton diversity index, plankton dominance index, and plankton saprobic index at the beginning of the dry season in Embung Imogiri were 48.050 (Oligotrophic), 464.270.69 Individuals/Liter, 2.545 (moderate), 0.1413 (low), and 0.398 (β/α - Mesosaprobic) compared to the beginning of the rainy season, were 25.065 (Oligotrophic), 290.932.93 Individuals/Liter, 2.674 (moderate), 0.586 (moderate), and 0.584 (β-Mesosaprobic).

Scope : Biolgy

[PSC02]

PRIMER DESIGN FOR ND2 GENE AMPLIFICATION IN DIABETES MELLITUS TYPE 2 PATIENT

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Abstract

The aim of this research to design DNA primer for NADH Dehydrogenase 2 (ND2) gene fragment amplification in mitochondrial genome using Polymerase Chain Reaction (PCR) method. ND2 gene code NADH Dehydrogenase 2 which is a sub unit protein belong to komples 1 protein in mitochondria. The occurrence of DNA mutation lead to functional change in respiratory activity. In this research, DNA primer was designed in silico using DNAStar software. The ND2 gene nucleotides was used as a template, this nucleotides were accessed from www.ncbi.nlm.niv.gov (GenBAnk: NC_012920.1). Primer was chosen based on nucleotide length, %GC content, and melting temperature (Tm). The result of primer design showed a pair of primers which have 20 base length for forward and 23 base length for reverse, there are 5'-GGCCCAACCCGTCATCTACT-3' for forward primer and 5'-GGCCCAACCCGTCATCTACT-3' for reverse primer. These primers were able to amplified 1,008 kb ND2 gen fragment in size. The product was successfully amplify following PCR condition as follows predenaturation at 90ºC for 30 second, denaturation at 98ºC for 5 second, annealing at 65ºC for 30 second, elongation at 72ºC for 60 second, the final elongation was done at 72ºC for 10 minutes.

Keywords: Primer, mitochondria, ND2 gene, in silico, PCR

Scope: Biology

[BED01]

The Potential of 21st Century Biology Learning Resources Based on Local Potential from Insect Diversity in Nglanggeran Ancient Volcano, Yogyakarta

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Abstract. The article aims to describe the potential of Insect diversity in the Nglanggeran AV as a 21st century biology learning resources based on local potential. This study uses logical analysis on local potential and the 2013 curriculum revised in 2018 for SMA/MA level. The analysis process conducted through several stages, namely (1) identification of research results in the form of processes and products, (2) selection, structuring, and supplementation of materials that produce the concept maps and essential concepts, (3) curriculum analysis, (4) instructional analysis, (5) students characteristics analysis, and (6) analysis of the times. The results of this research is refered to the cognitive and psychomotor levels, namely Basic Competency (KD) 3.1 & 4.1 on biology and scientific methods, KD 3.2 & 4.2 on biodiversity, KD 3.3 & 4.3 on principles classification of living things, KD 3.9 & 4.9 on grouping animals, and KD 3.10 & 4.10 on ecosystems and their interactions. At the affective level, the potential of biology learning resources can be used to increase the environmental awareness through Problem Based Learning and Project Based Learning that conducted by teacher in class.

Keywords: Biology Learning Resources, Local Potential, Insect Nglanggeran Ancient Volcano

Scope: Biology Education

[BED02]

Virtual Reality Design as Teaching Material for Local Potential Biodiversity in Tasikmalaya

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Abstract. Virtual concept has potential teaching material that complement limited offline learning. Delivering computerized virtual reality simulations could be an active and constructive process as an information builder for meaningful learning achievement. Virtual learning can display a panoramic view of the location of the area that can be seen by users by displaying information on the local potential biodiversity of Galunggung, Tasikmalaya. Additional features are supported by describing the location of the distribution area of each group of biota with an image display in the form of a 360 visualization that gives a real impression. This research has purpose to identify the need for virtual biodiversity tour plan in Mount Galunggung Tasikmalaya. Identification is done by measuring the need for taking panoramic photos and creating website-based virtual reality. Effective interaction plan by using a virtual tour allows users to feel as if they are in Galunggung and get a biodiversity learning experience in the form of non-immersive technology. Analysis is done by identifying system needs through a literature review approach and a direct field survey. The results of the virtual reality development approach that will be carried out in the form of website applications in the form of panoramic view and non-immersive technology. At several points taken from the field it is concluded to divide in 11 locations. The front and back end of the system is built with constant attention to the aesthetics and effectiveness of the user's needs.

Scope: Biology Education

[BED03]
TAnalytical Ability in Biology at Senior High School Level: A Review

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Abstract. The analytical ability is a basic ability in high-level thinking that must be possessed by students at the senior high school level. The ability to analyze can be trained on students in biology subjects at the senior high school level with learning models, modules, student worksheets, mini-research learning, instruments and learning media. The importance of analytical ability in biology learning so that students can differentiating, organizing, and attributing existing material in biology subjects. This paper aims to review the improvement of analytical ability in biology subjects at the senior high school level.

Scope: Biology Education

[BED04]

The Development of Online Flipped Classroom using Problem Based Learning based on Socio-scientific Issue to Enhance Student's' Scientific Literacy and Biological Ethic Awareness

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Abstract

This research aims to develop online flipped classroom using problem-based learning based on socio-scientific issue to enhance student's' scientific literacy and biological ethic awareness. This research is conducted in two phases. In the first phase, the research focuses on analysis, design, and develop the learning model. The second phase will be conducted to implement and evaluate the model. As the result of the first phase, the online flipped classroom model has been established including the model book.

Scope: BIiology Education

[BED05]

Urgency of Physical Activity for Elderly

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Abstract

Physical activity brings several edges to the physical and psychological state of the overall public, which is felt directly by the senior community. In Indonesia, most of the consequences of sports and physical activity as a healthy lifestyle are considered to be still low levels of awareness and reaction in the elderly. The description and urgency of the activity is shown in the study as ideas and recommendations for older people who exercise regularly on a daily basis. The purpose of this study is to produce an outline of the advantages and urgency to exercise that older individuals are able to do. This study uses a qualitative method of literature review by collecting multiple documents, books, and magazines related to the importance of elderly exercise in each study and reviewing the urgency used as a conclusion. And older people can mention any benefit. The results of this study confirmed the urgency of 10 health magazines for the elderly and suggested recommendations for these literature, there are 1) systematic, regular and safe physical activity, 2) physical activity choices are gentle exercise, and 3) synkinesis with relatives and friends within closest community, 4) choose your physical activity, 5) implement a healthy lifestyle.

Keywords: Elderly, Health, Physical activity.

[PSC04]

SOLIDIFICATION OF COPPER IN CaO-CuOx-SiO4 . COMPOSITES

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ABSTRACT

Domestics wastes are main problem to almost all countries. Methods are applied to reduce the wastes, but the problem still exists. Some domestics wastes may leave inorganic materials after docomposition. Burning eggshells may produce calcium oxide, and cogon grass *(Imperata cylindrica)* may produce silica. These oxides are promising materials for cement component synthesis, such as calcium siilicates. Calcium silicates indicate the high power to stabilize toxic metals. The copper may be stabilized by the calcium silicates, forming copper-doped calcium silicates.

This research was conducted to prepare and characterize copper-doped calcium silicates, synthesized using calcium oxide and silica from chicken eggshells and *Imperata cylindrica*, respectively, and to determine the leaching ability of copper from copper-doped calcium silicates.

The copper-doped calcium silicates were synthesised by using the solid-state reaction method. The reactions were conducted at the temperature of 1050°C for 4 hours to produce copper-doped calcium silicates. The samples were characterized using the X-Ray Diffraction (XRD), Fourier Transform Infrared (FTIR), Scanning Electron Microscopy-Electron Dispersive X-Ray Analyzer (SEM/EDX) methods, and to determine the leaching ability of copper the Atomic Absorption Spectrophotometry (AAS) method was deployed.

The results indicate that the copper-doped calcium silicates were successfully synthesized using the solid-state reaction method. The XRD, FTIR and SEM-EDX methods indicate the presence of typical peaks of Ca_2SiO_4, Ca_3SiO_5, $Ca(OH)_2$ and SiO_2 compounds in the samples. The AAS method confirms the leaching of <0.266 mg/L copper from the copper-doped calcium silicates.

Key words: calcium silicate, solid state reaction, chicken eggshell, *Imperata cylindrica*.

SYNTHESIS OF CARBON/Cu-Ni (1:1) NANOPARTICLES USING BIOREDUCTOR GALANGAL EXTRACT(Alpinia galangaL.) FOR OF CONGO RED DYE ADSORPTIONS

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ABSTRACT

This study aims to synthesize carbon composites/Cu-Ni nanoparticles (1:1) and determine their characteristics, as well as determine their characteristics as adsorbents. The adsorbent characters studied included the optimum contact time, adsorption capacity of adsorption at various concentrations of *congo* red dyes and the order of the adsorption rate.

Carbon composite/Cu-Ni nanoparticle were obtained by impregnating of activated carbon and Cu-Ni nanoparticles. Cu-Ni nanoparticle (1:1) were synthesized using bio reductant of galangal extract (*Alpinia galanga* L.). Characterization of Cu-Ni nanoparticle using Particle Size Analyzer (PSA) and UV-Vis spectrophotometer. Characterization of carbon composite/Cu-Ni nanoparticle using Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD). Congo red dye adsorption by carbon composite/Cu-Ni nanoparticle adsorbent was carried out in batch with variations in contact time of 0, 15, 30, 45, 60, and 120 minutes, as well as variations in initial concentration of congo red dyes are 50, 100, 150, 200, and 250 ppm.

Carbon composite/Cu-Ni nanoparticle was successfully synthesized. The character of Cu-Ni (1:1) nanoparticles based on PSA test measuring 55,3 nm and UV-Vis spectrophotometer showed a wavelength of 293 nm. Based on the XRD diffractogram, peaks of 2θ at 44.44°, 50.41°, and 75.43° were identified as typical peaks of bimetal Cu-Ni, while the SEM spectrum showed the distribution of Cu-Ni nanoparticles on the surface with an average size of 183 nm. At 15 min is the optimum contact time for adsorption with an adsorption capacity of 63.65 mg/g. The largest adsorption capacity at the initial concentration of congo red dye was 250 ppm with 103.57 mg/g. The adsorption of Congo red dye by the adsorbent of the carbon/Cu-Ni nanoparticle composite followed a pseudo-second order.

Keyword : Adsorption, activated carbon, Cu-Ni nanoparticle, congo red dye

[PSC06]

THE FIRST CALCULATION OF ELECTRONIC STRUCTURE OF ANATASE COMPOUNDS DOPED NITROGEN AND CARBON: $TiO_{(2-x)}A_x$ (A = N or C, x = 0-0.50) WITH DENSITY FUNCTIONAL THEORY (DFT) APPROACH METHOD

By:
Hari Sutrisno, K.H. Sugiyarto, Dyah Purwaningsih, Cahyorini Kusumawardani

FMIPA Resesrch Grant

ABSTRACT

This study aims to determine the effect of choosing the type of dopant on the initial calculations and the variations of the dopant concentration on the band gap energy (Eg) and density of states (DOS) of TiO_2 and $TiO_{(2-x)}A_x$.

The initial calculation method was carried out using a density functional theory (DFT) approach with generalized gradient approximation from Perdew-Burke-Ernzerhof (GGA+PBE) as a correlation function of change. The dopant used is Nitrogen (N) and Carbon (C) with various concentrations of $TiO_{(2-x)}A_x$ with x = 0 – 0.50. Initial calculation of band gap energy using conventional unit cells (1x1x1) for pure TiO_2 compounds and supercells (1x1x1, 2x1x1 and 2x2x1) for $TiO_{(2-x)}A_x$compounds using the CASTEP program in Material Studio.

The results of the calculation of the band gap energies of TiO_2 and $TiO_{(2-x)}A_x$ (x = 0, 0.0625 , 0.125 , and 0.25) with Nitrogen and Carbon extraction using the GGA+PBE calculation method produce a band gap energy of TiO_2 of 3.186 eV. The addition of 4.38% N and 3.75% C atoms in $TiO_{1.75}N_{0.25}$ and $TiO_{1.75}C_{0.25}$ compounds resulted in band gap energies of 1.54 eV and 1.74 eV, respectively. The addition of 2.19% N atoms and 1.877% C atoms in $TiO_{1.875}N_{0.125}$ and $TiO_{1.875}C_{0.125}$compounds resulted in band gap energies of 1.78 eV and 1.81 eV, respectively. The addition of 1.095% N and 0.94% C atoms in $TiO_{1.9375}N_{0.0625}$ and $TiO_{1.9375}C_{0.0625}$ compounds resulted in band gap energies of 1.85 eV and 1.92 eV, respectively. The result of DOS character calculation shows that the valence band is dominated by O 2p atomic orbitals and the conduction band is dominated by Ti 3d atomic orbitals. The addition of N or C atoms to $TiO_{(2-x)}A_x$ serves to widen or narrow the band gap.

[PSC07]

Molecular Docking and Dynamics Simulation for Searching Anti-Cancer Compounds of Piperlongumine Derivatives that Have Potential As An Inhibitor Against MAO-B (Monoamin Oxidase B)

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Abstract

The docking of the piperlongmine molecule and its derivatives has been carried out with the aim of finding molecules that have potential as anti-cancer. A total of 18 ligands were docked to the 2v5z protein using the autodock4 and autodock vina programs. The binding energies of piperlongumine and piperlongumine derivatives [R1 = CH3 and R2 = H] were -8.6 kcal/mol and -9.3 kcal/mol, respectively. Based on molecular dynamics simulations, the hydrogen bond interaction fraction was dominated by GLN 206 residue in both the SAG (88%) and piperlongumine derivatives ((R1=CH3, R2 = H)(93%) ligand, for this reason this piperlongumine derivative molecule is predicted to have potential as MAO B inhibitor.

[CED01]

Development of Problem Based Learning-Student Worksheet Assisted by Video on Colloid

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Abstract. This study aims to: 1) determine the characteristics of Problem Based Learning (PBL)-student worksheet assisted by video on colloid material; 2) determine the feasibility of PBL-student worksheet assisted by video based on the assessment of chemistry learning experts; 3) knowing the usability response by the teacher to PBL-student worksheet assisted by video; and 4) find out the readability response by students to the PBL-student worksheetassisted by video. A mixed method model was conducted with the exploratory mixed method. Instruments included need assessment sheets, expert validation sheets, teacher and student response questionnaire sheets. The student worksheet developed was validated by two expert lecturers and then revised. Next, five chemistry teachers participated in the usability test, while 20 students participated in the readability test. The data analysis technique were qualitative and quantitative data analysis. The results of the literature review, the need assessment interviews, the feasibility test, the usability test, and the readability test comprised the data generated in this study. Therefore, the results of this study were as follows: 1) the characteristics of the PBL-student worksheet assisted by video are the chemical content presented referring to the Basic Competencies 3.14 and 4.14, the PBL model is implemented in the student worksheet in the form of activities to find solutions to problems, the student worksheet raises phenomena in everyday life as a topic of problems that presented in the form of video; 2) based on the theoretical test, the PBL-student worksheet assisted by video is declared feasible based on expert judgment; 3) based on the usability test, the PBL-student worksheet assisted by video scored very good criteria with an ideal percentage of 87.7 percent; 4) and based on the readability test, the PBL-student worksheet assisted by video scored very good criteria with an ideal percentage of 94.3percent.

[CED02]

Development of SSI-Oriented Chemistry Learning Videos with Controversial Issues in ESD

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Abstract. This study aims to develop SSI-oriented chemistry learning videos with controversial issues in ESD. In detail, the objectives of this study are: (1) analyzing the specifications of the SSI-oriented chemistry learning videos with controversial issues in ESD following the results of the need assessment for the development of chemistry learning videos; (2) analyzing the feasibility of the SSI-oriented chemistry learning videos with controversial issues in ESD in terms of the aspects developed in this study; and (3) analyzing user responses to SSI-oriented chemistry learning videos with controversial issues in ESD being developed. The research was conducted using the exploratory sequential design method. The research activities were carried out in three stages of analysis: the primary qualitative phase, the secondary quantitative phase, and the integration phase, which connected the two data and expanded the findings of the initial qualitative exploration. The qualitative stage begins with a needs analysis of the types and formats of videos needed in learning. The next step is development activities based on the needs analysis obtained at the beginning, then theoretical validation through expert judgment by four learning expert lecturers and revision. Finally, the quantitative stage in this study was carried out through a response test to SSI-oriented chemistry learning videos with controversial issues in ESD by prospective users, namely five chemistry teachers and 54 senior high school/vocational students. The results of this study was nine learning videos uploaded via YouTube. Based on the teacher's assessment, the developed learning video can already be implemented for chemistry learning in terms of material, function, display, audio, language, and programming aspects. In addition, students remarked that the learning videos were engaging and wished that they were further developed for other discussions.

Keywords: SSI, learning video, controversial issues, ESD

[CED03]

Teaching Intervention of Learning Cycle 5E Models in Science Education: A systematic Review

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Abstrak. This systematic review analysis study was conducted to review the teaching intervention of the learning cycle 5E (engagement, exploration, explanation, elaboration and evaluation) model. The main criteria for the selection of articles the implementation of the learning cycle model in the field of science education with a period ranging from 2012 to 2022 from the well-known international data base. There were 15 articles were obtained that fit into the criteria. The review was focused on the course, sample level, methods and learning media used, and the form of activity of each stage in the learning cycle model. The results showeddifferent codes for each method used at each stage in the learning cycle syntax. The highest frequency of the method used in the engagement step is in the lecture code, the exploration step is in the experiment code, the explanation step is in the presentation code, the elaboration and evaluation steps are in the assignment code. In addition, the use of media and activities carried out at each stage of the syntax learning cycle are discussed also here.

[CED04]

The Indonesian Adapted Measurement Tool: A Valid and Reliable Tool to Measure Classroom Emotional Climate

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Abstract. Learning sciences and mathematics is challenging for most Indonesian students. Besides students' ability to comprehend the subjects, classroom emotional climate (CEC) affects the students' willingness to learn sciences and mathematics. A measurement tool to assess CEC in science and mathematics courses would be valuable for teachers to evaluate their classroom environment and enhance the emotional climate that enforces students' achievement in the classroom. CEC Questionnaire (CEC-Q) is a valid and reliable tool to measure sciences and mathematics classroom emotional climate. The original CEC-Q is in English. Therefore, this research aimed to adapt the CEC-Q into the Indonesian language and to define its validity and reliability. We translated the CEC-Q as Kuesioner terhadap Suasana Emosional Kelas (K-SEK) using expert panel and professional proof reading from a language center. The next step was the data gathering step. We obtained a purposive sampling of 120 students from high schools and first-year students through an online questionnaire. To check K-SEK's validity, we conducted the Corrected item-total Correlation technique. The analytical method used to check reliability was Cronbach's Alpha coefficient. Results showed that K-SEK had the Corrected item-total Correlation value in the range of 0.413 to 0.743, which indicated satisfactory discriminatory power as a valid measurement tool. The reliability analysis of K-SEK showed Cronbach's Alpha value as 0.956. The value proved that K-SEK is a reliable measurement tool. K-SEK is a promising tool to measure the classroom emotional climate in sciences and mathematics courses. The measurement tool would help teachers to improve the instructional design within sciences and mathematics courses in Indonesia.

[CED05]

VISUALIZATION OF CHEMICAL EQUILIBRIUM MATERIAL THROUGH MULTIPLE REPRESENTATION-BASED COMICS

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Abstract. Chemical equilibrium is one of the chemical materials in high school that is difficult for students to understand, especially in KD 3.9 the factors that influence the shift in equilibrium and its application in industry. This difficulty is due to the concept of abstract chemical equilibrium with concrete examples in addition, the learning media used are still common such as printed books, *powerpoints* and videos. Comics are one of the media that is favored by various groups from children to adults, in addition to being a medium for comic entertainment, it is also used as a learning medium. This study aims to develop multi-representation-based comic media as visualization of chemical equilibrium material, develop practical comic media and interesting comic media. This research is a research and development (R&D) using a 4D model with modifications. This research resulted in a *digital* comic product entitled "Chemical Comics: Factors Affecting Chemical Equilibrium". The results of validation by chemistry learning experts are feasible to use with revisions, the results of *the reviewer's* assessment of the visualization of chemical equilibrium material through multiple-representation-based comics obtained a percentage of practical value of 79.86% with practical criteria and good quality criteria, the results of the response of peer review obtained an ideal percentage of 82.82% with excellent quality criteria and the results of student responses obtained an ideal percentage of 79.43% with good quality criteria.

[CED06]

How are Students' Attitudes Toward Video Podcast of Buffer Solution in Chemistry Learning?

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Abstract. Video podcast is easily accessed by students. The aim of this study was to investigate students' attitudes of video podcast "Buffer Solution" on chemistry learning. There are 34 students of 11th grade in science-class at Cangkringan Senior High School, Sleman, Yogyakarta who participate as sample through purposive sampling. Participant fulfil questionnaire of student attitudes of video podcast instrument after saw video podcast of "Buffer Solution" that uploaded in YouTube platform. Students were positive about the video podcast. The clip podcast was easy to follow and learning features easy to read. The clip was not too long, but there were students who used pause button to understand the material. While some students thought the video podcast were not boring, but most felt that they were better when using textbook. Students thought that video podcast could be useful for homework, test preparation, and getting extra help as learning supplement about buffer solution.

[CED07]

Assessing Students' Motivation During Online Learning by Using Thinkific Platform

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Abstract. This study aimed to investigate students' motivation by using Thinkific as an online learning platform on an atomic structure topic. Students' learning motivation was measured using the Attention, Relevance, Confidence, Satisfaction (ARCS) questionnaire. The data were analyzed using the descriptive quantitative technique. Mostly, students are in the medium category of motivation after learning atomic structure supported by the Thinkific Platform. The satisfaction aspect from the ARCS motivation questionnaire got the highest score, while relevance and confidence got the lowest score. This research was conducted in small size (one class at SMA Budi Mulia Dua), which implied that further research in a larger sample need to be conducted to generalize the data.

[CED08]

THE EFFECT OF COLLABORATIVE BASED SELF-ASSESSMENT ON COLLABORATION SKILL AND COMMUNICATION CONFIDENCE OF PROSPECTIVE TEACHERS IN ONLINE LEARNING COURSES FOR CHEMISTRY

Research Group Report by
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The development of science, technology, and transformation in various sectors allows the need for human resources who are capable of 21st century 4C skills of creativity, critical thinking, communication, and collaboration. If an educator lacks collaboration skills and communication confidence, the message to be conveyed through certain educational activities becomes distorted and hampered. Therefore, all learning activities including chemistry need to be carried out with methods that can train prospective teacher collaboration skills to bridge communication and collaboration skills. The method that can be used in chemistry learning is collaborative group discussion, so the objectives of this study are (1) to determine the level of collaboration skills of students before and after the implementation of CBSA, (2) to analyze the effect of CBSA implementation, (3) to determine the level of student communication confidence before and after the implementation of CBSA. after the implementation of CBSA, and (4) analyzing the effect of CBSA implementation on students' communication confidence.

Designed as a pre-experimental study with a pretest-posttest design, there was one sample group that was given treatment in this study. Through the convenient sampling technique, students who take the Online Learning for Chemistry course are given treatment with the application of collaborative based assessment (CBA). In this study, researchers analyzed the application of CBA to the collaboration skills and communication confidence of students as prospective chemistry teachers by using instruments in the form of a collaborative skills questionnaire (AKK-GK) and a communication confidence questionnaire (ACC-GK). Data is collected online through LMS, Google Form, and Zoom Cloud Meeting. The collected data were analyzed using descriptive statistical techniques and the Wilcoxon Test. The analysis was carried out on the scores obtained by students before and after the application of CBA. Each sub-aspect of AKK-GK and ACC-GK was also analyzed through the same technique, so this research was conducted with the aim of analyzing the effect before and after the implementation of CBSA, as well as knowing the level of collaboration skills, and communication confidence of prospective chemistry teacher students.

The results showed (1) the level of student collaborative skills before and after CBSA implementation in Online Learning for Chemistry lectures was in the good category (2) there was no significant difference in student collaborative skills after CBSA implementation with P = 0.203, (3) communication confidence level students before and after CBSA implementation were in the sufficient category, and (4) there was a significant difference in student communication confidence after CBSA implementation with P = 0.000.

Keywords: Collaborative based self-assessment, online learning for chemistry, collaborative skills, communication confidence.

[CED09]

Exploring Pre-Service Chemistry Teachers' Scientific Habits of Mind via Local Socio-scientific Issues: An Exploratory Mixed Methods Study

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Abstract. This study was aimed to explore the SHOM of prospective chemistry teachers through the use of L-SSI. The research was designed to be carried out for 1 year applying mixed methods with an explanatory design through a cross sectional study. The data collected in this study were quantitative and qualitative data from SHOM chemistry teacher candidates. The research sample that participated in this study consisted of 374 prospective chemistry teacher students from 4 different generations, namely the 2021, 2020, 2019, and 2018 classes. The sampling technique was carried out by saturated sampling at the quantitative stage and purposive sampling at the qualitative stage. Quantitative data on SHOM for chemistry teacher candidates were collected using the SHOM L-SSI scale adopted from Wiyarsi and Calik (2019) covering 33 statement items with 13 L-SSI and 7 SHOM factors. Furthermore, the researcher collected qualitative data through the use of an open questionnaire to 20% of the total sample as support for the explanation of the results of the quantitative data obtained from the SHOM scale and ended by reflecting and interpreting the research findings. Descriptive statistical techniques with ideal assessment categories were used to analyze the SHOM category via local SSI chemistry teacher candidates from quantitative data obtained from the L-SSI SHOM scale. Furthermore, qualitative analysis using content analysis with a combination of interpretive and inductive coding is used to analyze qualitative data obtained from interviews. Furthermore, the MANOVA test was used to analyze differences in the SHOM factor via local SSI chemistry teacher candidates based on the level of education year. The results showed that: (1) overall the SHOM category via L-SSI chemistry teacher candidates was in the good category, (2) Mistrust Argument from Authority was the lowest SHOM factor for chemistry teacher candidates, and (3) there were significant differences from SHOM via L-SSI chemistry teacher candidates based on the level of education year.

[CED10]

Teaching Intervention of REACT Strategy In Science Learning: A Systematic Review

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Abstract. This research is a systematic analysis that examines learning interventions in the implementation of the REACT Strategy. The essential criteria in the selection of articles are the application of the REACT Strategy in science learning with a range from 2012 to 2020 from an international database. There are 9 articles that meet the criteria. The results of the review focused on the material, sample level, learning methods and media used, and the activities carried out at each stage of the REACT Strategy. The results show that the most widely used learning methods in each REACT stages are: Relating stage is exploration; Experiencing stage is experiment; Applying stage is assignment; Cooperating stage is discussed and Transferring stage is assignment. Moreover, the use of media and student activities in the REACT Strategy application is also discussed here.

Keywords : REACT Strategy, Teaching Intervention

[CED11]

LITERATURE REVIEW OF LEARNING MEDIA ON CHEMICAL BONDING MATERIAL

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Abstract : The purpose of this study was to determine the level of achievement of learning media related to chemical bonding material with existing learning media. The results obtained from this research are various learning media that can be used in learning activities on chemical bonding material. Some of the learning media used include animated videos, augmented reality, comics, and modules. The use of learning media in chemical bonding learning activities can improve student learning outcomes, increase learning motivation, and learning is not boring than just using media such as white boards. After conducting a study on various studies on chemical bonding learning, it was concluded that there is a need for more innovative and practical media in improving the understanding and memory of students more visually and easily in its application to chemical bonding material so that students can easily understand and remember the concept of bonding material. chemistry properly.

Keywords: learning media, chemical bonds, animated videos, augmented reality, comics, modules

[PSC08]

PENGEMBANGAN LKPD BERBASIS PROBLEM BASED LEARNING UNTUK PEMBELAJARAN FISIKA DALAM PENINGKATAN BERPIKIR KRITIS SISWA MELIPUTI SIKAP ILMIAH DAN HASIL BELAJAR MATERI MOMENTUM DAN IMPULS

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Abstrak

Penelian ini memliki tujuan : (1) untuk mengetahui mengetahui kelayakan LKPD problem based learning; (2) untuk mengetahui peningkatan dari keterampilan sikap ilimiah dengan cara menggunakan media LKPD yang telah dikembangkan; (3) mengetahui dari hasil belajar siswa dengan menggunakan media LKPD yang telah dikembangkan. Pada penelitian ini kedalam termaksud *research and development* (R&D). desain untuk uji coba produk utama ini menggunakan media LKPD *problem based learning* (PBL) yang dilakukan pada kelas X SMAN 1 Kalasan sebagai kelas eksperimen. Teknik pengumpulan data penelitian ini dengan menggunakan lembar observasi, angket atau kuisioner dan juga tes yang tertulis. Hasil pengembangan dan penelitian menyatakan bahwa (1)LKPD berbasis PBL layak digunakan dalam pembelajaran fisika; (2) terdapat peningkatan sikap ilmiah rata-rata 88,52%; dan (3) terjadi peningkatan hasil belajar sebelum menggunakan LKPD 64,12 dan setelah menggunakan LKPD 84,85.

Kata kunci : LKPD problem based learning, keterampilan berpikir kritis, hasil belajar.

[PSC09]

Relative Humidity Sensing Using Optical Reflection

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Abstract. Humidity sensing is essential in various fields, including industrial processes, agriculture, engineering, and health. A material suitable as a sensing element for humidity detecting is polymer optical fiber (POF).. Increasing the % of humidity tends to decrease the normalized intensity

[PED01]

Effectiveness of E-LKPD Using *Quizizz Application Learning Media* to Improve Students' Critical Thinking Ability

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Abstract. This research is a research on the effectiveness of E-LKPD using *Quizizz application learning media* to improve students' critical thinking skills. The purpose of the mechanism of the results of this study is to explain the stationary wave and longitudinal wave material for students in the form of E-LKPD. The subject of this research is class XI MIPA. The data collection method used in this study is data using multiple choice questions with a total of 20 items to measure students' critical thinking skills. The results of the research conducted concluded that the E-LKPD using the media in the *Quizizz application was* declared practical and effective to train students' critical thinking skills about wave material. The effectiveness of E- LKPD is included in the very practical category. The effectiveness of cognitive learning outcomes is in the very good category and student responses are in the valid category.

Keywords : E-LKPD, *Quizizz Media*, Critical Thinking.

[PED02]

Development of Physics STEM Project Based Learning E-Worksheet to Enhance Student's Creative Thinking Skills and Learning Motivation

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Abstract. This study focuses on developing the PjBL-STEM e-worksheet to enhance creative thinking skills and learning motivation of class X high school students in linear motion material. The objectives of this study are, 1) to produce an e-worksheet with the PjBL-STEM model that is suitable for use in physics learning, 2) to determine the amount of the increase score in creative thinking skills, and 3) to determine the amount of the increase score in learning motivation experienced by students. The development procedure refers to the stages of the 4D model by Thiagarajan. The define stage analyzes the learning needs in schools, then the design stage produces a research instrument design. The instruments were assessed by expert validators and practitioners at the develop stage, then the results were analyzed using the SBI and Aiken's value. The product trials in SMAN 9 Yogyakarta were carried out through limited trials with 30 respondents, empirical trials with 120 respondents, and field trials which was attended by 68 respondents . The analysis of increasing creative thinking skills and learning motivation was carried out based on Hake's normalized gain equation. The difference of increasing between two groups were analyzed using Independent Sample T-Test. At the disseminate stage, the product was disseminated to teachers and students. The results showed that the PjBL-STEM e-worksheet produced was feasible to use based on expert and practitioner assessments and trials to students. The increasing between two groups was significantly difference for creative thinking skill and motivation. The amount of increase obtained based on the average value of N-gain in the experimental class resulted in an increase in creative thinking skills in the low category with the highest increase in flexibility, elaboration, and fluency aspect. Meanwhile, there is no increase in the originality aspect. The increase of learning motivation was obtained in the medium category with the highest increase in aspects of attention, satisfaction, relevance, and confidence. For further research, it is recommended for teacher to conduct interactions that encourage students to be more confident so that they come up with unique creative ideas.

[PED03]

EFFECTIVENESS E-WORKSHEET OF PROBLEM BASED LEARNING (PBL) MODEL ON PROGRESSIVE WAVE AND STATIONARY WAVE MATERIALS TO IMPROVE CRITICAL THINKING ABILITY STUDENTS

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Abstract. The purpose of this research is to explain the effectiveness of problem-based learning (PBL) on the subject of progressive wave and stationary waves to improving critical thinking ability student at SMAN 20 Makassar. For implementation, this study used a quasi-experimental design technique that employs existing groups rather than random groups. A product assessment worksheet and a test of students' critical thinking abilities were employed as the instruments. The pretest-posttest control group design was employed in this investigation. There are two groups in this study design: the experimental group and the control group. Students in Class XI MIPA were separated into two groups for this study: Class XI MIPA 1 as the experimental group and Class XI MIPA 2 as the control group. E-Worksheet Based on Problem Based Learning (PBL) can be declared effective and can be used to improve students' critical thinking ability based on the results of the Homogeneity and Normality Test using an independent-test.

[PED04]

THE IMPLEMENTATION ELECTRONIC STUDENTS' WORKSHEET BASED ON POGIL TO IMPROVE ANALYTICAL THINKING SKILLS ON GLOBAL WARMING

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Abstract. *This study refers to the main problem. Namely, students have not been trained to analyze physics material related to everyday life, which results in low students' analytical skills. This study aims to improve the ability to analyze students conducted to grade 11 with a sample of 57 people. This research method uses a quasi-experimental research design with a nonequivalent control group design. This study resulted in an increase in students' analytical skills, which was marked by the rise in the N-gain score included in the medium category. The results of the posttest hypothesis test using the Mann-Whitney test at a significance level of 5% (0.05) obtained Asymp. Sig (2-tailed) of 0.000 with the results of H0 being rejected and H1 is accepted, which means there is an increase in students' analytical skills using worksheets based on Process Oriented Guided Inquiry Learning (POGIL). Student responses to learning using POGIL-based worksheets are considered very good, with a percentage of 82%.*

Keywords: Electronic students' worksheet, POGIL, Analytical thinking skills.

[PED05]

Development of Physics E-Books for Straight Motion Materials to Improve Critical Thinking Skills of Students in SMK

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Abstract. The purpose of this study was to determine the effectiveness of the developed e-book in improving students' critical thinking skills. This research is a development research with 4D model. This research was conducted at SMK St. Bartholomew Benteng Jawa. Based on the results of the study, it was found that there were significant differences in the results of the pretest and posttest of students' critical thinking skills after being given treatment. There is a significant difference in the results of the pretest and posttest of students' critical thinking skills after being given treatment. The treatment given is learning activities. In the lecture class, the results of the N-gain percent were 24%, based on the criteria table, it showed that the lecture method was not effectively used in learning. The results of the N-gain test in the control class were 84%, indicating that the e-book development media was feasible and effective to use in learning. The measurement of critical thinking skills aims to test the effectiveness of the developed e-book.

[PED06]

Development of Flipbook-Assisted Digital Teaching Materials on Momentum and Impulse Materials to Improve Students' Concept Understanding

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Abstract. This study aims to determine the results of the validation test of digital teaching materials made using Flipbooks and to see an increase in students' understanding of the concept of momentum and impulse material. This research is included in research and development (R&D). Three experts carried out validation to assess the product developed from the aspect of content, presentation, language and graphics. Based on the results of the validity test of the content feasibility aspect, the results obtained in the very high category, the presentation aspect in the High category, the language aspect in the high category and the graphic aspect in the very high category. Furthermore, students are given pretest and posttest questions to understand the physics concept. The average score for the pretest was in a low category; for the posttest, the average score was high. Based on these results, it can be concluded that the digital teaching materials using FlipBook are valid, included in the high category, and can improve students' understanding of concepts.

[PED07]

Animation Video Development Assisted by Powtoon in the TPS Type Cooperative learning model in Straight Motion Materials to Improve Students' Concept Understanding

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Abstract.

Purpose of this paper is to obtain an animated video of physics learning assisted by *Powtoon* in a *think pair share* cooperative learning model for the subject matter of straight motion for class X SMA in odd semesters. The making of animation videos for physics learning with the help of *Powtoon*, the subject matter of straight motion, is a development research using a 4D model with the steps of *Define, Design, Develop, Disseminate.* The instruments used are in the form of a feasibility assessment sheet and a cognitive learning outcome test that is used to see the increase in students' conceptual understanding. The analytical technique used is to find the average total validity, and the feasibility percentage score and the n-*gain value*. Based on the results of the feasibility of animation videos for physics learning assisted by *Powtoon* on the subject of straight motion, the average total validation for media experts is 3.70 and for physics teachers it is 3.57 which is categorized as suitable for use, while the percentage score is 92.5% and 89.25%. For understanding the concept of students also experienced an increase seen from the value of N-gain using animation video assisted learning *Powtoon* of 0.94 > 0.7 so that it is classified in the high category.

Keywords : Physics learning animation video, *powtoon, Straight Motion, think pair share* cooperative learning model

[PED08]

Literature Review: Effectiveness of Physics Comic To Upgrade Student's Mathematical Representation and Critical Thinking Skills In Physics Learning

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Abstract. Mathematical representation skills and critical thinking are skills needed by students in the 21st century. One way to improve these two abilities is by using various teaching materials, one of which is electronic physics comics. The purpose literature *review* is to explain the effectiveness of e-comic media in improving mathematical representation and critical thinking of students in learning physics. The method used in this research is descriptive by reviewing 30 pieces of literature from international-based journals that can be accounted for from 2019 to 2021. The review shows that physics e-comic media helps improve mathematical representation skills and critical thinking in physics learning. The data analysis technique in this study uses qualitative description. The learning outcomes of students using physics e-comic teaching materials are more effective and contextual.

[PED09]

Inquiry-Discovery Physics Electronic Worksheet with *TeacherMade*-Assisted Productive Questions to Improve Science Process Skills for Reflection of Light in Mirrors and Lenses

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Abstract. This study aims to improve students' science process skills through the reflection of light on mirrors and lenses through the development of the inquiry-discovery E-LKPD model with productive questions. The instrument was validated and tested for practicality using four validators. Based on the study's results, it will find that the developed electronic worksheet could improve students' science process skills, especially for the light reflective material on mirrors and lenses. This research is a concern for further research that wants to improve science process skills by involving students in experimental activities.

[PED10]

Electronic Physics Worksheet Using live worksheetslive worksheets with the Problem-Solving Method to Improve Verbal Representation Skills on collision topics

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Abstract. This study aims to see the feasibility of developing electronic physics worksheets using liveworksheets with problem-solving methods and the effectiveness of their use in improving students' verbal representation skills. This type of research is development research. The study was conducted from March to April 2022. The research subjects were students of Class X MIPA 1 as the experimental class by applying the developed product and class X MIPA 2 serving as the control class while maintaining the lecture method using PowerPoint. From the results of the data analysis that has been carried out, validation of the physics student worksheet product is very feasible to use with the presentation value reaching 86.8%. The use of this media has a good impact on the verbal representation ability of students about collision.

Keywords: liveworksheets, problem-solving, Verbal Representation, Electronic Physics Worksheet

[PED11]

Development of Simple Harmonic Motion Module Based on Flip Book to Improve Mathematical Representation Ability of Students

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Abstract. This research aims to develop students' mathematical representation skills with simple harmonic motion modules based on flipbooks in problem based learning (PBL) education. PBL learning increases students' independence with problem solving exercises. This research is a research and development (RnD) research proposed by Thiagarajan, et al. The research was designed with a posttest only control design. The information obtained was analyzed by paired t test with the help of the IBM SPSS Statistics application. A total of 24 students participated in this research who were selected by purposive random sampling method from all students of class X MIPA MAN 4 Bantul. Collecting data through triangulation with interviews, observations, and tests. The results of the research show that the simple harmonic motion material packaged in a flip book is able to improve students' mathematical representation.

Keywords: GHS module, flip book, mathematical representation

[PED12]

The Development of Quizizz Integrated Physics E-Worksheet to Improve Students' Critical Thinking Skills

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Abstract. This research aimed to produce an integrated Quizizz physics e-worksheet that is feasible to be developed in physics learning on kinetic theory of gasesto improve students' critical thinking skills. This is a research and development (R&D) with the 4D model (define, design, develop, and disseminate). Participants in this study were students of class X MIPA 1 (as a limited test class) and X MIPA 3 (as a broad test class) at SMAN 1 Baturetno. This research concludes that learning physics using an integrated Quizizz physics e-worksheet media is feasible to be developed based on the results of the validation carried out with a value of 4.5 in the very good category. It also can improve students' critical thinking skills by the normalized gain value in the limited test class of 0.62 (medium category) and the broad test class of 0.71 (high category). This finding is an alternative learning media that is feasible to use in face-to-face learning and can also be used in distance learning conditions.

[PED13]

DEVELOPMENT OF ULATIC ELECTRONIC MEDIA TO IMPROVE SCIENCE PROCESS SKILLS AND STUDENT CONCEPT UNDERSTANDING

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Abstract

This study aims to determine the feasibility of the Optical Snake and ladders (Ulatik) electronic media and to know the improvement of science process skills and concept understanding after the application of learning media in class XI Mipa SMA 1 Muhammadiyah 1 Pontianak. This type of research is Research and Development (R&D). the method used refers to the 4D model consisting of 4 stages, namely define, design, development and disseminate. The test in this study was in the form of a snake and ladder media product and 20 multiple choice questions . . The results of improving the concepts and learning skills of students on optical material, this can be seen in the results of the pre-test and post-test as follows: 1) The improvement of students' science process skills on optical material can be seen from the N-Gain value of 0.94 > 0.7 . 2) The increase in students' understanding of the concept of optical material can be seen from the N-Gain value of 0.74 > 0.7 . This shows that the improvement of science process skills and concept understanding is categorized as very good. The percentage of the feasibility of electronic media according to experts, namely media experts 87.75% and material experts 93.25%. The results of this study indicate that the caterpillar electronic media *is* feasible to use.

[PED14]

The Effectiveness of Electronic Student Worksheet Assisted by Liveworksheets to Improve Data Literacy Ability in Momentum Learning

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Abstract. This study aims to test the effectiveness of electronic student worksheet assisted by liveworksheets with a problem-solving learning model to improve data literacy skills in learning the physics of impact topic. The method used is quasi-experimental using Posttest Only Control Group Design. The study was conducted at Pangudi Luhur St. Yosef Surakarta High School with the sample consisting of 57 students from two classes X Mipa. One class with virtual laboratory and electronic student worksheet treatment assisted by liveworksheets using the problem-solving learning method and the other class with discussion and lecture treatment without electronic student worksheets. Based on the independent statistical test sample t-test, the results were obtained that electronic student worksheets based on liveworksheets with a problem-solving learning model was proven to be effective in improving data literacy skills in physics learning of momentum topic. Student response results obtained results in the excellent category.

Key Words: electronic student worksheet; liveworksheets; data literacy

[PED15]

Development of Parabolic Motion Practicum Tool as a Concept Visualization Media

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Abstract. *This paper aims to develop a simple practicum tool for parabolic motion as a medium for visualizing concepts. The making of this practicum tool is designed with two parts, namely the core and the support. The design at the core has a thrower and a protractor which is used as an angle adjuster. Then on the support, a simple design is made with measuring tools so that it is easy to adjust the height of the thrower. The main material for making props is Dutch teak wood which has a smooth and soft texture. To test the ability of the practicum tool, experiments were carried out with variations in height (40, 70, 100) cm, as well as variations in angles (16^0, 23^0, 33^0). Data retrieval is done by recording the experimental process, then the recorded video is analyzed using Video Tracker. The results obtained show that the greater the angle and height, the smaller the initial velocity of the object. This is in accordance with the results of the v_x and $v_y$analysis using the Tracker application.*

[PED16]

Development of Physics Websites Based on STEM Assisted of Google Sites on Momentum and Impulse Materials to Improve Creative Thinking Skills

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Abstract. Goals of this study to determine effect of applying physics websites based on STEM assisted of Google Sites to advance student's creative thinking skills for momentum and impulse materials. Method in this research is R&D by using ADDIE Models, and for experimental using one group research design pretest-posttest design. Collecting data technique are questionnaire and instrument test (pretest and posttest). The Data was obtained in SMA Negeri 1 Berau, with the respondent in this study 32 students from X MIPA 1, data analyzed by Software IBM SPSS Statistics 25 for Descriptive statistics, Sign Test and Reliability test. The research results showed that the instrument which have been developed was reliable. the results obtained that the website developed is practical for learning. The treatment given is able to advance students' creative thinking skills, which showed from the high average post-test score compared to the pre-test. The Profile Student's creative thinking skills each indicator showing that for indicator originality, flexibility, and elaboration has increase, but there is no difference value for indicator fluency.

Keywords: Physics Websites, STEM, Google Sites, Creative Thinking Skills

[PED17]

DEVELOPMENT OF SELF-ASSESSMENT INSTRUMENTS TO MEASURE THE SELF-CONCEPT AND THE MORAL OF STUDENTS IN PHYSICS LEARNING

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Abstract. The purpose of this study was to produce a self-assessment instrument to measure students' self-concept and morals in valid and reliable physics learning. The research method used is the Research and Development (R&D) method with a 4D development model (define, design, develop and disseminate). In this study, the model used is limited to the 3D stage (define, design and develop). The assessment instrument developed was 15 items which were analyzed for content validity using the V-Aiken method. While item analysis using Quest. The results of the instrument validation were validated by three validators resulting in a valid instrument with high validity criteria. And item analysis using Quest resulted in the INFIT MNSQ value of 0.64 – 1.36. The value is partly outside the range of provisions, so that some items do not fit the model. The item difficulty level is in the medium category, and the item reliability value is in the medium category, the case reliability value is in the high category.

Keywords: Self Assessment, Self Concept, Moral

[PED18]

Android Physics e-Module on Newton's Gravity and Planetary Motion Materials to Improve Students' Concept Understanding

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Abstract. This study aims to develop and determine the effect of the development of the *Android* -assisted physics module on Newton's gravity and planetary motion on increasing students' conceptual understanding. This research is an experimental research using the *One Group* research design *pretest-posttest design* . The research was conducted at SMAN 2 Kerinci. The sample in the study was 33 students. The media and test instruments given have been validated by two validators. The data obtained are the results of the students' pre-test and post-test which were analyzed using IBM Statistical SPSS 25 and obtained the average score, ui *sign -Test results* and statistical tests. Data analysis used IBM Statistical SPSS 25. Based on the data obtained, the average *pretest* score was 60.78 while the *post-test* average was 80.63. Statistical tests using *the Sign Test* obtained of 0.00. Because < 0.05, H $_{o\ is}$ rejected, so that there is an increase in students' understanding of concepts after using the *Android* -assisted physics module teaching materials on Newton's gravity and Planetary Motion that were developed. .

[PED19]

Modification of Team Games Tournament Learning Strategy for Collaboration and Communication Skills in Physics Learning

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Abstract. Collaboration and communication are two important skills that must be possessed by students today. This can be obtained through the process of learning physics with team games tournament learning strategies. The purpose of this research is to produce a modified TGT learning strategy in physics learning that is effective for students' collaboration and communication skills. The research method used is a mixed method with a concurrent embedded strategy. The sample of this study was 33 students of class XI MIPA SMA Negeri 4 Yogyakarta. Data collection techniques were carried out using observation sheets, assessment questionnaires between friends, and student response questionnaires. The results of this study include: 1) The modified TGT learning strategy is carried out in 4 stages, namely Class presentation, Studying in groups or teams, Playing games & tournaments and Team recognition, 2) Collaboration and communication skills appear in the physics learning process with TGT learning strategies. In the process, it even experienced an increase in the appearance of the ability indicator. At the first meeting the average score for collaboration was at 3.309 while the second meeting was at 3,418. The collaborative attitude has a score of 3,328 for the first meeting and 3.51 for the second meeting. At the first meeting the indicator of collaboration ability appeared at 76.67% while the second meeting increased to 80.3%. In the collaboration capability, the indicator appears by 70.2% at the first meeting and increases to 81.31% at the second meeting. The conclusion of this study is that the modified TGT learning strategy in physics learning can be used to help train students' collaboration and communication skills.

[PED20]

The Effect of STEM-Based Vertical Downward Student Worksheet Application on Students' Self Efficacy and Cognitive Learning Outcomes

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Abstract. This quasi-experimental research with non-equivalent pretest-posttest control group design aims to determine the effect of applying STEM-based Student Worksheet Downward Vertical Movement on self-efficacy and student cognitive learning outcomes. The population in this study were all class X SMA Negeri 1 Suro in the academic year 2022/2023. The research sample was obtained through cluster random sampling method. Class X IPA 2 is an experimental class, carrying out learning using STEM-based student worksheet while class X IPA 1 uses the interactive lecture method as the control class. The instruments used to measure students' self-efficacy are questionnaires and observation sheets. The test is used to measure students' cognitive learning outcomes. The data analysis technique used is the Wilcoxson test to determine the difference between the results of the level of self-efficacy and student cognitive learning outcomes for the pre-test and post-test, the Mann Whitney U test to determine whether there is a difference in the effect of applying STEM-based worksheets and interactive lecture methods in learning on students' cognitive learning outcomes. The results showed that there was a significant effect on the application of the STEM-based student worksheet Vertical Downward Movement on students' self-efficacy, but there was no effect of the interactive lecture method on students' self-efficacy levels. The results also show that there is no significant difference between the cognitive learning outcomes of students who apply STEM-based student worksheets and interactive lecture method learning.

[PED21]

Meta-Analysis of The Use of Augmented Reality in Physics Learning

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Abstract. This study aims to analyze the effect of using Augmented Reality (AR) on physics learning. This study uses a meta-analysis method from 20 journals. The journals used include international journals, national journals, and international proceedings. The analysis in 20 journals is seen regarding education level, physics material, and media types. The results of this study indicated that the effect size was in the medium to a high category based on education level. The results show that the effect size of physical materials in junior high school is in the middle and high categories. The effect sizes of high school physics materials are divided into low, medium, and high. The effect Size value of Physics materials in Higher Education is low, medium, and high. Finally, the study's results based on the type of media used showed the Effect Size value high category.

Keywords: Augmented Reality, Meta-Analysis

[PED22]

Application of Integrated PhET E-LKPD Material for Simple Harmonic Vibration to Improve Students' Physics Learning Output

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Abstract. The application of PhET-integrated E-LKPD on simple harmonic vibration material to improve students' physics learning outcomes. This study aims to determine the effect of applying PhET simulation media and to improve students' physics learning outcomes. The analysis was carried out using an independent t-test to see differences in learning outcomes in the experimental class which was taught using the integrated e-LKPD PhET simulation and the control class which was taught using commonly used media. In its application, there are 2 PhET simulations related to harmonic vibrations, namely Masses and Springs related to springs and Lab pendulums related to simple swings. The design in this study is a pretest – posttest control group design. This is because the learning outcomes data were obtained from the pre-test and post-test conducted. Based on the research conducted, it was found that the PhET-integrated E-LKPD media is feasible to use to improve student learning outcomes. There are significant learning outcomes in classes that are taught using the PhET-integrated e-LKPD on simple harmonic vibration material. These results are based on the GLM-Manova test which shows a significance value of <0.05. Learning outcomes increased significantly also seen higher in the experimental class based on the Pairwise Comparison table obtained from the analysis of pre-test and post-test scores. There are significant learning outcomes in classes that are taught using the PhET-integrated e-LKPD on simple harmonic vibration material. These results are based on the GLM-Manova test which shows a significance value of <0.05. Learning outcomes increased significantly also seen higher in the experimental class based on the Pairwise Comparison table obtained from the analysis of pre-test and post-test scores. There are significant learning outcomes in classes that are taught using the PhET-integrated e-LKPD on simple harmonic vibration material. These results are based on the GLM-Manova test which shows a significance value of <0.05. Learning outcomes increased significantly also seen higher in the experimental class based on the Pairwise Comparison table obtained from the analysis of pre-test and post-test scores.

[PED23]

Simulation of Uranium-238 Radioactive Decay with Virtual Basic Application of Microsoft Excel

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Abstract. Uranium-238 is one of the elements of radioactive with atomic number 92 and has a time beak of 4.51×10^9 years. This study aims to simulate core decay radioactive Elemental Uranium-238 based on Visual Basic Applications (VBA) of Microsoft Excel. The simulation starts from formulation problems, data collection, coding, validation, input data, simulation, evaluation, and improvement. The simulation results showed that the number of atoms of decay transmutation and graph exponential decrease in the relationship between time decay to the amount of atom residue. This research can be used as a reference for the teacher as learning media, particularly the radioactivity concept. More broadly, the use VBA of Microsoft Excel to create simulations to be applied to other physics concepts.

Keywords— simulation, radioactive decay, uranium-238

[PED24]

Implementation of Augmented Reality Learning Media: Its impact on the problem-solving ability of direct current electricity

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Abstract. This paper aims to determine the effectiveness of using augmented reality media in solving problems of direct current physics (DC), quasi-experimental research methods with the matching-only pretest-posttest control group design with experimental class samples using augmented reality media and student worksheet control. as a guide, the pretest and post-test data obtained were analyzed through SPSS 25.0, namely the first with the Shapiro Wilk normality test with the aim of the data being normally distributed with the provision that the sig value <0.05, the paired sample t test to determine the significance level of media effectiveness with sig level = 5% chance, N-Gain to determine the difference between the experiment and control, it can be concluded that the use of augmented reality media is effective in solving direct current (DC) electricity problems, it can be seen that the paired t test was carried out, it can be concluded that there are differences before thepretest and post-test are used augmented reality media on kete In addition, direct current (DC) electricity problem solving skills can also be seen from the average value of thepretest experiment and post-test. Furthermore, the N-Gain test between experiments can be used to see an increase in the average. Including the high class, Augmented reality media has an impact on learning problem-solving skills in each indicator, both experimental and control

[PED25]

Development of Electronic Student Worksheet Integrated PhET on Simple Harmonic Motion Materials to Improve Learning Outcomes

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Abstract. This study aims to produce a suitable electronic student worksheet integrated PhET to improve learning outcomes on simple harmonic motion material at 2 Senior High School Sleman. The subjects in this study were students of class X MIPA in the even semester of 2 Senior High School Sleman for the academic year 2021/2022. The research method used is a research and development (R&D) method with a 4D development model (define, design, develop, and disseminate). The product of this research is an electronic student worksheet which is integrated with PhET. The research data obtained were then analyzed descriptively qualitatively. Based on the results of the feasibility assessment and data analysis carried out, it can be concluded that the electronic student worksheet integrated PhET on simple harmonic motion material is feasible to use.

[PED26]

DEVELOPMENT OF THE "5E" LEARNING CYCLE E-MODULE ON MOMENTUM AND IMPULSE MATERIALS TO INCREASE MOTIVATION AND COGNITIVE LEARNING OUTCOMES

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Abstract. This study aims to develop a learning media in the form of an e-module based on the learning cycle "5E" to improve motivation and learning outcomes of Senior High School Nahdlatul Wathan Suralaga students with the topic of momentum and impulse. This type of research is development research (R&D). The development model used is the ADDIE development model, namely Analyze, Design, Develop, Implement and Evaluate. The subjects of this study were students of class X-MIPA 1 totaling 32 students. The research instruments used were validation sheets, learning motivation questionnaires and learning outcomes tests. The results showed that the e-module based on learning cycle 5e developed was categorized as very valid with an average score of 3.65, and for the practicality of the e-module with a very practical category it had a score of 3.72, meanwhile, the effectiveness of the e-module in increasing learning motivation in the quite effective category has an N-Gain score of 56.4% and the effectiveness of the e-module in improving student learning outcomes in the moderately effective category has an N-Gain score of 61.95%. The conclusion of this study is that the e-module based on the learning cycle "5E" is suitable to be used to increase students' motivation and learning outcomes.

[PED27]

Development of Simple Physics WorkBoard as Contextualization of Moment of Force Theory

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Abstract. Contextualization of a theory in physics is one way of understanding the theory by placing it on props that can prove its truth so that it can be accepted and stored by memory. This study aims to produce a set of teaching aids in the form of a workboard, which is expected to be able to support the contextualization function of the moment theory of force. The components that make up the workboard use simple tools. This workboard is then empirically tested to determine its accuracy by varying the force arm and load to be used. The test results show that the value of the moment of force will be greater if the value of the arm of the force and the load is greater. This proof is obtained by the presence of a positive difference in the value of the force moment between the force arm (0.09 m) and the force arm (0.075 m), on object 1 of 0.00344 Nm, object 2 of 0.0107 Nm, and object 3 of 0, 0334 Nm. In general, the results

[PED28]

Development of Physics Electronic Students Worksheet Using Problem Based Learning Model Assisted by Phet to Improve Students' Mathematical Representation

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Abstract. This study aims to: 1) describe the development procedures and results; 2) knowing the feasibility of physics electronic student worksheet; and 3) see the achievement of increasing students mathematical representation capabilities after using the product. The physics electronic student worksheets media was developed following the 4D model and implemented at SMAN 1 Baturetno. The research subjects were 3 physics teacher, and 19 students in small group trials. Expert validation states the physics electronic student worksheets is valid and worthy to be tested in a small group. Analysis of the student test results in the small group using the scoring guideline for mathematical representation capabilities. The results shows that development of physics electronic student worksheets media with a problem based learning model assisted by phet interactive simulation on work and energy learning has been successfully carried out and follows the 4D development model. After validation, it is known that the developed physics electronic student worksheets is declared valid so that it is suitable to be used as one of the media in the work and energy learning process. The results of the N Gain analysis show that there is an increase in mathematical representation ability after using the developed physics electronic student worksheets, so it can be said that the physics electronic student worksheets media with a problem based learning model is effective for improving the mathematical representation.

[PED29]

APPLICATION OF THE SNOWBALL THROWING LEARNING MODEL TO MTSN STUDENTS TO INCREASE ACTIVENESS AND SCIENCE COGNITIVE LEARNING OUTCOMES ON SUBSTANCES AND THEIR CHARACTERISTICS

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Abstract. This study aims to find out how much influence the application of the Snowball Throwing Learning Model on MTsN Students to Increase Activeness and Science Cognitive Learning Outcomes on Substances and Their Characteristics. This research is a classroom action research with the aim of overcoming problems in the classroom by applying the snowball throwing learning model, then reflecting on the results of the action. This research took place in two cycles. Each cycle consists of three meetings, each cycle is carried out through three stages, namely: the planning stage, the implementation stage, and the reporting stage. The subjects of this study were students of class VII D at MTsN 9 Bantul , totaling 31 students consisting of 15 female students and 16 male students . The time of the research is from August to December 2021. The data collection methods used are observation, interviews, documentation and learning outcomes tests. The data obtained in the field were analyzed using qualitative analysis techniques. The results showed that the application of the snowball throwing learning model could increase the activeness and learning outcomes of students. This is indicated by the activeness of students while the teacher delivers the material, such as paying attention to the teacher explaining, taking notes, asking questions, and answering the average increase. The average learning outcomes increased by 13.74 points, from an average of 66.29 in conventional learning to 80.03 at the end of the action. The highest score increased, namely 85 in conventional learning, to 86 and 90 in cycles I and II.

[PED30]

IMPLEMENTATION OF DIGITAL CAMERA SOFTWARE TO DETERMINE LIQUID VISCOSITY VALUE

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Abstract. This study aims to examine the value of the viscosity of a particular liquid by utilizing a digital camera. By utilizing video converter to jpg software, video recordings of collision events can be extracted into a collection of images. The image is then analyzed to find the terminal velocity acting on the object when it is dropped in a liquid: Viscosity of honey, = 15,073 . ; Cooking oil viscosity, = 0.294 . ; Sunlight viscosity, = 4.685 . ; Thus a digital camera can be used as a "motion sensor" to help calculate the coefficient of restitution in a careful manner, especially at the high school level.

Keywords: fluid, viscosity Digital camera

[PED31]

Development of E-Student Worksheet Problem Based Learning Model on Work and Energy to Improve Cognitive Physics Ability of Students

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Abstract. This study aims to develop e-student worksheet which refers to a valid and effective problem-based learning model. The method in this research is RnD (Research and Development). This research includes development research that uses a 4D development model (Define, Design, Develop, and Dissiminate). The product of this research is e-student worksheet problem based learning model. The learning tools were validated by three practitioner validators by high school teachers. The test subjects were students of class X MIPA 1 SMAN 1 Baturetno. The results showed that 1) e-student worksheetproblem based learning model was included in the valid category, 2) e-student worksheet problem based learning model was effectively used in online learning.

[PED31]

Development of E-Student Worksheet Problem Based Learning Model on Work and Energy to Improve Cognitive Physics Ability of Students

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Abstract. This study aims to develop e-student worksheet which refers to a valid and effective problem-based learning model. The method in this research is RnD (Research and Development). This research includes development research that uses a 4D development model (Define, Design, Develop, and Dissiminate). The product of this research is e-student worksheet problem based learning model. The learning tools were validated by three practitioner validators by high school teachers. The test subjects were students of class X MIPA 1 SMAN 1 Baturetno. The results showed that 1) e-student worksheetproblem based learning model was included in the valid category, 2) e-student worksheet problem based learning model was effectively used in online learning.

[PED33]

Development Physics E-Book Straight Motion Material to Improve Problem Solving Ability of Class X SMK

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Abstract. This study aims to determine the effectiveness of the developed E-Book in improving the physics problem solving ability of students of class X SMK. This research is a development research using a 4D model. The resulting e-book is an android-based application that presents concepts related to straight motion material. This research was conducted at SMK St. Bhartholomew Fort Java. Based on the results of the study showed that there was a difference between the results of the pretest and posttest students' problem solving abilities after being given treatment. The treatment in this case is given at the time of learning activities. Measurement of physics problem solving ability is carried out to test the effectiveness of the E-Book that will be developed. The results of the N-Gain test in the control class (lectures) are 30.15%, based on the criteria table, it shows that learning with the lecture method is less effective. Meanwhile, the results of the N-Gain test in the experimental class are 70.12%, based on the criteria table, it shows that learning by using E-Book teaching materials is quite effective. Thus, the developed E-Book media is effective and suitable for students to use in learning.

[PED34]

Development of Mind Mapping Worksheet Topics of Momentum and Impulse to Improve Critical Thinking Skills of High School Students

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Abstract. This research is a development research that aims to determine the influence of Mindscaping worksheet on improving students' critical thinking skills on the topic of momentum and impulse. The results obtained for students' critical thinking skills, namely based on the calculation of the N-gain score, showed that the average N-gain score for the experimental class was 18.2% and this was at the interval of the ineffective category. As for the control class, an average n-gain score of 12.06% was obtained and this score was at the interval of the ineffective category. Based on these results, it can be concluded that the use of mindscaping worksheet on the subject of momentum and impulses does not have an influence on improving students' critical thinking skills.

[PED35]

DEVELOPMENT OF E-LKPD BASED ON PROBLEM BASED LEARNING (PBL) ASSISTANT LIVE WORKSHEETS MODEL ON WAVE MATERIALS TO IMPROVE CONCEPT UNDERSTANDING OF CLASS XI SMA

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Abstract. The printed Student Worksheet (LKPD) given by the teacher has not been able to make students understand the mechanical wave material because it only contains an explanation of the material delivered through writing. Therefore, innovative and interactive learning media are needed that are able to help students understand the concept of waves, submaterials of mechanical waves. This study aims to: 1) Produce e-LKPD media based on problem based learning models assisted by live worksheets on mechanical wave material to improve understanding of concepts for high school students in class XI. 2) knowing the effectiveness of e-LKPD media with the help of live worksheets on mechanical wave material to improve understanding of the concepts of class XI students. This research is a type of research and development (*Research and Development*). The development model used is a 4D model with the steps of *define*, *design*, *develop and disseminate*. This research was conducted at SMAN 1 Baitussalam using 22 samples of modeling field trials and 22 samples of implementation field trials. The data collection tool was obtained from media validation questionnaires, *pretest* and *posttest questions*. The results of material and media expert validation show that the worksheet-based e-LKPD developed is very feasible. The N-Gain analysis shows that PBL-based e-LKPD assisted by Live worksheets has effectiveness in improving student learning outcomes. The results of the practicality analysis show that e LKPD is very practical. Thus, the *liveworksheet* that was developed is suitable for use in learning wave mechanics.

Keywords: e-LKPD Media, PBL, Live worksheets, Mechanical Waves

[PED36]

Integrating *Merdeka Belajar* Curriculum in Physics Context to Developing Scientific Literacy of Senior High School

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Abstract. literacy is defined as the ability to reason using language. Literacy is one of the crucial issues in education today to face the challenges of technological breakthroughs developing rapidly in the 21st century. Literacy in Physics as one of the subjects in the science family can be measured through scientific literacy. Countries whose citizens have high scientific literacy can make appropriate Science, technology, and social policies. In relation to scientific literacy, PISA focuses on several dimensions or areas of measurement. One of them is scientific competence. Through the Ministry of Education and Culture, the Indonesian government issued some regulations related to the government's assessment standards by replacing the National Examination (UN) with the National Assessment (AN). Furthermore, in AN, students' cognitive learning outcomes include reading literacy and numeracy as measured through the Minimum Competency Assessment (AKM). In this paper, it is explained how to integrate the Merdeka Belajar Curriculum in developing Scientific Literacy test instruments that include Phases E and F so that they can be used as a reference for teachers in training their students to improve Scientific Literacy skills.

[PED37]

Efforts to Improve Physics Learning Outcomes by Applying Numerical Literacy Based on Guided Inquiry Worksheets on Work and Simple Planes Learning

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Abstract. The purpose of this study was to determine the improvement of student learning outcomes, student activities, teacher's ability to direct learning, and student responses to the application of numerical literacy based on guided inquiry worksheets in the learning process. This type of research is Classroom Action Research (CAR). The subjects in this study were students of class VIII A of Junior High School 1 Rawamerta in the 2022/2023 academic year with a total of 35 students. The data collection instruments used in the study were observation sheets, tests and questionnaires, all of which were analyzed by descriptive statistics. The results showed that (1) the percentage of individual completeness as a whole increased from cycle I to cycle II from 63% to 83%, (2) There was an increase in student activity in the learning process, (3) there was an increase in the ability of teachers to manage learning from the moderate category. good to good (4) student responses tend to be positive where 97% said they were happy and understood with the application of numerical literacy based on guided inquiry worksheets. From this research, it can be concluded that the application of numerical literacy based on guided inquiry worksheets can improve physics learning outcomes for class VIII A students of Junior High School 1 Rawamerta on the subject of work and simple planes.

[PED38]

Development of Interactive Video on Straight Motion Materials to Improve Concept Understanding of High School Students

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Abstract. This research aims to create interactive educational video media using straight motion material. The research method used in this study is the 4D Thiagarajan research and development method. The design of the video media validation test was carried out with the involvement of physical materials experts: a physics lecturer and a physics teacher. Data were collected by a non-testing method using the questionnaire-packaged Validation Sheet instrument. A data analysis technique was performed to measure the feasibility of the learning media device using the V-Aiken equation. It categorizes the results of media feasibility checks by materials physics. Based on the validation test results, we can say that the developed interactive video media is suitable for limited trials.

[PED39]

Review on Research and Development of Physics Assessment Instruments on Momentum and Impulse Topic

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Abstract. Momentum and impulse are essential topics in physics. However, students still have the fairly low ability in this topic. Learning innovation, especially innovation in the field of assessment, can be one solution to this problem. This study aims to analyze the characteristics of the development of learning assessment instruments on the topic of momentum and impulse in terms of the instrument development method, instrument form, item analysis method, the measured ability attributes as well as to find out the research and development opportunities of this topic instrument in the future. These goals were answered by conducting a study using descriptive content analysis on Google Scholar indexed articles related to the development of assessment instruments on momentum and impulse topic. From this study, it can be seen that many assessment instruments on the topic of momentum and impulse have been developed. These instruments were developed with various procedures, analytical methods, instrument forms, and measured ability. However, there are still opportunities for further development. Opportunities for further development of this instrument are related to technology-based instruments to integrate assessment with learning. This study is expected to provide further implications for the emergence of learning innovations, especially new physics learning assessment innovations, so they can assist in improving students' quality and learning outcomes on momentum and impulse topics.

[PED40]

The Validity of Fister Apps based on Augmented Reality for Electrical Enggineering Students

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Abstract. This research is a development research using the ASSURE development model (analyze, state objectives, select methods/media/ and materials, utilize media or materials, require learner participation, and evaluate and revise) to improvement learning media for Apllied Physic as subject materials in electrical engineering. The aims of this study are: 1) to describe part of the Fister application as an augmented reality (AR)-based learning media, and 2) to describe the validation results of augmented reality-based learning media. The instrument used in this study is a non-test instrument in the form of a questionnaire using a Likert scale. The analysis used is in the form of quantitative analysis with the help of the SPSS program which is then described qualitatively. The results of the research are: 1) The Fister application developed consists of applications that can be run on AR-based smartphones developed with the Unity program, besides that a practical guide book using AR-based applications is also made, 2) the validation results from the validator show an average score of 4.27 is in the very valid category, which means it can be used as a learning medium in Applied Physics courses in the classroom. The reliability of the validator analyzed using Cronbarch Alpha was 0.799 that means based on the categorization including sufficient reliability.

[PED41]

Pengembangan LKPD Untuk Pembelajaran Fisika Dalam Peningkatan Sikap Ilmiah dan Hasil Belajar Materi Momentum dan Impuls

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Abstract. This research purpose: (1) to determine the feasibility of LKPD; (2) to find out the improvement of scientific attitude skills by using the developed LKPD media; (3) find out from student learning outcomes using the LKPD media that has been developed. This research includes research and development (R&D). The design for this main product trial uses LKPD media) which was carried out in class X SMAN 1 Kalasan as an experimental class. The technique of collecting data in this study was using observation sheets, questionnaires or questionnaires and also written tests. The results of the development and research state that (1) LKPD is suitable for use in learning physics; (2) there is an increase in scientific attitude by an average of 88.52%; and (3) an increase in learning outcomes before using LKPD 64.12 and after using LKPD 84.85.
Keywords: LKPD, critical thinking skills, learning outcomes.

[PED42]

Learning Media for Straight Motion on Flat Planes and Sloping Planes Based on Arduino with Infrared Sensors E18-D80NK

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Abstract. Learning innovations can be used with learning media by the teacher. The limited equipment in the laboratory is often an obstacle in practical activities for straight motion material. This study aims to create a learning media for physics material in straight motion using an infrared sensor. This media uses Arduino nano as a microcontroller, E18-D80NK infrared sensor, servo motor, 16x2 LCD, box, audio jack socket, audio jack, switch, and a set of tracks. The research method used is Define, Design, and Develop. The results of the data in this experiment are in the form of time with an accuracy of 0.01 seconds. The results of time measurements have 99% accuracy of measurement so that they can be used to analyze the velocity of objects and graph the relationship between displacement and time in straight motion in a flat or inclined plane.

[PED43]

Augmented Reality (AR) Application Design and Development of Momentum, Impulse, and Collision Materials

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Abstract. The purpose of this research is to develop Augmented Reality (AR) on the collision material. This research is a development research (R&D) with 4D stages, namely Define, Design, Develop, Dissemination. Augmented Reality developed in the form of 3-dimensional images on perfectly elastic collision materials, partially elastic collisions, and completely inelastic collisions. This application also has an evaluation test that can directly display the score. Based on the results of product validation, it was concluded that the Augmented Reality (AR) application on the collision material was categorized as very good by practitioners (teachers) with an average score of 0.87. The result of the development is an android-based application.

[PED44]

PENGEMBANGAN LKPD BERBASIS PROBLEM BASED LEARNING PADA PEMBELAJARAN FISIKA UNTUK MENINGKATKAN SIKAP ILMIAH DAN HASIL BELAJAR MATERIMOMENTUM DAN IMPULS

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Abstrak

Penelian ini memliki tujuan : (1) untuk mengetahui mengetahui kelayakan LKPD problem based learning; (2) untuk mengetahui peningkatandari keterampilan sikap ilimiah dengan cara menggunakan media LKPD yang telah dikembangkan; (3) mengetahui dari hasil belajar siswa dengan menggunakan media LKPD yang telah dikembangkan. Pada penelitian ini kedalam termaksud *research and development* (R&D). desain untuk uji coba produk utama ini menggunakan media LKPD *problem based learning* (PBL) yang dilakukan pada kelas X SMAN 1Kalasan sebagai kelas eksperimen. Teknik pengumpulan data penelitian ini dengan menggunakan lembar observasi, angket atau kuisioner dan juga tes yang tertulis. Hasil pengembangan dan penelitian menyatakan bahwa (1)LKPD berbasis PBL layak digunakan dalam pembelajaran fisika; (2) terdapat peningkatan sikap ilmiah rata-rata 88,52%; dan (3) terjadi peningkatan hasil belajar sebelum menggunakan LKPD 64,12 dan setelah menggunakan LKPD 84,85.

Kata kunci : *LKPD problem based learning, keterampilan berpikir kritis, hasil belajar*

[PED45]

DEVELOPMENT OF HIGHER ORDER THINKING SKILL (HOTS) TEST QUESTIONS ON FLUID MATERIALS FOR SMA/MA

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Abstract

This study aims to determine the validity and reliability of the Higher Order Thinking Skill (HOTS) test questions on fluid materials for SMA/MA. This study uses research and development methods (Research and Development). This study developed a two-tier multiple choice test of 10 items that can measure students' higher-order thinking skills and mastery of concepts. The development is carried out on physics material with the theme "Fluids (static and dynamic fluids)" class XI MIA 2 MAN 1 Temanggung. In this study, an analysis of the theoretical validity and reliability was carried out. To find out the results of the theoretical validity of the performance assessment that has been developed, first validation is carried out by 2 physics expert lecturers and 1 Physics teacher at MAN 1 Temanggung on the design of the practicum performance assessment instrument that has been made. The theoretical validity assessment indicators include: 1) content validity 2) construct validity and 3) language validity. Analysis of the theoretical validity of the instrument was determined using the Likert scale criteria.

Keywords: Test Questions, Higher Order Thinking Skill (HOTS), Fluid.

[PED46]

The Use of STEAM-Project-Based Learning to Enhance Students Critical Thinking Skills in Physics Magnifying Glass Project

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Abstract. This study aims to produce a students worksheet based on STEAM-PjBL on appropriate optical instrument materials to improve the critical thinking skills of class XI students. This research is a Research and Development (sR&D) with procedural adaptation procedures for developing 4-D models (Four-D Models). The product development procedure with the 4-D model in this study consists of 4 stages, namely: Define, Design, Develop and Disseminate. The research instruments used in this study were observation and interview sheets, research instrument validation sheets, student response sheets, products in the form of students worksheet based on STEAM-PjBL, and critical thinking ability question sheets. The results showed that the students worksheet based on STEAM-PjBL was feasible to use in the physics learning process. The developed students worksheet based on STEAM-PjBL product also has a significant effect on improving the critical thinking skills of class XI students.

[PED47]

Training Numerical Skills of Student Using Electronic Modul in Distance Learning Activities

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Abstract. This study aims to determine the effectiveness of physics learning activities using electronic modules with augmented reality-based on the concept of force and energy on numeracy skills of student. The augmented reality module used has been validated by experts and is in excellent criteria and is feasible to use. The implementation phase of learning was excecuted in three meetings using the quasi-experimental method. The learning process is implemented by blended learning with the teacher as a facilitator who is always actively accompanying students during learning activities. The data of this study were collected using a test instrument in the form of five items of numeracy skills with given at the pretest and post-test. The pretest and post-test data were analyzed using normalized gain (N-gain) and statistical tests were used as indicators of increasing students' numeracy skills. It can be seen, the data showed an improvment in the implementation of learning in the low category with a moderately interpreted N-gain value. In recapitulate, augmented reality-based electronic modules are effective in improving students' numeracy skills through blended learning inteructions.

[PED48]

Effectiveness of e-Worksheet assisted by PhET Simulation with Problem-Based Learning Model to Improve Problem-Solving Skills in Light Waves

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Abstract. This study aims to determine the effectiveness of the e-worksheet supported by PhET simulation with the Problem Based Learning (PBL) model in improving problem-solving skills. The study was conducted in April-May 2022 in high school class XI IPA SMAN 1 Balong on 62 students. The class study was divided into two classes, namely the control class as many as 32 students use e-worksheet without PhET, and the experimental class as many as 32 students use e-worksheet with PhET simulation. The Experiment design used quasi-experimental with a control group pretest post-test design with Research and Development (R&D) research methods. The analytical technique used is V Aiken to analyze the level of validity of the instrument and use ACCES analysis in each step of problem-solving in determining students' problem-solving skills. From the results of the study, it was found that in the experimental class which was given treatment with an e-worksheet assisted by PhET simulation, the value of students' problem-solving skills was at a high level while students in the control class with other treatments gave the value of students' problem-solving skills at a moderate level. The developed e-worksheet is worth using and is effective in improving students' problem-solving skills.

[PED49]

Analysis of Physics Teaching Subjects That Can Be Potentially Taught Using Bifocal Modeling Practicum

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Abstract. A research has been carried out to obtain the overviews of physics teaching subjects that can be potentially taught using bifocal modeling practicum. This research was done descriptively, in which the data was collected through observation to physics subjects found in the physics textbooks that is in accordance with the core competencies and basic competencies of physics for senior high schools students found in the Regulation of Education and Culture Minister 24/2016. The criteria used as the basis of analysis in this research are bifocal modeling framework criteria, the availability of laboratory tools, instruments, and kits; the ease of obtaining materials for developing a real experiment; and the availability of sensor modules that can be used to develop the tools of bifocal modeling-based physics practicum. Based on the data analysis, it was found that the physics subjects that can be potentially taught using bifocal modeling practicum are harmonic oscillation and kinetic theory of gases. The concept of physics on harmonic oscillation mostly suitable to be taught using bifocal modeling practicum is displacement of harmonic oscillation. The real experiment of the concept should be oscillation of an object on a spring connected to a computerized experiment which displays the values of quantities dealing with displacement of harmonic oscillation and visualizes a sinusoidal graph representing the relationship between displacement and time based on sensor real time monitoring. The sensor module may be used is PIR motion sensor. Meanwhile, the concepts of physics on kinetic theory of gases mostly suitable to be taught using bifocal modeling practicum are gas laws and kinetic theory of gas. The real experiment of the concepts should be Boyle-Gay Lussac law experiment connected to a computerized experiment which displays the values of kinetic theory of gas and visualizes the condition of gas particles when the temperature of gas changes. The sensor modules may be used are MQ-2 gas sensor, PIR motion sensor, and water temperature sensor.

Keywords: Physics Subjects, Bifocal Modeling Framework, Bifocal Modeling Practicum.

[PED50]

EFFORTS TO IMPROVE ACTIVENESS AND LEARNING OUTCOMES OF STUDENTS OF CLASS X IPA 1 SMA NEGERI 1 PUNDONG USING STAD-TYPE COOPERATIVE LEARNING MODEL

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Abstract. This study aims at improving students' activeness in the process of learning Physics concepts of Work and Energy as well as improving learning outcomes of Physics students in class X IPA 1 SMA Negeri 1 Pundong using the STAD type cooperative learning model. Classroom Action Research is implemented in this research. It was conducted in two cycles, each cycle consists of three meetings. The stages carried out in each cycle involve planning, implementation, observation, and reflection. The research subjects were 25 students of class X IPA 1 SMA Negeri 1 Pundong, while the object of the research was students' activeness and learning outcomes. Data collection techniques comprise observation, documentation, and learning outcomes tests. The data obtained were analyzed using qualitative method. The results showed that the use of the STAD type cooperative learning model could increase students' activeness and learning outcomes in Physics. In the first cycle of the first meeting, students' activeness only reached 69.17% ("moderately active" category), while at the second meeting the students' activeness increased to 72.37% ("active" category). The first meeting of the second cycle showed the percentage of activeness increased again to 79.12%, and at the second meeting it had reached 81.00%. The students' Physics learning outcomes in the first cycle showed that 17 of 25 (68%) students have reached the minimum mastery criterion (KKM) while in the second cycle, students who have reached the KKM increased to 21 students (84%), an increase of 16%. With these results, the implementation of the STAD type cooperative model can increase students' activeness and Physics learning outcomes on the concept of Work and Energy.

Keywords: Students' activeness, learning outcomes, STAD type model

[PED51]

APPLICATION OF PHSYICS *CROSSWORD* ASSISTED E-BOOK MEDIA ON LEARNING INTEREST

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ABSTRACT: The aims of this study were (1) to determine students' interest in learning by using E-Book media (2) Student responses to crossword-assisted E-Book media. The research method used in this research is an experimental method with a pre-experimental design research form. The research subjects at SMK TAMANSISWA JETIS YOGYAKARTA are all students of class X TKR Department. In the use of media in learning physics, it helps students in understanding the concepts of physics. One of the media that can be used is physics crossword. The results showed that: (1) students' interest in learning increased based on the results of data analysis which reached 81.03%; (2) students' responses to E-Book media were 66.10 before e-books were applied and became 81.03 after E-Books were applied. The difference in the percentage of student responses from the pre-test and post-test showed an increase in the average interest in learning by 14.93 so that this learning media was said to have succeeded in increasing student interest in learning. The results showed that: (1) students' interest in learning increased based on the results of data analysis which reached 81.03%; (2) students' responses to E-Book media were 66.10 before e-books were applied and became 81.03 after E-Books were applied. The difference in the percentage of student responses from the pre-test and post-test showed an increase in the average interest in learning by 14.93 so that this learning media was said to have succeeded in increasing student interest in learning.

Keywords: E-book Media, Interest in Learning

[PED52]

Improving Teachers' Ability to Create Higher Order Thinking SkillQuestions Through the PHOTFIS Training Model

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Abstract. The purpose of this analysis is to analyze the effectiveness of the PHOTFIS Training model in improving the ability of Physics Teachers to compile Higher Order Thinking Skill (HOTS) questions. The number of teachers who will be involved in this study is as many as 37 physics teachers. Before the training agenda, participants fill out the pretest instruments. After the training is completed, participants fill in the posttest instrument. The data collection technique in this study used documentation. The data taken were teacher pretest and posttest sheets, where teachers were asked to compile HOTS questions. Then, the questions made by the teacher are analyzed theoretically, using a question item study sheet to obtain data on question items that meet the criteria in terms of initial information, material, construction, HOTS and language. The test of the assumptions of normality and homogeneity is met, so that a parametric hypothesis test is carried out (Paired Sample t test). The results of the t tests showed that the significance value was 0.001 so that Ho was rejected, meaning that there was a difference in the pretest and posttest values in the training carried out. This indicates that the quality of HOTS questions made by teachers has improved after attending training in the preparation of HOTS questions. The increase indicates that the training developed is effective in improving the competence of physics teachers in making HOTS questions. The PHOTFIS training model can be used as a training tool for relevant agencies to improve teacher competence.

[PED53]

IMPLEMENTATION OF *PROJECT BASED LEARNING* (PJBL) LEARNINGMODEL IN IMPROVING 21ST CENTURY 4C SKILLS

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Abstract. The examination expects to discover the execution of the Project-Based Learning (PjBL) learning model to further develop 21st-century 4C abilities. 4C abilities comprise decisive reasoning, cooperation, correspondence, and innovativeness. This exploration was led by understudies of class X science 1 numbering 35 understudies at Public Senior High School 107 Jakarta. The exploration strategy utilized in this review is class activity research as per Stephen Kemmis with a course of execution in 2 cycles, each cycle comprises of (arranging), activity (acting means to know the execution of Project-based learning models), perception (noticing) and reflection (reflecting).). The outcomes showed that the normal 21st-century ability score in cycle I score for 4C abilities were decisive reasoning 74.1%, coordinated effort 72.3%, correspondence 72.6% and imagination 74.3%. While the results in *cycle II* are *critical thinking* 84.6%, *collaboration* 80.1%,*communication* 80.3%, and *creativity* 81.8%. From the outcome, it can be obtained that students experience an improvement in 21st-century 4C skills with indicators of completion of a minimum of physical skills has been achieved by 75.00. As the result, it very well may be inferred that the use of the undertaking-based learning model (PjBL) can further develop the 4C abilities of the 21st century.

Keywords: *PjBL,* Classroom Action Research, Improving Skills 4C

[PED54]

The Effect of Reciprocal Teaching Learning in Achieving Students' Critical Thinking Ability on Parabolic Motion Material at SMAN 2 Wates

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Abstract. This study seeks to examine the impact of the reciprocal teaching-learning paradigm on students' critical thinking skills in class X at SMA Negeri 2 Wates during the academic year 2021/2022. This sort of research employs a non-equivalent control group design and is quasi-experimental. Class X MIPA SMA Negeri 2 Wates pupils comprised the population of this study, which included 108 students divided into three classes. Using a technique of random sampling, samples were obtained. The experimental group and the control group were then determined by random selection. Thus, the research sample consists of 36 students from class X MIPA 3 as the experimental group and 36 students from class X MIPA 1 as the control group. Twelve validated questions comprising a description test instrument were used to obtain data on students' critical thinking skills. The acquired data were then evaluated with a polled variance t-test. The analysis of the data yielded tcount = 3,073 > ttable price = 2,000 at a significance level of 5% and dk = 65. Consequently, it can be stated that the reciprocal teaching-learning paradigm affects the proficiency of critical thinking skills in physics. X = 0.504 in the experimental group, while X = 0.374 in the control group, based on the average value (mean) of critical thinking ability in physics. Based on the findings of this study, it can be concluded that the reciprocal teaching-learning model affects the critical thinking skills of class X SMA Negeri 2 Wates students in the academic year 2021/2022.

[PED55]

EFFORTS TO IMPROVE PHYSICAL LEARNING OUTCOMES WITH A *PROBLEM-SOLVING* LEARNING MODEL IN STUDENTS OF CLASS XI SCIENCE 1 PUBLIC SENIOR HIGH SCHOOL 107 JAKARTA

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Abstract. This research aims to improve the results of learning physics of students of class XI SCIENCE 1 Public Senior High School 107 Jakarta which amounted to 40 learners. The learning model used is problem-solving with the syntax: 1. Prepare a clear problem to solve, 2. Presenting problems, 3. Collect data or information that can be used to solve the problem, 4. Formulating a hypothesis, 5. Testing hypotheses. This research method is a class action research carried out in 2 cycles consisting of four main components, namely: 1). Planning, 2). Implementation of actions, 3). Observation, and 4). Reflection. Indicator the minimum completion criteria of learning outcomes is 75.00. The results of the study showed in cycle I the average score of learners' learning outcomes amounted to 67.53 with the percentage of the number of learners in the high category of 62.5% while in cycle II the average score of learners' learning outcomes amounted to 75.88 with the percentage of the number of learners in the high category of 85.71%. Thus, it can be concluded that the results of learning physics on the subject of temperature and heat, students can be improved through *the problem-solving* learning model.

Keywords: physics learning outcomes, Problem-solving, learning models

[PED56]

The Effectiveness of PhET-Assisted Inductive Thinking Learning Model onStudents' Critical Thinking Skills and Curiosity Attitudes

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Abstract. This study aims to determine the effectiveness of the PhET-assisted inductive thinking learning model on students' critical thinking skills and curiosity attitudes. This study is a quasi-experimental study using a pretest-posttest control group design. The study population is the entire 10th class for the department of mathematics and science at Senior High School State 1, Jetis, Bantul, Yogyakarta which amounts to 160 students. The study sample used a cluster random sampling technique. Data collection uses test techniques and non test (questionnaires) using description questions and questionnaires. The General Linear Model is used as a data analysis technique. The results showed that the PhET-assisted inductive thinking learning model: (1) effectively improves students' critical thinking skills and curiosity attitudes simultaneously with a large effect size. (2) effectively improve students' critical thinking skills with a large effect size. (3) does not have a great effect on the student's attitude of curiosity. In addition, judging from the improvement of critical thinking skills and students' curiosity attitudes, the inductive thinking learning model is more effective with a large effect size.

[PED57]

Development of LKPD Based on *Mind Mapping* Subject Momentum and Impulse to Improve Students' Concept Understanding

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Abstract. This research is motivated by the lack of understanding of students' concepts on the subject of momentum and impulse. This study aims to determine the improvement in understanding the concept of momentum and impulse of students using LKPD *mind mapping* . This study uses a research and development (R&D) methodology with a 4D model using the One Group Pretest-Posttest design. The main product trial design uses a *mind mapping -based worksheet* with class X MIPA 1 as the experimental class and class X MIPA 2 as the control class. Increased understanding of students' concepts can be known through the calculation of N-gain. Based on the results of the pre-test and post-test for the experimental class , 69.82 % were in the category of quite effective intervals. Meanwhile, for the control class, an average N-gain score of 44,61 % was obtained and the score was in the less effective category interval. Based on the research obtained, it can be concluded that the use of *mind mapping -based worksheets* on the subject of momentum and impulse is appropriate to use because it can improve students' conceptual understanding.

[PED58]

Development of E-LKPD Based on Kvisoft Flipbook Maker to Improve Concept Understanding of Class X Students on Global Warming Materials

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Abstract. This research is a development research with the aim of developing learning media based on kvisoft flipbook maker on Global Warming material in order to improve understanding of concepts in class X high school students. This type of research is the development of Research and Development (R&D). The design of this study uses the ADDIE (Analysis, Design, Development, Implement, and Evaluation) model. The instrument used is an assessment scale to determine the quality of the developed learning media and a concept understanding test to determine students' conceptual understanding. The software used to develop this learning media is kvisoft flipbook maker. Validation was carried out by 3 expert validators and students. Analysis of the data used is SBi to analyze the feasibility of the media and the Mann Whitney Test. The results showed that the kvisoft flipbook maker-based E-LKPD was feasible to be used in improving understanding of the concept of Global Warming in class X high school students. This was based on the average number of learning media feasibility scores by expert validators was 4.6 which means 4.21 and the average score of the students' assessment is 3.6, which means 3.0. Then from the results of the non-parametric test, the output of the test statistics is known as Asym.Sig (2-talled) with a value of 0.049 which means 0,05.

[PED59]

Development of Physics E-Module Integrated with the Values of Pancasila During the Covid-19

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ABSTRACT

This study developed a physics e-module integrated with the practice of Pancasila values. The preparation of the lesson plans uses a discovery learning model on momentum and impulse material. E-modul was validated by media and content experts and practitioner to determine its feasibility. The type of research used is Research and Development with a 4-D model, namely Define, Design, Development, and Disseminate. The research subjects were 70 students of class X IPA 1 and X IPA 2 at SMA N 1 Prambanan Yogyakarta. Data were gathered through observation, interviews and questionnaire techniques. The data collected were analysed using descriptive interpretations and equations. The results state that the physics e-module integrated with the practice of Pancasila values is valid for product development and suitable to use in the learning process. The accumulated student responses to the media are very good.

Keywords: *electronic modul, pancasila values, physics learning*

[SED01]

Critical Thinking Analysis in Natural and Social Science Books

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Abstract. This study analyzes science and social science books used in elementary schools. The natural and social science book under study is a book from the independent curriculum. This study examines whether there are critical thinking skills in natural and social science books. This research uses qualitative descriptive research. The setting of this research is natural and social science books used in fourth grade elementary school learning. Data collection is done by analyzing fourth grade books. This study aims to make teachers emphasize activities that can foster critical thinking skills.

[SED02]

Preliminary Analysis of Basic Science Process Skills of Post-Pandemic Era Elementary School Students

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Abstract: This study aimed to determine elementary school students' basic science process skills after the implementation of distance learning during the covid-19 pandemic. This study uses a survey technique by giving tests to research subjects. The research subjects were 50 grade 4 elementary school students in Yogyakarta. The test given is based on the science process's primary ability. The test item has a Reliability coefficient was found 0.68. The test has observing, questioning, experimenting, associating, and communicating indicators. The survey test was carried out simultaneously in both classes. The results of the study show that the primary ability of the scientific process has a score of 49.2 which means it is at the medium level. Each indicator has the following percentage contribution to that score: observation 40.8%, asking 40.8%, experimenting 36.8%, reasoning 37.6%, and communicating 41.6%. The overall indicators of elementary school students' basic science process skills are at the medium level. Thus, it can be concluded that the essential ability of elementary school students to process science after the COVID-19 pandemic is at a medium level.

Keywords: basic science process skills, post pandemic era.

[SED03]

Multi-Rater Analysis for Learning Instruction Webbed Models based on Local Potential "Pulau Kembang" Validation: An Innovative Means to Assess Product Quality

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Abstract. An important process in developing learning instruction is content validation by expert judgment. However, these data were not explored comprehensively to prove the feasibility of content and constructs. This study explores the method of a comprehensive analysis of learning instruction validation using multi-rater analysis. The data in this study were collected from five experts (four lecturers and one practitioner). The experts evaluate learning instruction based on instrument sheets. Then, the RASCH model was used to estimate the quality of the instruments sheet, the expert, and the learning instruction. The results showed that using multi-rater analysis showed that the instrument items had an MNSQ score of 1.00 in the range of 0.77 to 1.33, which means the items can estimate content validity well with a reliability of 0.91, which proves the instrument's reliability. The split score of 3.27 proves that experts have different assessments for learning instruction according to background and experience. Overall, the evaluation of learning instruction is feasible to use in learning. Researchers must adjust the multi-rater analysis to comprehensively explain the quality of instructional learning.

[SED04]

Science Learning and Technology: Teachers and Students Perspective on Virtual Reality Learning Media Development in Junior High School in The Post Pandemic Era

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Abstract. Various digital learning media have been developed in science learning, but digital learning media that can visualize science material are still rare. The development of the Covid-19 pandemic that has occurred in the past two years has made learning activities that were previously face-to-face into distance learning or online learning. Online learning makes teachers and students aware of various digital media, one of which is virtual reality. This study aims to determine the perspectives of teachers and students on the development of virtual reality learning media in science learning in junior high schools after the pandemic. This research is a qualitative research using the mix method. The subjects in this study were 2 science teachers and 55 8th grade students at SMP N 4 Yogyakarta. The instruments used in this study were interview guidelines for teachers and questionnaires for students. Descriptive analysis was used to process interview data and quantitative analysis was used to process questionnaire questionnaire data. The results show that from the perspective of developing virtual reality learning media it is necessary and very possible to do it because it sees the need for digital learning media that can visualize abstract material. Based on the perspective of the students, 87% of students agreed to develop virtual reality learning media

[SED05]

Science Mobile Learning: The Need Analysis of Junior High School Students in The Post-Pandemic Era

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Abstract. This research aims to analyze the need of students and teachers for science mobile learning as learning media in the science learning process. This research is qualitative research using a survey technique. The subjects of this research were 68 students of Class VIII who were randomly selected and 2 science teachers at SMPN 4 Yogyakarta. The sampling technique used research instruments namely interviews, questionnaires, and documentation studies. Data analysis carried out included data reduction, data display, and conclusion drawing/ verification. The data obtained from the questionnaire were analyzed using a percentage formula. Based on the results of the questionnaire, students showed interest in developing science mobile learning as media learning which showed 89,7% of students agreed. Based on the teacher interviews showed that teachers never develop mobile learning and interest in science mobile learning developing.

[SED06]

Analysis of Teaching Models for Preservice Science Teachers in Indonesia.

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Abstract. The development of preservice science teachers is an essential process in producing professional science teachers. The teaching model used by university needs to be oriented towards the appropriate competence of science teachers. This is the need for analysis to explore the teaching model used in University. This study aims to analyze the teaching model in several university in Indonesia in producing science teachers. This study uses qualitative research with case studies (qualitative case study) to obtain information about the teaching model in university in producing science teachers. The subjects of this study consisted of science lecturers in several university in Indonesia. The data was obtained using an interview technique in the type of structured interview. Furthermore, the data were analyzed using the Miles and Huberman analysis technique.

[PSC10]

The Combination of CSI And IPA Analysis To Measure The Service Quality of Undergraduate Students Using The SERVQUAL Model Approach

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Abstract. Graduates are a representation of the educational process carried out in universities. The existence of graduates will be an attribute in the community's assessment of a university. Therefore, universities need to measure graduate outcomes through graduate users so that they can be useful for curriculum development and the improvement of the learning process. This study aims to measure the gap between the expectations of graduate users and the reality of graduate performance using the SERVQUAL model. Several dimensions were developed in a questionnaire instrument which was then filled in by several graduate users who were hiring graduates from several study programs at Surabaya State University. Data analysis was carried out in two stages, namely calculating the customer satisfaction index (CSI) and importance performance analysis (IPA) for mapping the dimensions of service quality that were useful for prioritizing improvements. In general, the results of the graduate user satisfaction index of 78% are in the satisfied category, where the highest satisfaction is obtained in tangible variables. Then followed by quality satisfaction based on reliability and empathy. In addition, some variables showed high expectations from users unless performance does not comply with expectations, there were assurance and responsiveness.

[PSC11]

Developing Mathematic Studies-Digital Game to Increase Student's Self-Regulated Learning Time Management: A Literature Study

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Abstract. The media use increasingly dominates teaching-learning activities along with technology development. One of technology uses in education is the use of video game in mathematic learning and time management. Time management is a part of self-regulated learning; thus through easy access to technology and internet, the students can expectedly develop their SLR and time management abilities. Meanwhile, video game has elements that can be found in mathematic learning and thereby videogame can be an alternative learning media. To develop video game for mathematic learning and time management, digital game-based learning method can be used. This study will find out how to use mathematics in video games, the relationship between time management and self-regulated learning, and what a teacher needs in developing digital game for learning purpose. The result of current study shows that video game and mathematics are interrelated, particularly in developing logic-mathematic ability, and time management and self-regulated learning are correlated positively. To develop the two elements for one digital game, teacher should consider the targeted students that will use the media and gameplay, transparency, and additional learning in the digital game to be developed.

[SED07]

The Influence Of Guided Inquiry Learning Based On The Socio-Scientific Issues Model On StudentsCritical Thinking Skills

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Abstract

This study aims to determine the effect of *guided inquiry learning* model based on *socio-scientific issues* oncritical thinking skills of junior high school students in science learning. This research is quasi-experimental research with *non-equivalent control group design*. The population in this study was grade VIII of SMPN 9 Yogyakarta in the2019/2020 school year. Sampling was done randomly through a lottery (*cluster random sampling)* so that class VIII Ewas obtained as an experimental class and class VIII D as a control class. This research instrument is an observation sheet of learning implementation and a test question sheet to measure students' critical thinking skills. The analysis used includes analysis of the average implementation of learning, normality test, homogeneity test, *independent sample t-test* and *effect size*. The results of observations of learning implementation in two classes showed a very good category with the percentage of implementation of the experimental class reaching 90.25% and the control class reaching 95.67%. While the analysis of test results shows that there is a significant effect on the application of *guidedinquiry learning* model based on *socio-scientific issues* on critical thinking skills of junior high school students in science learning with moderate category.

Keywords: *guided inquiry*, critical thinking skills, and *socio-scientific issues*

[SED07]

STEM Based Module with Crosscutting Concepts for Science Learning: Context Feasibility

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Abstract. The lack of science teacher knowledge of an approach called Science, Technology, Engineering, and Mathematics (STEM), and crosscutting concepts, has caused only a few teachers to create and develop science teaching materials, including a module. The study aims to develop and test the feasibility of a STEM-based module with crosscutting concepts to facilitate scientific literacy and students' self-efficacy. The method uses research and development with the ADDIE model. It consists of five main phases: analyze, design, develop, implement, and evaluate. The module feasibility assesses by two expert validators, namely expert lecturers in media and material; practitioner assessment from three science teachers and a readability test in a trial group involving 30 students at SMP Negeri 1 Nusawungu. The results showed that the module was feasible to apply in learning with a very high category. Suggestions for further research are to implement and evaluate the developed product.