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Proceedings of the Mathematics, Informatics, Science, and Education International Conference (MISEIC 2018)

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Mathematics, Informatics, Science and Education International Conference (MISEIC) is organized by Faculty of Mathematics and Natural Sciences Universitas Negeri Surabaya.

This international conference aims to bridge the scientists, education experts and practicioners, and students in the scientific forum through sharingideas and issues about theoretical and practical knowledge in mathematics, informatics, science and STEM education.

This seminar will be held on July 21, 2018 and will take place in Surabaya, Indonesia. The theme for this conference is “Emerging Trends of Research in Mathematics, Informatics, Sciences, and Education”.

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Proceedings of the Mathematics, Informatics, Science, and Education International Conference (MISEIC 2018)

Mathematics, Informatics, Science, and Education International Conference (MISEIC) 2018 is the second conference of MISEIC held by Universitas Negeri Surabaya (Unesa), Indonesia this year. The conference held in Best Western Papilio Hotel on 21 July 2018. This conference reflect the commitment of Unesa about the research activities.

This international conference aims to bridge the scientists, education experts and practicioners, and students in the scientific forum through sharing ideas and issues about theoretical and practical knowledge in mathematics, informatics, science and STEM education. STEM education have been a central issues that become research trending topics nowadays especially for

researchers of Mathematics, Informatics and Science Education. The theme of MISEIC 2018 is “Emerging Trends of Research in Mathematics, Informatics, Sciences, and Education”.

This conference has attracted attention from educational practitioners’ community. There are 299 review and research-based papers submitted and presented in this conference. The paper have a wide range topics such as Pure and Applied Mathematics; Physics, Chemistry, Biology, Science and Technology; Computer Science. Out of the submitted papers, 66 papers were selected to be published by Atlantis Press. The selection was based on the rigid and rigorous review of papers by two referees who focus on content format and language used. We hope that the papers can give valuable knowledge and insight for readers on those variety of topics.

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Series: Advances in Intelligent Systems Research

Proceedings of the Mathematics, Informatics, Science, and Education International Conference (MISEIC 2018)

66 articles

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Designing Teaching Material Oriented Towards Inquiry-Based Learning in Biology

Insar Damopolii, Jan Hendreik Nunaki, Elya Nusantari, Novri Youla Kandowangko

The inquiry-based learning model is the model suggested for learning in the 21st century. This learning process will succeed if supported by teaching material that prepares students for real-life situations. This research aimed to design and develop valid teaching material that is oriented towards inquiry-based...

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Comparison of Knowledge and Hydration Awareness on Adolescent Soccer Athletes

Kunjung Ashadi, Rangga Lutfi Fachri, Gigih Siantoro, Donny Ardhi Kusuma, Agus Hariyanto, I Dewa Made Kusuma

Soccer is a sport type that is done for long time duration. Therefore, it is important for soccer athletes to maintain the adequacy of body fluids so that sports performance is maintained properly. The purpose of this study is to determine the level of knowledge and hydration awareness of adolescents...

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Properties of Anti-Adjacency Matrix of Cyclic Directed Windmill Graph $K_4^{(n)}$

Muhammad Sabili Robbi Solihin, S Aminah, Suarsi Utama

Anti-adjacency matrix is a way to represent a directed graph as a square

matrix, whose entries show whether there is a directed edge from a vertex to another one. This paper focuses on the properties of anti-adjacency matrix of windmill graph (4,), such as its characteristic polynomial and eigenvalues....

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Navigating New Waters: Indonesian Muslims Practicing Islam in A Taiwanese University

Donne Jone Panizales Sodusta, Ricky Setiawan, Beni Setiawan

This phenomenological study sought to understand the lived experiences of Indonesian international students studying in Taiwan and their practice of Islam. An open-ended questionnaire was first administered to a group of Indonesian students in a Taiwanese public university then three interviewees were...

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Students' Metacognitive Thinking Process in Solving Covalent Bonding Problem Based on Academic Ability Level

H Aliyah, Erman Erman, B Sugiarto

This study was designed to identify and describe students' metacognitive thinking process of solving covalent bonding based on student academic ability level One hundred eight high school students in Indonesia participated in the study. Students are classified into upper, middle and lower academic groups...

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Teacher Training Scaffolding Type to Improve Teacher's Ability in Developing Guided Inquiry Practical Worksheet

Abdul Rosid, Yayan Sunarya, Mulyati Arifin

Generally, a teacher training is still ineffective and has many weaknesses in its implementation. The main objective of a teacher training is to improve teachers' abilities and skills in teaching, so as to prepare students for competition in the millennial century. In chemistry learning teachers must...

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The Characteristics of Digital Assessment Bloom for Indonesian Junior High School

Yurizka Melia Sari, Badrun Kartowagiran, Heri Retnawati, Shofan Fiangga

In this recent years, the integration of technology in learning and assessment has become a major need in education. In Indonesia, CBT has been used as a computer-based national examination system (UNBK), a computerized exam as a media to display the problem and process of answering it. In addition,...

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The Effect of Think-Pair-Share Learning with Contextual Approach on Junior High School Students' Mathematics Problem Solving Ability

Choirul Abidin, Siti Maghfirotun Amin, Raden Sulaiman

The aim of this research was to find out the effect of Think-Pair-Share learning with contextual approach on students' mathematics problem solving ability. The static group comparison design was used as the research design. This research used test method with the research instrument of problem solving...

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Validity and Effectiveness of Physics Learning Package based on Guided-Inquiry to Improve Science Process Skills of Senior High School Student

Agung Aliffianto, Mohammad Nur, Madlazim Madlazim

The aim of this research is to know the validity and effectiveness of physics learning package based on Guided Inquiry. This research uses development method by Plomp and Nieven research design. Physics learning package that have been developed and then validated by three expert validators from UNESA....

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Mathematical Justification Ability: Students' Divergent and

Convergent Process in Justifying Quadrilateral

Magita Danang Pamungkas, Dwi Juniati, Masriyah Masriyah

Justification is an important component in learning mathematics to optimize reasoning skill, understanding concepts and mathematical communication. This research is qualitative descriptive research because it aims to obtain a natural picture of the student's mathematical justification on the quadrilateral...

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Chemistry for Beginners: What Makes Good and Bad Impression

Inas Sausan, Sulistyo Saputro, Nurma Yunita Indriyanti

Most secondary high school students think that chemistry was a difficult subject. Bad perception can influence the students' interest in chemistry. We aimed was to explore the students' perception toward chemistry in junior high school and its influences on students' interest to learn chemistry in secondary...

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Encouraging Literacy in Mathematics Teaching and Learning: Junior High School Teachers' Perspectives

Netti Lastiningsih, Soedjarwo Soedjarwo, Toho Cholik Mutohir, Tatag Yuli Eko Siswono

School literacy program (SLP) tries to nurture the attitude of noble character to children through reading activities, since such activities are believed to become a reflective, analytical, and critical skill leading to the development of other disciplines including mathematics. Consequently program...

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Students' Creative Thinking in Posing Mathematical Problem with Different Context

Ratih Maharani, Tatag Yuli Eko Siswono, Endah Budi Rahaju

Learning mathematical is believed to enhance student's creative thinking. Problem posing can be a form of training in creative thinking. Problem posing requires that the student be creative and use the mathematical knowledge that has been obtained to connect several concepts. Differences context of the...

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Students' Creativity and High-Order Thinking Skills in Laboratory Activity of Surface Chemistry

Bertha Yonata, Siti Tjahjani, Dian Novita

Students' creativity and High-Order thinking skills involved in the enrollment of surface chemistry course was examined in this study. The laboratory activity worksheet developed in previous research done by Yonata et al (2017) was used to guide student activity. Meanwhile, the students' creativity was...

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Effectiveness of Guided-Inquiry Model to Train Science Process Skills of Senior High School Students

Arinta Rezty Wijayaningputri, Wahono Widodo, Munasir Munasir

This research aims to analyze the effectiveness of Guided-Inquiry model to train science process skills. This research design in this study was One-group Pre-test and Post-test which applied to 15 students of senior high school. The data were analyzed using Anova, N-gain and the paired t-test. The result...

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Reducing Light Misconceptions by Using Predict-Observe-Explain Strategies

Lusandra Dewi Lestari, Prabowo Prabowo, Widodo Widodo

The reason for the low quality of science education in general is the existence of misconception and learning conditions that are less attention to the preconceptions of learners. Misconceptions of light can occur at any age level. The purpose of this study is to demonstrate that Predict-Observe-Explain...

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Graceful Labelling of Corona Product of Aster Flower Graph

Elvi Khairunnisa, Kiki Ariyanti Sugeng

There are many graph labelling that have been developed, one of which is a graceful labelling. A graceful labelling of a graph G=(V,E) with E edges is an injectivef:V(G)→{0,1,...,|E|} that the resulting edge labels obtained by |f(u)-f(v)| on each edgesuv are pairwise distinct. An aster flower graph (A_((m,n)...

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Developing learning materials supporting teachers' understanding on mathematics problem-solving knowledge for teaching

Tatag Yuli Eko Siswono, Ahmad Wahidul Kohar, Sugi Hartono, Rooselyna Ekawati, Pradnyo Wijayanti

This study aims to develop a set of learning materials supporting teachers' understanding of mathematics problem-solving knowledge for teaching (MPSKT). The MPSKT implemented in the learning materials consist of problem-solving content knowledge (PSCK) (knowledge of problems, nature of problem-solving,...

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The Open-Ended Problem Based Mathematics Learning to Increase Students' Creativity on Fraction for Third Grade Elementary School

Nur Indah, Mega Teguh Budiarto, Agung Lukito

This study aims at developing an open-ended problem based mathematics learning to enhance students' creativity. Plomp model was used to develop the instructional materials for fraction unit at grade 3. The subjects consisted of third grade students. The data was collected by observation, interview, test,...

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The Development of Learning Material Using Learning Cycle 7E with Socio-scientific Issues Context in Rate of Reaction to Improve Student's Argumentation Skills in Senior High School

Siti Nurlatifah, Tukiran Tukiran, Erman Erman

The Learning Cycle 7E (LC-7E) with Socio-scientific Issue (SSI) Context learning material is learning material that links chemistry learning with science issues and involves moral and ethical component. It will lead students to explore and develop their knowledge by connecting of issues or events in...

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Student interaction with Open Journal System based on ISO 9241-110

I S Rahayu, R Hartanto, A P Wibawa, D Meirawan, E Nugraha

Open Journal System (OJS) is rapid grown open source system that is used to support and manage online journal publication. Problems interaction between

the users and the system appear since many users finding difficulty to use OJS. ISO 9241-110 becomes a standard in the aspect of human interaction with...

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Geometric Transformation in Surakarta Batik Patterns

Melindawati Kusuma Anggraeni, Mardiyana Mardiyana, Dewi Retno Sari Saputro

Ethnomatematics is mathematics that grows and develops in a society. Batik Surakarta is one of the cultural wealth in Indonesia that has the potential to increase the knowledge of society about the concept of mathematics, especially the geometric transformation. Surakarta batik patterns are influenced...

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Guided Inquiry Model To Promote Science Process Skill Students on Acid-Base

Rusly Hidayah, Nurul Lailiy

This study aims to describe the effectiveness of guided inquiry learning model to train the science process skills of learners on acid-base material grade XI from one public school (Senior High School 1 Bangkalan). The type of this research is descriptive quantitative with "One Group Pretest-Posttest...

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The Effectiveness of Learning Physics Based on Multi Representation Integrated with Guided Inquiry to Train Students' Science Literacy

Dewi Nur Arofah, Wahono Widodo

This study aims to analyse the improvement of mathematical connection ability and the habits of students' mind who are taught by using the Missouri Mathematics Project (MMP) model and Discovery Learning (DL) model. This type of research belongs to quasi experiment using quantitative and qualitative data...

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Students' Proof Schemes for Disproving Mathematical Proposition

Mochammad Amirudin, Yusuf Fuad, Pradnyo Wijayanti

Proof and proving play an important role for students in justifying the validity of mathematical propositions. This qualitative research was concerned to assess students' proof schemes for disproving mathematics propositions. The sample was 11th grade students of SMAN 1 Surabaya. All students had to...

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Barcode Recognition Using Principal Component Analysis and Support Vector Machine

Clarin Mulyaningtyas, Elly Matul Imah

Barcode is visual code to identify the symbols of the data in the form of one or two-dimension image contains lines and spaces based on detecting the edges. The use of barcode has significantly contributed for warehouses and retail product. Nowadays, the research about barcode is still an interesting...

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The Exploration of Mathematical Intuition and Its Role in Solving Mathematical Problem

Arwanto Arwanto, I Ketut Budayasa, Mega Teguh Budiarto

This type of research is qualitative since it aims at finding out the exploration of mathematical intuition and its role in solving mathematical problems. The research method was done by collecting data through mathematical problem-solving test according to Polya stages and conducting in-depth interview...

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The Study of Local Wisdom of Ethnic SasakS In Development of Biology Instructional Learning Program (P3Bio) Based on 21st Century Skills

Septiana Dwi Utami, Ismail Efendi, Ika Nurani Dewi, Agus Ramdani, Immy Suci Rohyani

The Sasak community of Mount Rinjani region has been developed the original system of knowledge and technology as a local wisdom. Disclosure of local wisdom through biology instructional learning can strengthen the nature of meaningful learning and encourage students to be wise in solving the problems....

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The Assessment Model of Undergraduate Mathematics and Science Education Competency Based on Indonesian National Qualification Framework and 21st Century Demand

Wasis Wasis, Raden Sulaiman, Elok Sudibyo, Bertha Yonata, Muji Sri Prastiwi

This article reports the competency profile of undergraduate Mathematics and Natural Science education based on Indonesian National Qualification Framework (INQF) and 21st century demands, and its assessment model. The competency profile was formulated based on theoretical and regulation reviews. The...

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Analysis of Factors Affecting The Acceptance of Surabaya E-Government Service Using Technology Acceptance Model (TAM) 3: A Case Study of E-Lampid

Rendris Dirgantara Putra, Febriliyan Samopa

E-lampid is an application which focuses on population service in terms of

e-Government. The service of E-lampid was created by the Surabaya government aiming to minimize the length of queue of the people coming to the Department of Population and Civil Registration. However, the application has not...

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The Relational Thinking Process of Secondary School Student with High Mathematical Ability in Solving Mathematics Problem

Ahmad Zakaria, Mega Teguh Budiarto, Raden Sulaiman

This research is aimed to describe the process of relational thinking of junior high school student with high level a ability in solving mathematical problems. In this qualitative research, data collection techniques are performed by using tests and interview. The subject of this research is only one...

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Development Factors of Small Medium Software-Enterprises

R B Rinawan, M Sa'adah, Wibawa A P, E Nugraha

The development of small medium software enterprises accompanied by various factors. These factors will be structured as a strategic plan for the company's progress. This paper will discuss identification of the factors of development of small medium software enterprises. The research was done by analytic...

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Developing Moodle in Problem-Based Learning to Improve Student Comprehension on the Concepts of Wave

Lovy Herayanti, Syifaul Gummah, Baiq Azmi Sukroyanti, Sukainil Ahzan, Gunawan Gunawan

E-learning is learning process through electronic media, especially the internet. E-learning enables students to learn or possess science no matter when and where. The purpose of this study was to develop Moodle in problem-based learning in order to improve learners' comprehension of wave concepts. The...

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Critical Thinking Skill of High-Performance Mathematics Teacher in Solving Mathematical Problem

Deka Anjariyah, Dwi Juniati, Tatag Yuli Eko Siswono

This study aims to describe the critical thinking skill of high performance mathematics teacher in solving mathematical problems with the subject was a junior high school teacher who was awarded as a high performance teacher. Qualitative research method was used to reveal the critical thinking skill...

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Improvement of Student Creative Thinking Skills Through Implementation of OrDeP2E Learning Model with Contextual Approach

Hamsa Doa, Budi Jatmiko, Thamrin Hidayat

The OrDeP2E learning model based on contextual approach is a science-based learning activity of contextual approach that emphasizes the creative thinking process of junior high school students. The syntaxes of OrDeP2E learning model are (1) Problem definition, (2) Problem Orientation, (3) Submission...

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Vocational Student's Strategies in Posing Mathematical Problems Assisted with Google Forms

Ririn Diyannita Sasanti, Tatag Yuli Eko Siswono, Manuharawati Manuharawati

The purpose of this study was to determine the ability of the student's problem in completing the task of mathematics with sub-topic translation and reflection by using the help of google form. This research method was qualitative descriptive by involving 32 students of class XI TEi2 in SMK Negeri 1...

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Profile of Scientific Literacy Skills in Junior High School One Roof

Sifak Indana, Rudiana Agustini, Yuni Sri Rahayu

This research aimed to describe student scientific literacy skills with the concept of interaction between living things and environment. The research used quantitative descriptive method implemented at SMPN Satu Atap Kenduruan with subject of students grade VII which were determined by cluster random...

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Students' Creative Thinking Process based on the Wallas Stage in Solving Mathematical Modeling Problems

Ila Mardianti, Masriyah Masriyah, Pradnyo Wijayanti

The individual's creative level in solving mathematical problems is of course different. Using mathematics to solve problems is called math applications. The modeling process is very helpful for students in solving mathematical problems related to contextual problems. Four stages of Wallas's creative...

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Students' Argumentation for Solving Geometry in Junior High School

Arista Nur Jannah AR, Dwi Juniati, Raden Sulaiman

Mathematics learning requires students to be active in learning.

Mathematical learning should also encourage students to express mathematical ideas according to what they have learned. Students must be able to unfold their argumentation while solving problems. This study aims to investigate the ability...

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The Analysis of Students' Mathematical Literacy Based on Mathematical Ability

Aulia Nurutami, Riyadi Riyadi, Sri Subanti

One of the 21st century skills is the mathematical literacy ability. The aim of this research was to describe the mathematical literacy ability student based on mathematical ability. This was qualitative descriptive research. The subjects of this research were three 8th grade students an Islamic secondary...

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Developing Higher Order Thinking Skill (HOTS) Mathematic Problem Using That Quiz Application

Ririn Faridah, Tatag Yuli Eko Siswono, Endah Budi Rahaju

This study aims to describe process, responses, and effectiveness of applying HOTS problem using That Quiz application in the learning of Sequence and Series. Based on the analysis of ADDIE model, it was obtained that HOTS questions were in good quality because they meet valid, reliable, and objective...

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Students' Spatial Reasoning in Solving Geometrical Problems Based on Personality Types

Aprilia Lutfitasari, Siti Maghfirotun Amin, Masriyah Masriyah

Student's spatial reasoning is the process of manipulating objects that can help students to solving the daily problems about spatial. The aim of this study was to know students' spatial reasoning in solving geometry problems based on personality types. This study was used qualitative descriptive approach...

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Mathematical Literacy Problem and Use of Intuition

Faiz Latif Usman, Budiyono Budiyono, Diari Indriati

The digitalization of 21st-century in the society is focusing mathematical competence on computer performance where real-life problems are modeled into the language of mathematics. Mathematical literacy helps individuals to recognise the role of mathematics playing in the world and helping them to make...

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Visual and Analytical Strategies in Spatial Visualization of Junior High School Students in Completing the Reflection Tasks

Faridhotus Sholihah, Pradnyo Wijayanti, Endah Budi Rahaju

Spatial visualization is a mental ability in imagining an object, manipulating objects, rotating objects along with changing elements in it, or changing objects described into different shapes. Every student has a different strategy in solving a particular mathematical problem in solving mirroring problems....

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Challenges of Teaching Statistics to EFL Undergraduates: Action Research

Kusumarasdyati Kusumarasdyati

The present paper reports the challenges that the researcher had when teaching statistics to undergraduates majoring in the teaching of English and how to overcome them. It attempted to describe: (1) how to increase their motivation to learn statistics, and (2) how to improve their ability in statistical...

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Idea Generation on Social Media Based Brainstorming Session

Atikah Mauluddiyah, Diina Itsna Annisa, Dila Fipta W Sari, Neini Ratmaningsih, E Nugraha

The rise of forums that utilize communication technology today is one of them using a brainstorming method to facilitate discussion. Brainstorming is a method to explore the ideas of all participants in a forum. The purpose of this research is to understand the effectiveness and result of applying brainstorming...

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Using the Schema Owned in Solving Problems through Assimilation and Accommodation

Mubarik Mubarik, Mega Teguh Budiarto, Raden Sulaiman

Schema has an important role in problem solving process because it determines an action towards problem solving. Problem solving involves two aspects namely the problem to be solved and the knowledge (schema) that is owned. This study was aimed at describing the use of owned schema in problem solving...

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The Discovery Learning Model with A Scientific Approach to Increase Science Learning Achievement of Students

Fiona Setyo Resmawati, Prabowo Prabowo, Munasir Munasir

This study aims to describe the effectiveness of the discovery learning model with a scientific approach to the science learning of temperature and heat matter. Discovery learning model is a learning model that aims to train students in finding the concept independently in solving problems. This

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Justification Strategies of The 7th Grade Students in Understanding Triangles' Concepts

Shanty Galuh Perdanawati, Yusuf Fuad, Endah Budi Rahaju

Triangle is one of the fundamental concepts in geometry which has to be studied in secondary schools. Students have many difficulties to implement maths' reasoning and to understand concepts of the triangle. If students' difficulties have to be addressed and facilitated, then the students understand...

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Reflective Abstraction of Junior High School Students in Reconstructing The Factorization Concept

Helmi Rahmawati, I Ketut Budayasa, Rooselyna Ekawati

Construction of the mathematical concept is important to support students' success in learning. Factorization is one of the important subjects to be mastered by students in order to solve advanced mathematics problems. Reflective abstraction is a mental mechanism which someone can build all mathematical...

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7th Grade Students' Number Sense Based on Reflective and Impulsive Cognitive Styles

Zainal Zainal, Masriyah Masriyah, Pradnyo Wijayanti

Understanding of numbers refers to number sense. Number sense is basic for learning numbers. The aims of this study are to describe 7th students' number sense who have reflective and impulsive cognitive styles fraction. The subjects were students of the 7th grade. All students' were given Matching Familiar...

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Learning Instrument of Guided Discovery Model to Increase

Science Literacy on Hydrocarbon Learning Students' Thesis

Olly Astria Virginia, I Gusti Made Sanjaya, Harun Nasrudin

Chemistry learning is one of the processes to provide knowledge and skills about chemistry contained in nature. Understanding the concept of science-related literacy can be improved by the application of learning methods, because with a precise understanding of the concept it can provide ease, increase...

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The Use of Design Pattern on Informatics Engineering Students Thesis

Alifah Diantebes Aindra, Oktarica Pratiwi Suryoningtyas, Aji Prasetya Wibawa

University students should write a thesis to get their undergraduate (Bachelor) degree is. Most Informatics engineering students of the Electrical Engineering Department in Universitas Negeri Malang use research and development method for their thesis. There are many solutions or methods in software...

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Problem Solving Ability: A case study in Postgraduate Mathematics Student

Siti Khabibah, Manuharawati Manuharawati, Lukito Agung

Problem solving is the ability which can be used not only to solve a simple

problem but also a complicated problem. It is a skill which can be trained in every level of education. Therefore, teachers are required to be able to trill this ability and an obligation for mathematics teacher to have an excellent...

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Mathematics Teachers' Pedagogical Competence: How is the Attitude of the Mathematics Teachers in Teaching?

Fitri Ayu Ningtiyas, Jailani Jailani

Pedagogical competence is the ability of teachers in managing to learn. This study was designed to review the pedagogical competence of high school math teachers and their attitudes in teaching. Pedagogical competence in this research will be reviewed from two aspects, that is knowledge aspect and skill...

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Metacognitive Strategies to Train Creative Thinking Skills in Creating Media for Learning

Merina Safitri, Sunu Kuntjoro

Students' creative thinking skill is still found to be low. One strategy to train creative thinking skill is metacognitive strategies. In this strategy, students are trained to monitor their own thinking to come up with ideas to solve problem of creating a work. This study aims to train students' creative...

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Designing of Basic Chemistry Course to Support Learning Curriculum With Green Chemistry Insight

Mitarlis Mitarlis, Utiya Azizah, Bertha Yonata

This article presents the results of study in a series of development of learning materials with green chemistry insight. The issues that will be discussed in this paper are describe the feasibility of basic chemistry course design to support learning curriculum with green chemistry insight and its supporting...

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Conducting A Real-Time Instrument System for Observing Biogas Digester's Temperature and Humidity

Meta Yantidewi, Nurita Apridiana Lestari, Utama Alan Deta

Biogas is a clean and renewable energy generated from organic digestion under anaerobic condition. The anaerobic process is held inside a biogas digester. The production of biogas in a biogas digester might be affected by the temperature degree and humidity of the digester. This research focused on building...

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Learn Physics Using Interactive Demonstration to Reduce The Students' Misconceptions on Mechanical Wave

Mukhayyarotin Niswati Rodliyatul Jauhariyah, Zulfa Zaitul, Mulyastuti Indina

In the learning process, students have conception and misconception, no exeption in mechanical wave learning. The aims of this study to reduce students misconceptions on mechanical wave using interactive demonstration. Interactive demonstration of physics learning applied to students of 16th State Senior...

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Problem Solving Behaviors of Grade Seven Students Focusing on Negative Integers

Suidah Nur Aini Aziz, Yusuf Fuad, Rooselyna Ekawati

Problem solving behavior play an important role for any student because problem solving behavior can given provided description of the student's behavior during the process of solving the mathematics problem. This study investigate student problem solving behavior when solving the negative integers problems....

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The Improvement of Mathematical Connection Ability and Habits of Students' Mind with Missouri Mathematics Project

and Discovery Learning

Aditya Prihandhika, S Fatimah, D Dasari

This study aims to analyse the improvement of mathematical connection ability and the habits of students' mind who are taught by using the Missouri Mathematics Project (MMP) model and Discovery Learning (DL) model. This type of research belongs to quasi experiment using quantitative and qualitative data...

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Students' Reasoning Behavior on Generalization of Figural Pattern

Riski Ayu Triwardani, Yusuf Fuad, Masriyah Masriyah

Pattern generalization is a core area in mathematics that is recognized by a community of researchers as an approach to develop student's algebraic reasoning. Examining students' generalization strategies of patterns becomes very important in term of learning advanced algebra. This study applied qualitative...

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Reasoning Behaviors of Mathematics Difficulties Students in Solving Multiplication Integers

Fitri Tri Hana Padang, Yusuf Fuad, Rooselyna Ekawati

Behavior is an action to be performed, in learning behavioral math can be

interpreted as a way of student action when solving problems. Reasoning is one part of the thinking process of students to drawing a conclusions from a problem. Reasoning behavior students has been attracted many researchers to...

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Bagas Widyo Arbowo, Aidha Aprilia P L, Fifin Aisyah

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Harsi Admawati, Jumadi Jumadi, Farida Nursyahidah

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Faidah Mutimmatul, Setya Chendra Wibawa, Rooselyna Ekawati

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Profile of Scientific Literacy Skills in Junior High School One Roof

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***Abstract*— This research aimed to describe student scientific literacy skills with the concept of interaction between living things and environment. The research used quantitative descriptive method implemented at SMPN Satu Atap Kenduruan with subject of students grade VII which were determined by cluster random sampling. The instrument used was science literacy test consisting of 25 items of multiple choice and essays from competence and knowledge domains. The results showed that the percentage of student scientific literacy from competence domain skills was 22%, while from student knowledge domain was 34%. The percentage of both domains was still below 50% of the total number of the students. In other words, scientific literacy skills of students in SMPN Satu Atap Kenduruan were categorized as low.**

Keywords*— Scientific literacy skills, competence domain, knowledge domain, science learning, SMPN 1 Atap Kenduruan.

I. INTRODUCTION

Scientific literacy is defined as the ability to use issues and ideas related to science as a reflective citizen [1]. The science literacy in PISA includes 4 domains, namely, context, knowledge, competence and attitude of science [1, 2]. The context domain includes the personal context; local and global; competence domain includes aspects of the ability to explain scientific phenomena, evaluate and design scientific research, and interpret data and scientific evidence; knowledge domain includes aspects of content knowledge and epistemic knowledge; the domain of one's attitude toward science is characterized by their attachment, concern and response in science and technology and the issues that affect them in real situations [1].

According to the National Research Council [3] the low contribution of science learning to the success of citizens is due to the release of science learning from the social context, emphasizing only the mastery of the material, and the inappropriate use of assessments so that citizens are only prepared to master knowledge. In the learning process, students should know the relevance of science learning to everyday life and social life. Science learning in schools should be directed to understanding of the importance of science when it is associated with past, present or future societies [4]. In addition, one of the factors that allegedly led to the low achievement of science literacy in Indonesia is the selection of learning resources, such as textbooks. Based on the previous study [5, 6], it was found that textbook content of physics in junior high school which is widely used in Bandung city has unbalanced aspects of scientific literacy.

Scientific literacy is for all students, regardless whether the students are become a scientist or not [7]. Science literacy can assist students in addressing and making decisions related to science issues in life as well as developing knowledge, skills, and using science as citizens and individuals [8]. Students are literate when are able to apply concepts or facts obtained in school with natural phenomena occurring in everyday life [9]. Students with less science literacy skills are able to solve problems in simple and familiar situations, while students with more developed literacy skills are able to solve problems in complex and less familiar situations [10]. Therefore the ability of science literacy must be owned by all students including those who study in junior high school one roof.

School one roof or "Satu Atap" schooling is an educational model which is different from other elementary and junior high schools because the implementation of the teaching and learning processes occur in one place, instead of moving to other location for those two type of schooling. This model is designed for educational institutions to be closer to the most accessible to society [11]. The government hopes no more school-aged children not attending school because of school distance. However, the quality of education in "Satu Atap" and other School in general is far from ideal, as happened in SMPN "Satu Atap" Karangploso Batu-Malang and Satu Atap School in Kokop Bangkalan Village, that was no single

student was passed in 2010 national exam. This indicates that students of Satu Atap School do not master the science subject which includes in the national exam. One of the reasons for such a failure is the limited quality of human resources. This is in accordance with the results of Rahmasari's research [12] which states that the limiting factor in the implementation of primary and junior high schools of "Satu Atap (SATAP)" is the insufficient number of teachers and educational administration personnel.

In contrast, regular schools provide qualified human resources, equal amount of high-achieving and low-achieving students, adequate facilities, and easy-to-reach location. Therefore, a breakthrough in science learning process in primary and secondary schools "Satu Atap" needs to be done in terms of preparing teacher's learning process plan. Empowerment of teachers in primary and junior high schools "SATAP" should be undertaken to overcome barriers in applying school policies in the learning process [12]. In addition, it is necessary to pay attention to the lack of facilities in schools, such as no LCD projector, no internet connection and no inquiry model implementation in science subjects in “SATAP” elementary and junior high school. Inhibiting factors from the implementation of learning activities in the elementary and junior high schools of “SATAP” was not only from the lack of teachers and educational personnel, but also from the facilities and infrastructure that are inadequate [12]. Muhafid [13] stated that those insufficiencies occur because the teachers come from various disciplines and limited learning tools, media, and science learning resources for teachers and students.

Based on the problems above that happend in “SATAP” schools, it is important to describe the science literacy skills of Satu Atap students for the next action. So, the purpose of this research was to describe the student scientific literacy skills of SMPN Satu Atap in Kenduruan. Student scientific literacy skills can be known by scientific literacy test.

II. METHOD

This research used quantitative descriptive method implemented at SMPN one roof. The sample used in this research was sixty students at grade VII that determined by cluster random sampling. Instrument research used was the instrument of scientific literacy test that consist of 15 items of multiple choice and 10 item of essays. Scientific literacy skills measured in terms of knowledge domain and competency domain. Based on the two domains are then compared between number of students who answered correctly and students who answered wrong based on the percentage analysis. The data obtained was used to analyze the level of students' scientific literacy.

III. RESULT

A. Level of scientific literacy skills of the competence domain

Competence domain of scientific literacy test that proposed to the students was based on the indicators that already established in PISA 2015. The essay questions of number 1,3,6 and 7 contain sub domains which explain the phenomenon scientifically. The questions of number 5 and 9 contains sub domain of evaluation and design of scientific discoveries. While the questions of number 11, 12, 13, and 14 contain sub domain of interpretion data and scientific evidence. The results of the answers analysis of 60 students on the scientific literacy competence domain are shown in Figure 1.

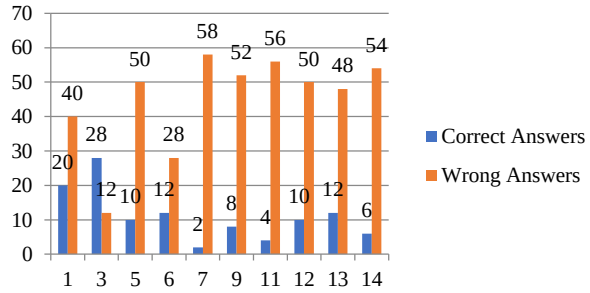

Figure 1. Graphic the number of students who answer the competence domain of science literacy

Figure 1 showed the number of students who answered correctly on the scientific literacy questions of number 1,5,6,7,9,11,12,13 and 14 at competence domain. The most amount of correct answer of students is question number 3, while on the number 7 students most slightly answer correctly. Only one problem that can be answered more than 50% of students is the number 3. The result of the percentage of students correct answers to scientific literacy questions on the competence domain was presented in table 1.

TABLE I. PERCENTAGE OF STUDENTS' CORRECT ANSWERS TO EACH COMPETENCY SUB DOMAIN

Competency sub domain	Number of questions	Percentage of students correct answers (%)
Explain the phenomenon scientifically	4	34
Evaluate and design scientific discoveries	2	13
interpret the data and evidence scientifically	4	15

Table 1 showed that the percentage of students who answered correctly on the questions of the sub domain explain the phenomenon scientifically as much as 34% of the question 4. Percentage of students who answered correctly on the sub domain question evaluate and and design the scientific discovery was 13% of 2 questions. While the sub domain interpret the data and evidence scientifically, students who answered correctly was 15% of 4 questions. The percentage results were obtained from the comparison of the average

number of students scores with the maximum scores of the correct answer.

B. Level of scientific literacy skills of the knowledge domain

The scientific literacy questions of the knowledge domain used in this study are in accordance with the criteria and indicators set by PISA 2015. Questions of number 2, 4 and 8 contain the content of knowledge sub-domain. The sub domain of procedural knowledge is found in questions of number 10, 15, 19, and 20. While the sub domain of epistemic knowledge is found in questions 16, 17 and 18. The analysis results of 60 students' answers on the scientific literacy knowledge domain are shown in Figure 2.

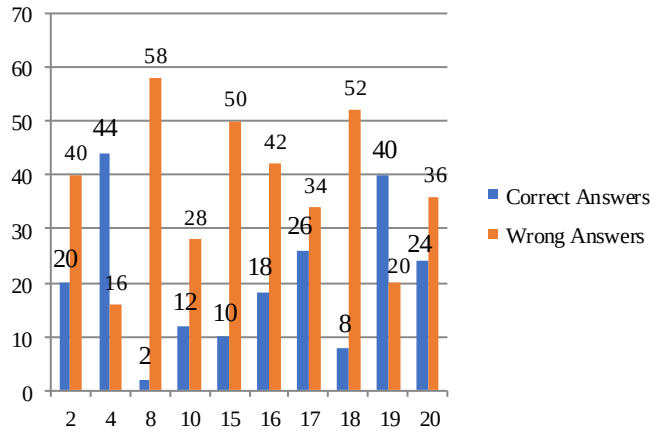

Figure 2. The graphic of the students number who answered science literacy questions of knowledge domain.

Figure 2 showed that the number of students who answered incorrectly are larger than the number of students who answered correctly on domain literacy questions was number 2, 8, 10, 15, 16, 17, 18, and 20. Question 4 and 19 indicate the number of students who answered correctly more than the incorrect answer. The fewer number of students who answered correctly was on number 8. There are 2 questions answered more than 50% of the number of students was question number 4 and 19. The results of the percentage of students correct answer of scientific literacy questions on the domain of knowledge were presented in table 2.

TABLE II. THE PERCENTAGE OF STUDENT CORRECT ANSWER FOR EACH KNOWLEDGE DOMAIN

Knowledge sub domain	Number of questions	Percentage of students correct answer (%)
Content knowledge	3	37
Procedural knowledge	4	36
Epistemic knowledge	3	29

Table 2 showed that the percentage of students who answered correctly on the content sub domain was 37% of 3 questions. The percentage of students who answered correctly on the questions of procedural sub domains was 36% of the 4 questions, while the percentage of the epistemic sub domain was 29% of 3 questions. The percentage was obtained from the comparison of the average number of student achievement scores with the maximum score of the students correct answers.

IV. DISCUSSION

Based on the results of scientific literacy studies conducted by PISA, it was illustrated that the ability of Indonesian students in competing at the International level should be improved. In recent results of PISA, Indonesia has been ranked in low position among the other countries participating in PISA. The science literacy scores of Indonesian students was around 400 points, that mean the Indonesian students was only able to remember scientific knowledge based on simple facts (such as names, facts, terms, simple formulas) and use general scientific knowledge to attract or evaluate a conclusion [14]. The concept of scientific literacy expects the students to have high senses of concern for themselves and their environment in dealing with the problems of everyday life and making decision based on the scientific knowledge.

The definition of scientific literacy in PISA 2012 is related to (1) individual scientific knowledge and ability to use the knowledge to identify problems, acquire new knowledge, explain scientific phenomenone, and draw conclusions based on evidence related to scientific issues; (2) the understanding the main characteristics of knowledge built on human knowledge and inquiry; (3) realizing how science and technology form the material, the intellectual and cultural environment; and (4) the willingness to engage in issues and ideas relating to science [2].

The competence domains based on PISA 2015 measured in this study include a sub-domain of ability to explain the scientific phenomenone, evaluate and plan scientific research, and interpret data and evidence scientifically [1]. These three sub domains are measured through multiple choice questions and essays to find out the students' mastery of science literacy in the competence domain. The result of the analysis showed that 34% of students capable of answering questions correctly and these are interrelated to explaining phenomenon scientifically. This indicates that the students' scientific literacy skills are dominant in the ability to recognize and remember concepts, predict hypotheses, and to apply scientific knowledge in everyday life [1].

The result of scientific literacy skills of competence domain that least controlled by students was interpretation the data and scientific evidence that was 13% of students answer correctly. This showed that the students' science literacy skills was less in the ability to manage data that obtained in the form of tables, diagrams, or graphs; analyze data and draw conclusions appropriately; interpret text or science-related discourse from various sources (newspapers, internet, or journals); and distinguish between scientific arguments and arguments without scientific evidence [1].

Knowledge domains based on PISA 2015 include aspects of content knowledge, procedural knowledge and epistemic knowledge [1]. The analysis result of the showed that the science literacy skills of the knowledge domain of the content sub domain was 37% higher than the other sub domains. This

is supported by research which mentioned the concept of knowledge aspect is higher than the science knowledge aspect in analyzing the text or articles and aspects of problem solving [15]. Based on cognitive learning theory, students use their initial knowledge to process new information by linking the new information with their initial knowledge [16]. Levels of cognitive aspects contained in the student's memory affect the ability of students in identifying scientific issues. The result of the percentage of science literacy skills in the epistemic sub domain is lowest compared to the other, that is 29%. This explained that an understanding of the functions and roles of students in science knowledge was still less applied in the learning of life [1].

The science literacy skills in both domains showed less than 50% percentage, so it can be stated that science literacy skills of SMPN Satu Atap Kenduruan was low. Other supporting studies also mention that the science literacy skills in junior high school was at the low category [2]; [17]; [18]; [19]. The low ability of science literacy makes students difficult to address and make decisions related to science issues in everyday life.

Science literacy can be a benchmark for the future determination of students career, even if the student is not involved in the science [20]. The low of science literacy can be enhanced by appropriate handling, for example by pay more attention to the characteristics and potential of the students, developing appropriate teaching materials, developing appropriate instruments, managing good learning activities, and learning strategies that needed [21]. Learning that is able to arouse students 'curiosity about the topic of learning and encourage the students to solve the problems that presented by the teacher is believed to be able to build the science process skills which is part of the competence aspect of science literacy.

V. CONCLUSION

Based on the results and discussion, it can be concluded that the students' scientific literacy skills of SMPN Satu Atap Kenduruan was low with the percentage of competency domain of 22% and knowledge domain of 34%. The percentage of both domains was still below 50% of the total number of students. From that conclusion it is necessary to make an appropriate strategies and learning methods to improve the students' scientific literacy skills of Satu Atap schools.

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