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# Proceedings of the International Joint Conference on Science and Engineering (IJCSE 2020)

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Preface International Joint Conference on Science and Technology (IJCSE) 2020 was successfully held on October 3, 2020 at Universitas Negeri Surabaya, Surabaya, Indonesia. This conference features three international conferences organized by Universitas Negeri Surabaya including the 3rd International Conference on Vocation Education and Electrical Engineering (ICVEE), the 4th Mathematics, Informatics, Science and Education International Conference (MISEIC), and the 2nd International Conference on Research and Academic Community Services (ICRACOS). The joint conference was completely conducted online using Zoom as a platform. This event was also broadcasted live via an official YouTube channel of Universitas Negeri Surabaya. Through this scientific forum, Universitas Negeri Surabaya invited scientists, education

experts, practitioners, and students all over the world to share and discuss their ideas, research findings, and issues about relevant topics, as well as to build scientific networks. This event shows the the commitment of Universitas Negeri Surabaya in supporting research activities of the community.

A total of 330 papers were submitted to IJCSE 2020. The papers have various topics including electrical, electronics, telecommunication, instrumentation and control, informatics engineering, pure and applied mathematics, science and technology, computer science, and education in mathematics, science, computer science, and engineering. After subsequent reviews on the content, format, and language, 77 papers were selected to be published in this proceeding. The authors of the selected papers came from three different countries, namely Pakistan, Taiwan, and Indonesia. The rest of the papers were selected to be published elsewhere or rejected.

We would like express our best gratitude to keynote and invited speakers for their invaluable contribution and worthwhile ideas shared in the conference. We would also thank to all authors for their contribution to this proceeding as well as our reviewers for their constructive comments and suggestions to improve the quality of the presented papers. The organizing and editorial committee of IJCSE 2020 hopes that the presented papers can serve a reference for the relevant topics and you can enjoy reading this volume of the proceeding.

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using Zoom as a platform. This event was also broadcasted live via an official YouTube channel of Universitas Negeri Surabaya. Through this scientific forum, Universitas Negeri Surabaya invited scientists, education experts, practitioners, and students all over the world to share and discuss their ideas, research findings, and issues about relevant topics, as well as to build scientific networks. This event shows the the commitment of Universitas Negeri Surabaya in supporting research activities of the community.

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77 articles

**Proceedings Article**

## Design and Implementation of Different Types of Smart Dustbins System in Smart Campus Environments

Arifin N. Asyikin, Aulia A. Syahidi, Subandi

In Indonesia, waste is still a very serious problem. Garbage causes bad odors, air pollution, disease, and even flooding. Whenever and wherever each individual produces waste, waste can come from households and industries which have various types and forms. Public awareness to dispose of trash in the...

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#### Proceedings Article

## Early Warning System for Flood Disasters Using the Internet of Things

Yuyun, Hamka Zulfaesa, Latief Arda Abdul

Floods are one of the most frequently occurring natural disasters in Indonesia. It is therefore of special concern to reduce the risk of flood fatalities and other damage. The purpose of this study is to design a flood early warning system based on the Internet of Things (IoT). In this work, we use an...

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#### Proceedings Article

## Deformation of 3D Object of Human Body Internal Organs Using Finite Element Method Approach Accelerated by GPU

Cakra Adipura Wicaksana, Wahyuni Martiningsih

Few years ago, there are some research or publication about 3D simulation especially virtual surgery that still continuous growing, that is 3D deformable

object. The 3D deformable object resembles or mimic some object. The purpose of the research is to continue or add previous research especially in...

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### Proceedings Article

## New Smart Virtual Content for Hanzi Characters in Mandarin Laboratories

S Sunarti, Tiksno Widyatmoko, Lukluk Ul Muyassaroh, Dewi Kartika Ardiyani, Edy Hidayat, Maria Mintowati

Industrial technology is developing rapidly accompanied by learning technology, especially in some virtual applications. Virtual Laboratory is one of the virtual learning applications that is currently being developed in the 4.0 industrial revolution. The use of virtual laboratories in Revolution 4.0...

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### Proceedings Article

## Design of Sea Wave Power Hybrid Power Generation Through Utilization of Wave and Wind Energy as Renewable Electric Energy Sources for Leading, Outermost and Disadvantaged Areas

Masus Subekti, Parjiman, Nur Hanifah

This study conducts the design of sea wave hybrid power plants by combining wave energy with wind energy. Vertical energy of ocean waves is converted into pressurized water energy to rotate turbines connected to direct current generators, while wind energy uses wind turbines connected to direct

current...

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#### Proceedings Article

### Automatic Control Based on Voice Commands and Arduino

Alfiantin Noor Azhiimah, Khusnul Khotimah, Meini Sondang Sumbawati, Agus Budi Santosa

Control that is widely used today was control by voice commands. This study aimed to determine the application of voice and Arduino-based control automation which had been developed from 2014-2020 based on 25 journals that would be studied. Journal assessments were carried out by taking into account...

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#### Proceedings Article

### The Relationship Problem Solving Skills to Critical Thinking Skills in Aircraft Maintenance: A Conceptual Study

Bayu Dwi Cahyo, Luthfiyah Nurlaela, Meini Sondang Sumbawati

Aircraft safety and security is a major factor in aviation. Therefore, ensure the aircraft maintenance and repairs carried out correctly, effectively, and efficiency needed to support these factors. This study aims to explain the importance of an aircraft mechanic to have critical thinking skills and...

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**Proceedings Article**

## Application of Retrieval Information on Android-Based Online Music Course Application

Albertus Dera Andika, Farid Baskoro, Eppy Yundra

This research was conducted to develop a basic design of an android-based online music course application, and to implement an Information Retrieval system to search and find data located on the online music course application. This application was designed using Android Studio software, and thus can...

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**Proceedings Article**

## Analysis of Online Learning Implementation in Undergraduate Students of Building Construction Education in the Pandemic COVID-19

Kusnan, Suparji, Gde Agus Yudha Prawira Adistana, Muhammad Imaduddin, Wahyu Dwi Mulyono, Heri Suryaman

Surabaya State University (Unesa) as an educational actor limits physical distance by implementing online learning activities to break the spread of COVID-19. Online learning is usually carried out at a maximum of three meetings and combined with face-to-face. However, in the even semester 2019/2020...

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**Proceedings Article**

## Effectiveness of Online Learning of Construction Equipment Courses During the COVID-19 Pandemic

Hasan Dani, Puguh Novi Prasetyono, Suryanto HS Mas, Danayanti Azmi Dewi, Nusantara, Amanda Ristriana Pattisinai, Feriza Nadiar

The whole society is affected by the pandemic of coronavirus or COVID-19, even in Indonesia's education sector. One of the government's policies to constrict the spread of COVID-19 is by physical distancing. The education sector's impact is which must be using an online learning platform, which is also...

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### Proceedings Article

## Automatic Hand Sanitizer Container to Prevent the Spread of Corona Virus Disease

Puput Wanarti Rusimamto, Nurhayati Nurhayati, Eppy Yundra, Reza Rahmadian, Arif Widodo, Much Ade Dermawan

COVID pandemic has influenced human life in various sectors. Various attempts were made to reduce the virus transferring by work from home, social distancing, and also including hand hygiene. So far, most of the available hand sanitizers do not operate automatically. This article aims to make an automatic...

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### Proceedings Article

## Analysis of the Use of Virtual Meeting in the Implementation

## of Proposal/Thesis Examination During Covid-19 Pandemic

Dodik Arwin Dermawan, Rindu Puspita Wibawa, Martini D E Susanti

In the early 2020s, Indonesia was shocked by the Coronavirus Disease (Covid-19) outbreak which struck almost all parts of the world. The Indonesian government spontaneously implemented a policy of learning from home, working from home, and worship at home. All face-to-face activities are diverted online....

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### Proceedings Article

## Curriculum Development is Conducted to Improve Competencies of Air Transportation Management Study Program for Cadets of Aviation Polytechnique Surabaya

Ariyono Setiawan, Luthfiyah Nurlaela, Munoto, I Gusti Putu Asto Buditjahjanto, Bambang Suprianto, Yuyun Suprpto, I Gede Susrama Mas Diyasa, Dama Yanti Hilda

The purpose of this study is to provide an analysis of the effect of curriculum development on air transportation management competencies by contributing to cadets at Surabaya Aviation Polytechnic. The design of this study uses quantitative research methods that emphasize numerical data analysis such...

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### Proceedings Article

## Implementation of Google Classroom-Based Learning

## Management System on the Subject Digital Signal Processing and Propagation Antennas as One of the Effective Learning Media in the Middle of Pandemic COVID-19

Farid Baskoro, Miftahur Rohman, Fendi Achmad

Effective learning is quality learning in relation to the effectiveness of the learning process interaction itself to achieve the expected goals. This study aims to determine the effectiveness of lectures in the middle of the Covid 19 pandemic, where learning by face-to-face method is vulnerable to the...

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### Proceedings Article

## Diverse Forms of V-learning Students' Acceptability During the Pandemic Covid-19

Ita Fatkhur Romadhoni, Dwi Kiristiasuti, Luthfiyah Nurlaela, Any Sutiadiningsih, Nugrahani Astuti, Lucia Tri Pangesthi, Sri Handajani, Niken Purwidiani, Suhartiningsih, Asrul Bahar

Covid-19 pandemic encourages online learning to prevent wider spread. Various types of learning platforms were implemented, but there needs to be an evaluation of student acceptance of the platforms. This study aims to assess the impact of v-learning on student acceptance during a pandemic. The v-learning...

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### Proceedings Article

## Schoology and Slido: The Perfect Platform Combination for

## Distance Learning During the Covid-19 Pandemic

Vania Zulfa, Prastiti Laras

The Covid-19 pandemic that occurred worldwide caused a social policy for all citizens to break this Covid-19 chain. However, this policy impacts all aspects of life, including the field of education in Indonesia. The government decided to move the learning process from face-to-face learning to online...

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### Proceedings Article

## The Design and Implementation of Web Crawler Distributed News Domain Detection System

I Gusti Lanang Putra Eka Prisma, Dedy Rahman Prehanto, I Kadek Dwi Nuryana

Spreading data or info through internet to increase the chances of success in a business through analysis of market trends is very common today. Web Crawl is one important thing, so that the incomplete data will not be appeared, and the data received is the most recent data. Exploration Web crawler technology...

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### Proceedings Article

## The Implementation of Project Based Learning Model Towards the Learning Outcome of Subject Wood Structure I

Tuti Iriani, M. Agphin Ramadhan, Nurul Anisa

This study aims to compare student learning outcomes using two different

tasks in the Project Based Learning (PBL) learning model in a wooden structure course 1. The research method used is Quasi Experiment with pretest-posttest design conducted in 4 meetings. The subjects of this study were 36 UNJ Civil...

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### Proceedings Article

## Blood Donor Matching Information Systems and Determining Tools for Blood Cluster and Human Rhesus Based on IoT

Aditya Chandra Hermawan, Ita Mubarokah, Farid Baskoro

Until now, the process of testing human blood groups is still done manually by mixing blood and antisera. Testing is done by observing the agglutination reaction of blood samples. Then the testing process takes a long time, without storing donor data. this is less effective if the blood is tested a lot...

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### Proceedings Article

## Home Monitoring and Control Using Smartphone and Speech Processing

Mochamad Mobed Bachtiar, Bima Sena Bayu Dewantara, Dwi Prastyo

Monitoring and control of home electronic equipment in general is still done manually, this is less efficient if we are not at home but want to monitor the condition of the electronic equipment. With the remote control using a smartphone can be a solution to simplify the control system and monitoring...

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### Proceedings Article

## Design and Development of Chatbot Using Dialog Flow in Surya Sembada PDAM Surabaya City

Ariyono Setiawan, Yuyun Suprpto, I Gede Susrama Mas Diyasa, Chilyatun Nisa, Maulana Idris, Feronika Nur Maghfiro, Yuri Setiawan, Dama Yanti Hilda

Surya Sembada City Surabaya Water Supply Company is a company that provides clean water production. In its service, many complaints are obtained from customers. During this time complaints are carried out manually, of course, less effective. With the development of information technology, the chatbot...

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### Proceedings Article

## The Development of the Sub Instruments of Digital Literacy on the Subjects of Electronics Circuit in Vocational School

Nur Kholis

In this study has the objective to develop sub instruments digital literacy of subjects of electronics circuit in vocational school students. The resulting sub instrument is used to measure the competency of students with the three domains such as affective, cognitive, and psychomotor. This study uses...

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### Proceedings Article

## The Effect of Project-Based Learning Model (PjBL) and Direct Instruction (DI) on Result Learning of the Basics Building Construction and Survey Engineering From Student Learning Motivation

Tri Rijanto, Kusnan Evany Iqrammah

This study aims to: (1) obtain information on differences in result learning, students who use the project based learning model and the direct instruction model in DKTB, (2) answer the differences in result learning of participants students who have high motivation to learn, and students who have low...

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### Proceedings Article

## The Effects of Self-Efficacy on the Competency of Cadets in Aviation Polytechnic of Surabaya

Ariyono Setiawan, Munoto, Eko Hariadi, Luthfiyah Nurlalela, Yuyun Suprpto, I Gede Susrama Mas Diyasa, Dama Yanti Hilda

This research purposes to analyze the effects of self-efficacy on the Competency of Cadets in Surabaya Aviation Polytechnic. This study uses the quantitative approach. The researcher decided to use a polytechnic institution located in Surabaya namely Surabaya Aviation Polytechnic which has competence...

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### Proceedings Article

## Design Automatic Hand Sanitizer Microcontroller Based using

## Arduino Nano and Ultrasonic Sensors as an Effort to Prevent the Spread of Covid-19

Meini Sondang Sumbawati, H Aditya Chandra, Tri Wrahatnolo, Ibrohim, L. Endah Cahya Ningrum, Khusnul Khotimah, Ali Nur Fathoni

The government through the Ministry of Education and Culture (Kemendikbud) has made a decision to suspend teaching and learning activities in schools. The learning process that starts face to face directly in the classroom turns into distance learning /brave. However, the government decided to reopen...

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### Proceedings Article

## Work Analysis of Constant Current Regulator BF 1200 With Current Loop and Gauss Jordan Method as Learning Media for Cadets

Hartono, I.S. Rofdian, H. Slamet

Runway lights at the airport are 1-5 km in length, which always connected in series so the pilots look the same bright lights from the beginning of runway until the end of runway. The same bright lights will be on if runway lights connected in series and every lamp obtains the same current flow. The...

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### Proceedings Article

## Technology Compatibility Factors in the Implementation of the Ovo Digital Payment Application

Rahadian Bisma, Yuanita Puspita, Endang Sulistiyani

Digital developments are increasingly reaching the financial world, leading to a variety of new payment service innovations, one of which is OVO. The emergence of digital payment technology is not necessarily in accordance with the habits of users in using digital payments using mobile devices. Therefore,...

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#### Proceedings Article

## Comparison of Machine Learning Algorithms for Autism Spectrum Disorder Classification

Erina S. Dewi, Elly M. Imah

Autism Spectrum Disorder is one of the fastest-growing neurodevelopmental disorders in the world. These neurodevelopmental disorders often attack children, affecting social development and behavior. Effective early detection of ASD is needed to reduce the risk of ASD in children. This study classified...

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#### Proceedings Article

## Worksheet of Entrepreneurship Students to Train Ecopreneurship Characters

Tutut Nurita, An Nuril M. Fauziah, Siti N. Hidayati

Entrepreneurship is one of the courses in science education study programs that examine the development of products in the form of finished goods, services, learning resources and learning media for science and services that

begin from analyzing market needs, testing the feasibility of products, producing...

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#### Proceedings Article

### Training Science Literacy Skills Through Article Writing on Local Wisdom in East Java

Firas Khaleyla, Dwi Anggorowati, Pramita Yakub, Fida Rachmadiarti

Science literacy is one of main skills students should have in the 21st century. One method to train science literacy is by writing scientific article. The purpose of the study was to improve science literacy of students through scientific writing in exploration of local wisdom in East Java on Conservation...

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#### Proceedings Article

### Contribution of Housewives to Increase the Immunity of Family Members During Covid-19 Pandemic

Dwi A. Rahayu, Reni Ambarwati, Rinie P. Puspitawati, Isnawati, Nur Kuswanti

Currently we are battling with the outbreak of a new type of infectious disease known as coronavirus disease 2019 (COVID-19). This virus causes severe acute respiratory coronavirus 2 syndrome (SARS-CoV-2). The spread of SARS-CoV-2 from human to human becomes the main transmission source; hence the rate...

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### Proceedings Article

## The Effect of Chemiclife Media on Chemical Bond Material Based on Completeness and Student Learning Outcomes

Fawzia Aulia Praptiwi, Rivaldi Dwi Kurniawan, Rusly Hidayah

The aim of the research is to obtain the validity of Chemic-life media on chemical bond material. This research use 4D model (Define, Design, Develop and Disseminate) modified by Ibrahim, for this research the stages of dissemination have not been carried out. Chemic-life Media was tested on 12 students...

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### Proceedings Article

## Biology Online Classes During Covid-19 Pandemic in Indonesia

Eva Kristinawati Putri, Wisanti, Reni Ambarwati, Dwi Anggorowati Rahayu, Firas Khaleyra

Indonesia reduces the spreading of COVID-19 infection by physical distancing. There is no argue that this policy affects all aspects, including education. Online learning has replaced the ordinary procedure of learning, whether we are ready or not. Organizing an online learning becomes an evitable challenge,...

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### Proceedings Article

## Description of Knowledge, Attitude, and Consumption Behavior of Supplements Drink for the Elderly to Improve the Immunity Systems

Tukiran, Mauren Gita Miranti

At the end of March, Indonesia was shaken by a plague that attacks the respiratory system resulting in death. The virus is known as Covid-19 from Wuhan, China. Until May, cases of the spread of Covid-19 have increased in Indonesia with a mortality rate of 6.61%. Some areas have been identified as red...

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### Proceedings Article

## Teaching Strategy in Effective Science Learning Based on Classroom Discourse and Empirical Research

Taufik Muhtarom

The purpose of this article is to explain the results of a study of effective teaching strategies in learning science in the classroom based on classroom discourse and relevant research. The method used is the literature review by collecting and reviewing the results of scientific studies about learning...

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### Proceedings Article

## The Development of Optical Module Based on Science Process Skills

Wahyudi, Nurhayati, Dwi F. Saputri

The optical concept is an important concept that must be mastered by pre-service teacher. The concept is not only obtained theoretically but also through scientific process skills. This requires an optical module based on process skills to assist students in mastering optical concepts. This study aims...

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### Proceedings Article

## Improvement of Self-Efficacy and Student Learning Outcomes on Acid Base Material Using 9E Learning Cycle Model

Tukiran, Fitroh A. Mubarokah, Harun Nasrudin

The aim of the research was to find the effectiveness of developed teaching materials to increase students' self-efficacy and learning outcomes using 9E learning cycle on acid base matter. The teaching materials was applied in SMAN 7 Surabaya toward 36 students of grade XI-6. This research used 4D model...

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### Proceedings Article

## Students' Reasoning With Logical Mathematical and Visual Spatial Intelligence in Geometry Problem Solving

Jafar A. Aziz, Dwi Juniati, Pradnyo Wijayanti

Reasoning in solving geometry problem used by students to recognize shapes, identify properties and analyze relationships between geometric objects. This study aimed at investigating the students' reasoning in geometric problem solving with predominance of different intelligence types. This research...

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### Proceedings Article

## Tomini Bay as a Source of Chemistry Learning

Sandy A. Kusumah, Sri Atun, Hari Sutrisno

This study aims to identify the potential of Tomini Bay resources that can be utilized as a source of chemistry learning. This is a qualitative research using primary data and secondary data. Data collection were conducted through the combination of field research and literature studies. All data were...

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### Proceedings Article

## The Effect of OPPEMEI Model on Students' Creative Thinking Skill and Cognitive Learning Achievement

I Gusti Ayu Tri Agustiana, Rudiana Agustini, Muslimin Ibrahim, I Nyoman Tika

The study was conducted to find out the effect of OPPEMEI model on creative thinking skill and cognitive learning achievement and their correlation in the third semester students of the Elementary School Education Department, Faculty of Education Science of Universitas Pendidikan Ganesha. This study...

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### Proceedings Article

## Developing Android-Based Comic for Learning Quadrilateral to Improve Seventh-graders' Geometric Thinking

Dany Samsurya Kurniawan, Mega Teguh Budiarto, Atik Wintarti

This research was conducted to develop android-based comic learning media and describe the increase in geometric thinking skills after learning to use android-based comic learning media. This comic development process uses the Gall and Borg development model. The stages were needs analysis; product planning...

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### Proceedings Article

## Applying of Search, Solve, Create, and Share (SSCS) Learning Model to Improve Students' Mathematical Quantitative Reasoning

Sugiarti, Mega T. Budiarto, Tatag Y.E. Siswono

The purpose of this study was to determine whether the application of the search, solve, create, and share (SSCS) learning model can improve students' quantitative mathematical reasoning. This study was a pre-experimental research with one group pretest-posttest design. The population in this study were...

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### Proceedings Article

## Vandemicum of Nanogold and Nanosilver to Improve Quality Life of Cancer Patients

Titik Taufikurohmah, Najlatun Naqiyah, Sumarlik, Muhammad F. Ilhamuddin, Ananto Sidohutomo

The purpose of this study was to examine the success of the nanogold and nanosilver drug vandemicum in improving the quality of life of cancer patients. Vandemicum can be interpreted as a guide to treatment in the health sector. The quality of life of cancer patients is influenced by the individual's...

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#### Proceedings Article

### 3D Blender Animation Media as Self-Assessment Implementation in Corrosion Engineering Course

Aisyah E. Palupi, Arya M. Sakti, Bellina Yunitasari, Suparji, Setya C. Wibawa

In the midst of an increasingly widespread coronavirus (COVID-19), online lectures are a solution to keep running teaching and learning activities instead of class meetings. The purpose of this study was to create learning media using a 3D blender animation media and a self-assessment platform as well...

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#### Proceedings Article

### Production of Herbal Mixes (Jamulacang) Instant as an Effort to Increase Immune to Prevent Covid 19

Any Sutiadiningsih, Niken Purwidiani, Agung Prijo Budijono, Yunus, Veni Indrawati, Meda Wahini

This program of activities was carried out in an effort to help prevent the

spread of the epidemic and prevent the transmission of the Covid-19 virus. This prevention effort was carried out by the PKM implementation team by making instant herbal mix herbs made from raw ginger, ginger, secang, cardamom,...

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### Proceedings Article

## Self Concept in Social Behavior Based Android to Boost Family's Immunity in Preventing Covid-19 Spread

Ari Wahyudi, Sugeng Harianto, Agus M Fauzi, Refti H Listyani, Farid Pribadi

The purpose of this study is to develop self concept in social behavior based Android to boost the immunity of family members as the prevention of Covid-19 spread. The developments are (a) self-concept in physical terms including family, school, and children's play environment, (b) self-concept in social...

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### Proceedings Article

## Effect of Cross Section Dimensions to Stiffness and Deflection on Reinforced Concrete Beams

Berkat Cipta Zega, Hakas Prayuda, Dimas Putra Mulia

The strength of reinforced concrete can be planned in various ways, either doing manual calculations, compressive strength testing, or testing using applications. Therefore, an accurate result approach can be obtained, one of which is by using the Response-2000 application program. This research aims...

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### Proceedings Article

## Issues on Academic Writing Consultation: Alternative Online Platforms for Graduate Students

Eppy Yundra, Utama Alan Deta, Yetty Septiani Mustar, Muhammad Abdul Ghofur, Sueb

During the global pandemic, academics have experienced a challenging transition period that affects the learning process, leading to disruption in adjusting the existing learning modes. More specific problems faced by graduate students upon the research consultation and writing scientific reports from...

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## Sugar and Cooking Oil Consumption in Surabaya

Amalia Ruhana, Choirul Anna Nur Afifah

The consumption patterns of urban communities has been shifted and leading to fast foods. Fast foods contained high sugar and fat so they tasted delicious and became favorite for many people. Excessive consumption of sugar and fat might lead to overweight and obesity, which increased the risk of coronary...

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Leny Yuanita, Wahyu Budi Sabtiawan, Prima Retno Wikandari, Dhita Ayu Permata Sari

Yacon (*Smallanthus sonchifolia*) was a potential plant to be developed: its tubers were as antidiabetic sweetener, anti hypercholesterolemic, contains antioxidant polyphenols especially chlorogenic acid and cancer prevention; the leaves contain high protein and as an anti-fungal. The main bioactive compounds...

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Lila Yuwana, Suyatno, Susilo Indrawati, Alfi Tranggono Agus Salim, Sudarsono, Niniet Indah Arvitrida

Generally, syrup production requires press machine to minimise time production. This paper reports detail design and construction of mangrove fruit press for syrup production purpose. The previous survey of syrup production in Wonorejo Rungkut Surabaya indicated that time production took a long duration...

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Some diseases are transmitted through droplets or touch and contact with patients. Transmission can also occur with objects that are often touched by patients. This contact is impossible to avoid for medical personnel who care for patients, therefore the effort made is to minimize contact with patients...

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Luthfiyah Nurlaela, Eppy Yundra, Ita F. Romadhoni

One of the efforts that can be made to prevent the spread of Covid-19 is to increase the body's immunity, especially for residents who are affected. The purpose of this study was to determine the results of the starfruit syrup made with the addition of the herbal ingredients of turmeric (*Curcuma longa*)...

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## Nutridrink TOGA as an Alternative to Maintain Body Immunity Against Covid

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Family medicinal plants have played an important role since ancient times in maintaining health, maintaining stamina and treating diseases. Therefore, the TOGA plant has become part of local wisdom in the life of Indonesian society until now. This study aims to determine the level of acceptance of family...

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Nia Kusstianti, Sri Usodoningtyas

Coconut milk is a milk-white liquid and comes from grated coconut meat

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Oce Wiriawan, Donny A. Kusuma, Nurhasan, Abdul Hafidz, Arifah Kaharina

Fitness indicators have a close relationship with several health indicators. Besides, that has a function to find out the people's fitness indicators, and it also has the potential to gain the fitness targets that can be achieved by doing physical exercise. However, the high variation in fitness assessments...

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Puput W. Rusimamto, Rina Harimurti, Endryansyah, Yeni Anistyasari, Lilik Anifah

Researchers designed and implementation of thermal body measurement system for Unesa residents when they entered the building. The system design is made using engineering methods. Before body temperature is measured, the object will occupy a position at a predetermined point. At that point installed...

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Rifqi Firmansyah, Muhammad Badruddin A. Mustofa, Muhammad Eko Prasetya, Pressa P. Surya Saputra

The progress of space technology in various countries is increasing rapidly. In Indonesia, there is a Non-Government Organization Ministry of Indonesia who carries out government duties in the field of aerospace research, development and utilization. The institute is known as LAPAN (National Institute...

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## The Study of Amylase's Reaction Kinetics From Soybean Sprouts (*Glycine max L.*) in Hydrolyzing Starch

Rudiana Agustini, Nuniek Herdyastuti

Amylase is an enzyme that has a role in hydrolyzing starch. This enzyme can be obtained from germinated seeds, one of them is soybean seed sprouts. The research aimed at studying the reaction kinetics in hydrolyzing the substrate, which is called starch, has been done. The research was conducted in three...

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## Synthesis Hydroxyapatite/Collagen/Chitosan Composite as Bone Graft for Bone Fracture Repair

Sari E. Cahyaningrum, Amaria, Muhammad I. F. Ramadhan, Nuniek Herdyastuti

Composite hydroxyapatite-collagen-chitosan as bone graft materials for bone fracture has been synthesized using ex-situ method. Combining the advantages of hydroxyapatite with chitosan and collagen as composites bone material that it show good biocompatibility and can bond with surrounding host tissues...

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## Student Learning Independence in Online Learning Depends on Motivation

Meini Sondang Sumbawati, Munoto, Ismet Basuki, Euis Ismayati, Tri Rijanto

Online learning requires high internal motivation and learning independence to achieve satisfying results. Student learning independence is a internal ability to study independently, and can overcome its own problems related to the internet and the use of applications, so as to be able to motivate themselves...

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Sri Dwiyanti, Siti Sulandjari, Dindy S. Megasari, Nia Kusstanti, Mutimmatul Faidah, Sri Usodoningtyas

Solid bath soap is a product that is used as a body cleansing agent or certain parts of the body. A good soap serves to cleanse, not damage the skin and can protect the skin from disease by microorganisms. In addition to the main ingredients, soap can be added natural ingredients that contain compounds...

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Novi Sukma Drastiawati, R. Soekrisno

Failure on reheater tube was rupture. Scale latched on the outer surface and progressively thinning thickness with a minimum thickness of tube rupture at the nearest corner. An analysis of this research is to find the cause fracture mechanism and prevent similar failure. The mechanical analysis used...

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## Development of Physical Distancing Detector (PDD) Integrated Smartphone to Help Reduce the Spread of Covid-19

Suryanti, HP Paksi, VD Wicaksono, W Widodo, I Sucahyo

The Government of Indonesia has issued rules on how to avoid covid-19 transmission, namely through various means including social distancing (SD)

and physical distancing (PD), at least 1 meter. Until now to run the PD protocol based only on estimates, there has been no safe distance detection tool between...

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Susilo Indrawati, Diky Anggoro, Heru Sukamto, Nurrisma Puspitasari, Sungkono, B. Indarto, Suyatno, Gontjang Prajitno, Niniet I. Arvitrida, Lila Yuwana

According to the statistics agency in 2017, banana production had the largest portion in Indonesia. Furthermore, banana production increased from 6.28 million tons to 7.04 million tons. Consequently, this tremendous production lead to an increasing of pseudostem waste. Through a research-based community...

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## Provision of Health in Rural Areas of Pakistan Through Community Health Centers

Muhammad Saud, Marwa Aymen, Shah Faisal, Meliana Handayani, Muhammad Anns

The role of Community Health centers apart from the traditional hospital setting is meant to provide and promote the health care needs of the

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P. Puspitaningayu, N. Funabiki, R.W. Sudibyoy, H. Briantoro, Nurhayati, T. Wrahatnolo

The promising purpose of wireless body area networks have brought a new paradigm in many aspects such as healthcare, lifestyle, and entertainment. One of the most popular sensors is the accelerometer which meant to monitor movements of its user. With the help of MEMS technology, an integrated chip which...

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Alifah, Titin Siswantining, Devvi Sarwinda, Alhadi Bustamam

Diabetic retinopathy, which is one of the complications in diabetes, is an eye disease that can lead to blindness. The damage happens in retina as result of a long period of diabetic mellitus. People usually do research using image data in diabetic patients. This paper presents the idea of using feature...

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Humaidillah Kurniadi Wardana, Imamatul Ummah, Lina Arifah Fitriyah

Diabetes Mellitus (DM) is a frightening type of disease because DM causes complications for the patients if it is not treated quickly. From year to year DM in Indonesia undergone a significant increase and was ranked 6th in the world. In this study, a fuzzy logic system was created for the early diagnosis...

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## Prototype Design of Transmission Trainer as Learning Media to Support Student's Learning Interest

Mohammad Munib Rosadi, Retno Eka Pramitasari, Ali Hasbi Ramadani

Based on observations, there were some students who felt sleepy or were not interested in the materials being taught, even though the presenter had prepared good presentation and explained it coherently, especially in engineering subjects. Therefore, tools in the form of learning media are needed. This...

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Rifqi Firmansyah, Muhamad Yusuf, Pressa P. Surya Saputra, Muhammad Eko Prasetyo, Fahmi Mahardi Mochtar, Fandik Agung Kurniawan

Water heaters are currently needed especially in the industrial world. This heater is used to maintain the temperature of the liquid so that the products produced are appropriate with standard specifications. Along with technological developments in recent years, circulating water heaters still use conventional...

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Juan Ardi Kusuma, Firman Yasa Utama

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Maria Paristiowati, Zulmanelis, U Dessy Indira, K Novita Lutfi

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Anita Qoiriah, Rina Harimurti, Andi Iwan Nurhidayat, Asmunin

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### The Development of Students' Learning Material on Arithmetic Sequence Using PMRI Approach

Ichdar Domu, Navel Oktaviandy Mangelep

The aim of the learning process in this study was to help students find

concepts on arithmetic sequence materials using the approach of Pendidikan Matematika Realistik Indonesia (PMRI) as well as produce a path of arithmetic sequence learning using PMRI approach. This research method was design research...

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PSmet Basuki, Joko, Anil Widodo

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# The Effect of OPPEMEI Model on Students' Creative Thinking Skill and Cognitive Learning Achievement

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## ABSTRACT

The study was conducted to find out the effect of OPPEMEI model on creative thinking skill and cognitive learning achievement and their correlation in the third semester students of the Elementary School Education Department, Faculty of Education Science of Universitas Pendidikan Ganesha. This study was an experimental research with the Post-test-Only Control Group Design. The result of the descriptive statistical analysis showed that the students' creative thinking skill and cognitive learning achievement in the experiment class was higher than that of the control class. Furthermore, the result of inferential statistical analysis showed that there was a significant effect of the OPPEMEI model on the students' creative thinking skill and cognitive learning achievement with a positive correlation coefficient of 0.689 (medium correlation).

**Keywords:** *OPPEMEI teaching model, creative thinking skill of the prospective elementary school teachers, science concepts, cognitive learning achievement*

## 1. INTRODUCTION

This template, Creative thinking skill is one of the key competencies in the 21st century. An individual's level of flexibility is very important in meeting the complex and fast changing opportunities and challenges in this global era. Creative thinking skill is one of the forms of creativity in teaching. Its mechanism can be shown by cognitive flexibility in the students [1]. Hence, studies on creativity are not only acknowledged in science and art [2][3][4] it is also proven to play an important role in solving daily problems [5][6][7][8][9]. Due to its crucial role in innovation, creation of new ideas and problems solution it has become the main focus of attention in most organizations and businesses [10], and some experts call it creative economics [11][12]. An important concept is that "innovation will become the most important factor in determining success in the future" [13]. Initiative to facilitate creativity is very important since a crisis in creativity has been identified, which shows a significant decrease in creativity since 1990s [14][15][16]. Creative thinking skill is attached to the normative function rather than to

the inborn attitude. Hence, creative thinking can be trained [17].

The training process to develop creative thinking ability in science teaching still faces some constraints due to the varied backgrounds of the students of the Elementary School Teachers Education. Some have language major, some social science major and other science major. With the introduction of a generic curriculum the students who take science are very varied so that they have not reached a maximum learning in developing creative thinking ability. Thus, science teaching model needs to be taught to the students optimally so that the implementation of a new model to improve creative skill is interesting to be investigated [18]. Fazilla found that the students of Elementary School Teachers Education were given Science Students' Worksheets, if the meaning and benefit of science teaching was understood correctly, then the level at which it could be implemented and the level at which it could be evaluated were high, and the science teaching was effective [19]. The strengthening of the effect of teaching by OPPEMEI model is interesting to be conducted since the creative model

developed consists of some stages (1) orientation, (2) exploration of creative ideas (3) investigation, (4) elaboration, (5) presentation of results (6) evaluation as a reflection and revision, and the last one (7) implementation. This model is called OPPEMEI with 7 phases [12]

Based on the points above, this study was done to answer the following questions : a) does OPPEMEI model have some effect on creative thinking skill and science learning achievement of the students in basic science at Undiksha?; b) Is there any correlation between creative thinking skill and basic science after the students are taught with OPPEMEI model in the third semester at The Elementary School Education Department of the Faculty of the Education Science at Universitas Ganesha.

## 2. METHOD

This study was a quasi experimental research that investigated the effect of OPPEMEI teaching model on the cognitive achievement in Elementary School Science and creative thinking skill. The study used post-test control group experimental design. The population in this study consisted of all third semester students. The sample was selected by using the cluster random sampling technique. Based on the technique, Class A were selected as the experimental group and Class B as the control group, each consisting of 29 and 28 students respectively of the Elementary School Education Department of the Faculty of Education Science of Universitas Pendidikan Ganesha in the academic year 2017/2018. Class A (the experimental group) used OPPEMEI teaching model while Class B (the control group) used the conventional teaching model. The dependent variables in this study were science cognitive learning achievement and creative thinking skill. To collect the data, a cognitive learning achievement test of material change in an essay format and a creative thinking skill test in an essay format were used.

The cognitive learning achievement test covers all of the cognitive levels in Bloom's taxonomy: C1 (recall), C2 (understanding), C3 (application), C4 (analysis), C5 (evaluation), and C6 (creation) in the topic of material change. The creative thinking skill test covers four indicators of creative thinking: fluency, flexibility, originality, elaboration and evaluation [19] [20]. The data analyses used were statistical analyses: descriptive and inferential statistics. The descriptive analysis was used to describe attitude and cognitive learning achievement in basic science of the students while the inferential analyses consisted of normality test and homogeneity test using SPSS-2020. The normality was tested to know whether the data obtained from the respondents had a normal distribution or not by using Kolmogorov-Smirnov Test while the homogeneity testing was done by using a two-way ANOVA. To test

the second hypothesis, Pearson correlation analysis was used while to test the significance t-test was used.

## 3. RESULT AND DISCUSSION

This study was conducted for eight meetings in the experiment class giving a treatment of an implementation of OPPEMEI teaching model in Class A, with the teaching syntax as follows: 1) orientation phase, that is to prepare the students psychologically and physically to follow the teaching process; the lecturer motivated the students to learn contextually according to the benefit and the application of the material in daily life, by giving some examples of the application of science in daily life; the lecturer gives problem/ questions that relate the prior knowledge of the students to the topic to be learned; the lecturer explained the learning objective of problem solving by telling the students the learning experience that will be experienced and directing the students to form groups, each with 4-6 heterogeneous members to do an investigation together, 2) creative idea development phase in which the students explore creative ideas to find claims as a form of freedom to make as many claims as possible by (1) making as many statements of problem as possible, (2) determining variables, (3) formulating hypotheses freely and openly according to their cognitive ability and, (4) designing experiments freely and creatively by using materials and tools for scientific purposes 3) Investigating phase in which the students test hypotheses concerning the problem that has been selected by exploring learning resources, then together with the group exploring various sources such as textbook and other references to support creative ideas in answering problems and collecting data through an investigation/ experiment or by doing creative tasks guided by students' worksheet. 4) Elaboration phase in which the students develop values of cooperation in themselves, both in communicating, expressing opinions and defending ideas/ opinions, appreciating other's opinions and communication ability, applying the ability to collect information through discussions about other problems in groups. 5) presentation of results in which the students prepare results of investigations/ experiments such as reports; the students display/ present the results in an open-discussion, other groups give comments or their opinions. 6) evaluation phase in which the students make an evaluation to verify creative thinking, and knowledge acquired during the teaching process; the students analyze, synthesize, make conclusions of the concepts of knowledge from the teaching process, and the students take the creative thinking test 7) implementation phase in which the students apply theories/concepts they got from the teaching process by stating new problems ( authentic problems related to the topic) [18].

In the conventional teaching model in Class B (control), after the treatment is over, the activity ends with a test of creative thinking skill to know the increase in the students' creative thinking skill after the teaching process is over.

Before testing the hypotheses, a prerequisite test was conducted which consisted of normality test and variance homogeneity test. The result of the prerequisite test showed that the data had a normal distribution, homogeneous, linear, collinear, and there was no interaction between covariate variables and dependent variables.

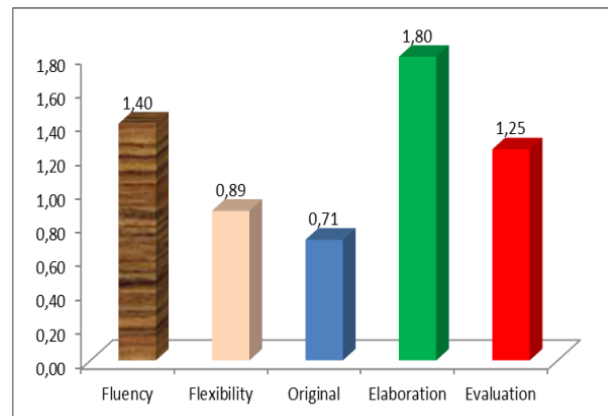
From the study that has been conducted data on the posttest of the students' creative thinking skill and cognitive learning achievement were obtained. Based on the scores of the posttest improvement in cognitive learning achievement of the students was determined through statistical analysis computation. It turned out that there was an improvement in learning achievement and creative thinking skill. The normality test of the control and experimental groups showed the result of normality. The level of significance was  $0.987 > 0.05$  for the control class which showed that the data were normal and the normality test of the experimental group showed the level of significance of  $0.783 > 0.05$  which showed that the data were normal too so that it was feasible to continue to the next testing. The first hypothesis that states that there is a difference in the students' cognitive learning achievement of the students who learned through OPPEMEI model and those who learned through the conventional model was accepted. The level of significance was  $0.00 < 0.05$ . Thus, there was a significant difference in the students' creative thinking skill between the experiment class and the control class. In other words, the use of OPPEMEI can improve the students' creative thinking skill in learning Science as shown by Pearson correlation of 0.689. After being given a treatment in the form of a different teaching model there was a difference in the students' cognitive learning achievement. The mean score in creative thinking skill from the posttest result of the control class who were taught with the conventional teaching model was 71.43 while that of those in the experiment class who were taught with OPPEMEI teaching model was 91.21. These data show that there was a significant difference in the students' cognitive learning achievement.

**Table 1.** Correlation between creative thinking skill and learning achievement

		Creative Thinking Skill	Learning Achievement
Creative Thinking Skill	Pearson Correlation	1	.689**
	Sig. (2-tailed)		.000
	N	57	57
Learning Achievement	Pearson Correlation	.689**	1
	Sig. (2-tailed)	.000	
	N	57	57

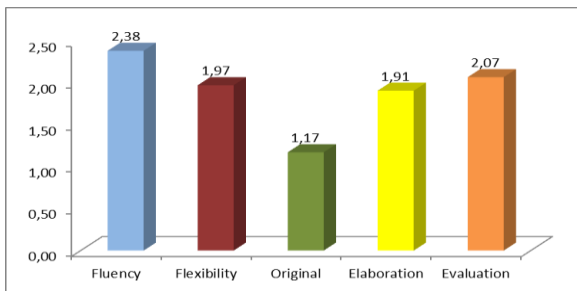
\*\* . Correlation is significant at the 0.01 level (2-tailed).

Then the inferential statistical analysis showed that there was a significant effect of OPPEMEI model on creative thinking skill of the students and they had a positive correlation of 0.689 (medium correlation). The achievements of the control class and the experiment class for the creative thinking indicators were as follows. For the control class: fluency= 1.40, flexibility = 0.89; originality =0.71, elaboration= 1.80 and evaluation = 1.25, while for the experiment class: fluency= 2.38, flexibility= 1.97, originality=1.17, elaboration =1.91 and evaluation = 2.07.



**Figure 1** Indicators of creative thinking skill for the control class

The experiment class could show an improvement in creative thinking skill of the students/OPPEMEI model consisted of seven phases: (1) orientation, (2) exploring creative ideas, (3) investigation, (4) elaboration, (5) presentation of results, (6) evaluation, and (7) implementation. The use of this model stems from cognition motivation theory that believes that individuals are motivated to perform an action from their minds when given a stimulus with various problems which are contextual so that a deeper understanding will be developed in addition, the construction of creative thinking skill can be developed better.



**Figure 1** Indicators of creative thinking skill for the experiment class

In the orientation phase, the students were required to have fluent thinking ability (fluency) that was focused and could improve curiosity and enjoyment in solving scientific problems. Fluent thinking could be initiated in two problems: that is, the cue of fluency was used to monitor the start: fluency in answering, or speed that produced an initial answer, intuitive, and perceptual fluency, or ease of problems that could be read [21]. The advantage of the orientation phase compared to its trivial model is in the aspect of giving simpler examples, to simplify problems.

The second phase, the exploration of creative ideas. The students in this phase explored creative ideas in solving problems by making problem statements, formulating hypotheses, determining variables, defining variables, and designing the experiment procedure. The students can learn optimally if the lecturer gives an intrinsic motivation appropriately [22]. The students are given ambivalent/ ill structured problems which can increase curiosity [23]. In this phase the students can develop integrated and comprehensive understanding.

The third phase was investigation. The lecturer accompanied the students to investigate according to the design that had been determined. Accompanying the students to classify data and facts obtained well. The students could determine the best way to solve scientific problems in a small group. The students had an open mind to various situations and were able to make a mental picture or the problem faced.

The fourth phase was elaboration, developing and enlarging a new idea (originality), making into detail the solution to the problem and scientific argumentation contained in the report of the investigation. The empirical support provides a learning environment that matches the students' needs [24] the elaboration phase could be modified to improve cooperation and provide more time to a heterogeneous group. The aspect of problem solving was given more details so that it could increase high order thinking of the students. The fifth phase was presenting results. The students could think fluently to produce many ideas/ answers relevant to the scientific problems given and had the ability to think flexibly to defend and accept opinions. They could express ideas/ descriptions of experiences resulted from

an investigation in detail. This phase needs supports and strongly controlled time management. The students can fluently present the results of their investigation.

The sixth phase was evaluation. In this phase the students evaluated the situation related to the problem solving. They could evaluate the results of teaching in terms of process and product. This needs a rubric of evaluation. It can become an inspiration for those with high and low IQ.

The seventh phase was implementation. The students could implement originally theories/ concepts to produce a reflection (evaluation) and a final evaluation of the creative thinking skill to obtain a significant knowledge. This needs a teacher that is able to implement new ideas in daily life, optimizing the mastery of concepts and creative thinking ability to make the students enjoy and love the learning process.

Viewed from creative thinking skill, it can be concluded that there was an increase. This condition could occur because of the implementation of OPPEMEI model with systematic phases to stimulate students' activities starting from orientation. In the orientation phase the students used their ability to listen and observe and then entered the phase of thinking to explore creative ideas until the final phase of implementation. This is in line with the Confucius' saying "I hear and I forget. I see and I remember. I do and I understand." [25].

Creative thinking skill improves when OPPEMEI model is implemented. This is closely related to the psychological factor known as "self concept". Self-concept is not an inborn factor, but a factor that is learned and developed through individual experiences in relationships with other people. Thus, an individual's view about himself or herself is influenced by how he or she interprets others' views about himself or herself. Thus, it becomes a natural condition that every human has a different ability. This can occur since human has the ability to reflect about himself or herself which is called "self-concept" [26]. Rahman's study showed that self-concept influences students' creative thinking ability. Self concept is closely related to the number of responses. The higher their self-concepts show the more their activities [27].

Flexibility of the students also increases when OPPEMEI model is implemented. This can be explained that the model actually uses scientific approach. This approach can be viewed in the investigation phase. Scientific approach is effective in improving flexibility in the teaching of basic science concepts [28].

This increase is supported by habitus theory in which the result of the internalization of social world structure or internalized social structure. Habitus is the product of history that develops after a human is born and interacts with the society in certain spaces and

times. Creative thinking skill can be increased through the support of OPPEMEI model, since the orientation phase gives a full picture of an object. The orientation phase plays an important role that needs to be used to increase performance [29].

The use of OPPEMEI model, especially after the orientation phase, which is continued with the exploration of creative ideas, can produce creative thinking skill, since these phases stimulate motivation. Motivation built in the first phase will provide the power to explore to individual's ability [29]. Motivation in a group strengthens the occurrence of individual's scaffolding and group play that is built in the group motivates creative thinking, and working in group in OPPEMEI model produces competitions that make creative thinking skill, especially in the original indicator, continue to develop [30].

#### 4. CONCLUSION

Based on the study done it can be concluded that the result of inferential statistical analysis shows that there is a significant effect of OPPEMEI model on the creative thinking skill and the cognitive learning achievement of the students and they correlate positively at 0.689 (medium correlation).

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