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The International Conference on Science and Technology (ICST) was held at the Bali Nusa Dua Convention Center, 18-19 October 2018. This conference is an international platform for scholars, researchers, practitioners, and government officials to discuss interdisciplinary research and practices.

Please click here for the conference website. (*Conference website no longer available.*)

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Proceedings of the International Conference on Science and Technology (ICST 2018)

PREFACE

The Organizing Committee of ICST 2018 is proud to present the proceedings of the International Conference on Science and Technology (ICST 2018: <https://www.bali-icst.org/>), held on October 18-19, 2018 in Bali, Indonesia. The theme of this conference is Science, Technology, Innovation, and Education for Sustainable Development to Support Community Empowerment.

This conference is an international platform for scholars, researchers, practitioners, and government officials to discuss interdisciplinary research and practices.

ICST 2018 has received more than 300 manuscripts. And 229 submissions have been accepted by our reviewers. By submitting a paper to ICST 2018, the authors agree to the review process and understand that papers undergo a peer-review process. Appropriately qualified experts have reviewed manuscripts in the field selected by the Conference Committee, who gave detailed comments and if the submission gets accepted-the authors to submit a revised version that takes into account this feedback. The Committees of ICST 2018 invest significant efforts in reviewing the papers presented to the conference and organizing the sessions to enable the participants to gain maximum benefit.

Finally, we would like to thanks all the authors, speakers, and participants of this conference for taking part in and contributing to the International

Conference on Science and Technology. (@ICST 2018 Organizing Commit

October 18 to 19, 2018

With our warmest regards,

Madlazim

Conference General Chairs

Bali, Indonesia

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Decision Support System: A Prototype for Determining Rice Price Based on Its Quality Measurement

Rizka Hadiwiyanti, Prisa Marga Kusumantara, Dedi Anugrah, Tri Lathif MS

Quality measurement of rice is an important and necessary activity before it is sold to market. By distinguishing its quality, pricing will also be suitable by the physical characteristics of rice delivered by farmers. This paper proposed a prototype of DSS application to assist intermediaries in determining...

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Prototvpe of Voice Commanded University Executive

Business Intelligence Assistant (BELA)

Mohamad Irwan Afandi, Eka Dyar Wahyuni

Higher education institutions have already started implementing business intelligence application in order to support university executives to make better decisions. Normally, an application is operated using a mouse, keyboard, or touch-screen device which in some cases is not suitable for the users....

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Unsupervised Image Segmentation Algorithm using Superpixel and Cosine Similarity

Wahyu S J Saputra, C Aji Putra, Yisti Vita Via

In computer vision, image segmentation is a process of dividing image to get several segments of image. Image segmentation aim to divide image into simple section that meaningful and easy to analyze. Image segmentation regularly use to locate boundary of object in image, so object in image can analyzed....

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Optimization of Student Interest Selection Using Artificial Neural Network and Rete Network

M. Syahrul Munir, Eva Y Puspaningrum, Dimas Eko Wicaksono

The need for a prospective student to know the interest of the field of study at the college according to his intelligence becomes one of the complex problems. The selection of the right field of study makes the prospective students more enthusiastic to attend college and graduate on time.

Therefore...

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The Robust Regression Performance for Face Recognition with Lighting Condition Variation of Training Data

Budi Nugroho, Anny Yuniarti

In this research, the Robust Regression method used for face recognition tested its performance with illumination variations on the training dataset. Experiments were carried out using Cropped Yale Face Database B. By using this standard face database, generally the data for the training process used...

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IoT-based Intelligent Fishcarelab System (IFS) for Koi Fish Monitoring System

Minto Waluyo, Basuki Rahmat, Tuhu Agung Rachmanto, Mohamad Irwan Afandi, Helmy Widyantara, Harianto Harianto

Internet of Things (IoT) allows connections between devices using an internet connection with the ability to collect and exchange data. This research utilizes the IoT network to monitor the growth of koi fish in the pond. By utilizing the NodeMCU microcontroller, temperature and pH sensors, the sensor...

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CNN and SVM Based Classifier Comparison to Detect Lung Nodule In Computed Tomography Images

I Wayan Budi Sentana, Sri Andriati Asri, Naser Jawas, Anggun Esti Wardani

Convolutional Neural Networks (CNN) are biologically-inspired variants of Multiple Layer Perceptron (MLPs). Meanwhile, support vector machines (SVMs) are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. In some research...

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Hydrolysis of Glucose from Bamboo with Micro Controller PID type Arduino UNO and Fuzzy Method

Ni Ketut Sari, Dira Ernawati, Intan Yuniar Purbasari, Basuki Rahmat

Glucose needs each year has increased significantly while glucose production has decreased, this is because supplies of the raw materials limited, where bamboo is one of the raw material alternatives to glucose. The selection of bamboo plants based on levels of cellulose which ranges from 42.4%-53.6%,...

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Making Bioethanol from Glucose Off Grade With Fermentation Process Using Fermiol

Ni Ketut Sari, Khurniawati Khurniawati, Uman Fathoni, Widi Wurjani

Fermentation can be defined as a process of anaerobic oxidation of carbohydrate which produces alcohol and carbon dioxide. Batch fermentation is fermentation system closed, where there is no addition of new media, there

are no additions (O₂), antifoam, acid/alkaline pH control is done in a way fermentation...

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Optimization of Slice Thickness, Drying Method, and Temperature of Turmeric Rhizome (*Curcuma Longa L.*) Based on Water Content and Functional Compound Degradation

Pirim Setiarso, Nita Kusumawati, Rusijono Rusijono, Supari Muslim

The research of oven-based drying technology on the production process of turmeric rhizome (*Curcuma Longa L.*) with thickness 0.15 and 0.30 cm have been. A number of parameters, such as slicing thickness, drying methods and temperatures are optimized, to achieve water and functional compounds (essential...

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Impact of Lapindo Hot Mud Flowing on Macrozoobenthos Communities in Estuary Porong, East Java

Tarzan Purnomo, Fida Rachmadiarti, Soegiyanto Soegiyanto

Estuary Porong is part of the east coast of Sidoarjo, East Java, which receives the Lapindo mudflow. Lapindo mudflow into the sea through the Porong river has caused sedimentation and changed the Porong river base substrate morphology so that it affects the organism that live in the estuary, especially...

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Specific Oxygen Reaction through analysis of Malondialdehyde in the body of Methapire postuma

Widowati Budijastuti, Nur Ducha, Dyah Hariyani, Sunu Kuntjoro

The purpose of this study was to evaluate the specific oxygen reaction on the body of Methapire postuma worms found in Pb metal contaminated areas. This study uses exploration methods with selected samples in Bangkalan. The body of the worm was cut off on the spermateka, vesicles and prostate sections...

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The Morphological, Anatomical, And Physiological Characteristics of Elephantopus scaber As Explant Source For Tissue Culture

Yuliani Yuliani, Sari Kusuma Dewi, Fida Rachmadiarti

The purpose of this study was to describe morphological characteristic (leaf area, plant height, and leaf sheath), to describe anatomical characteristic (trichomes found in leaf sheath, veins, leaf blade and stem, to describe the physiological characteristic from phytochemical tests of secondary metabolites...

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Enhancing Problem Solving Skills of Pre-Service Teachers by Integrating 21st Century Interdisciplinary Theme Into Science Class

Dhita Ayu Permata Sari, Wahono Widodo, Elok Sudibyo

Mastery of key academic subjects in school is not enough to succeed in the 21st century. Some specific skills, such as problem-solving, is needed. On the

other hand, it is also important to foster understanding of academic content at much higher level by relating 21st-century interdisciplinary theme,...

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Efficiency of Optical Sensors with Quasi Gaussian Beam for Determining Cholesterol Concentration

Mohammad Budiyo, Suharningsih Suharningsih, Moh Yasin

Research on fiber optic sensors with Quasi Gaussian beam has been carried out aiming to analyze the beam intensity profile of the light beam, sensor performance and sensor sensitivity to determine cholesterol concentration. The concept of laser beam propagation is guided by an optical fiber bundle in...

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Exploring Pre-service Science Teachers' Capabilities in Competing for National Scientific Fair through SETS Learning

Aris Rudi Purnomo, Martini Martini, Laily Rosdiana, Wahyu Budi Sabtiawan, Hasan Subekti

To participate in the National Scientific Fair, pre-service science teachers (PSTs) need to prepare their capabilities in the competition. This study used survey to explore the capabilities of PSTs in terms of preparing scientific proposal, assessing proposal format and surveying PSTs perception. Rubric...

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Soil Physic and Chemistry Characteristics on Pesticide Application of Soybean Land in Jombang, Lamongan and Probolinggo

Mahanani Tri Asri, Tarzan Purnomo, Yuliani Yuliani, Fida Rachmadiarti, Evie Ratnasari

Applications of pesticides on crop land have been used by soybean land farmer in Jombang, Lamongan and Probolinggo in order to control pest. Pesticide application of soybean land influence physic and chemistry soil, against growth of plant furthermore. This study aimed to identify soil physic and chemistry...

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Study of Kana (*Canna sp*) and Butterfly (*Bauhinia purpurea*) Plants as Leading Absorbents (Pb)

Sunu Kuntjoro, Fida Rachmadiarti

According to the Environment Project Agency (2007), about 25% of lead (Pb) remains in the engine and the other 75% will pollute the air as exhaust fumes. Kana (*Cana sp*) and Butterfly plant (*Bahuinia purpurea*) are plants that are suitable for the needs of urban forest plants. Studies related to the potential...

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Curriculum Implementation in Biology Program of Universitas Negeri Surabaya

Ahmad Bashri, Rinie Pratiwi Puspitawati, Muslimin Ibrahim

This study aims to describe the effectiveness of curriculum implementation in the Biology Program, implementation of curriculum implementation in the Biology Program, and obstacles in implementing the curriculum. This research is an observational study, which observes curriculum documents and their implementation....

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Azolla microphylla and Pistia stratiotes as Phytoremediator of Pb (lead)

Fida Rachmadiarti, Herlina Fitrihidajati, Tarzan Purnomo, Yuliani Yuliani, Dwi Asih Wahyuningsih

Azolla microphylla and Pistia stratiotes were type of plants which used as alternative to remove pollutant from contaminated water. This study aimed to determine efficiency of Azolla microphylla and Pistia stratiotes as phytoremediator of Pb. These plants were grown in 14 days under hydroponic system...

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Characterization of Microorganism Isolated From "Fermege": The Ruminant Fermented Feed from Water Hyacinth (Eichhornia crassipes)

Isnawati Isnawati, Guntur Trimulyono

The aim of this study was to determine the number of bacteria and fungi the fermentation process and characterization of these microorganisms. There were several steps in this research including production of fermented feed, isolation of indigenous microorganisms, purification, characterization of...

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Improving the Quality of Goat Sperm through the Implementation of Fermented Feed based on Water Hyacinth: Fermege Formula 3

Evie Ratnasari, Herlina Fitrihidajati, Isnawati Isnawati

Fermented feed made from water hyacinth contain high nutrition, increase goat weight, improve carcass quality and improve the reproduction system of goats. The aims of this study were determining the effect of fermege formula 3 on the quality of goat spermatozoa was compared to conventional feed. This...

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Improving the Quality of Tofu Liquid waste by the Sedimentation Process and the Phytoremediation of Water Hyacinth (*Eichornia crassipes*)

Herlina Fitrihidajati, Fida Rachmadiarti, Dwi Savitri Vidyawati

Waste from the tofu industry produced the pollutant like NH₃, NO₂, NO₃ with high content that caused environmental pollution. Hence, the processing of tofu liquid waste was needed. The purpose of this research was to determine the effect on the levels of pH, NH₃, NO₂, NO₃ and to determine the biomass...

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Glycemic Index of Snack Bar from Pedada Fruit Flours (Sonneratia caseolaris) and Legumes Flour

Jariyah Jariyah, Sri Winarti, Inka Agrita

Snack bar is a snack in the form of bars made from cereals or nuts, has a high protein content which is usually consumed on the sidelines of meals. Pedada fruit is one of the mangrove fruits that contain high dietary fiber, while the legumes a good source of protein, and it also contains carbohydrates,...

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Decreasing Organic Containers in Slaughterhouse with Photocatalyst Method using TiO₂ and UV-C Rays

Okik Hendriyanto Cahyonugroho, Kiki Indra Cahya, Agil Harnowo Putra

The slaughterhouse waste generally contains blood, protein, grease and suspended solids which cause the burden of high organic materials that can contaminate the rivers and environment. Therefore, efforts should be made before the waste with this high organic content in order not to pollute the environment....

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Performance of Algae Reactor for Nutrient and Organic Compound Removal

Agil Harnowo Putra, Aulia Ilfah Farahdiba

The excess content of nutrients in the water can cause eutrophication which has an impact on increasing turbidity and causing anoxic conditions in a waters. High Rate Algae Reactor (HRAR) is wastewater treatment and

nutrient recycling based on symbiotic interactions between heterotrophic bacteria and...

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Encapsulation and Germination of Synthetic Seeds of Chrysanthemum

Pangesti Nugrahani, Ida Retno Moeljani, Irda Lydiana

Chrysanthemum is one of the most important Indonesia flowers, that which has always been developed in various plant breeding studies, including the development of synthetic seed encapsulation methods. Encapsulation is a technology on enclosed any meristematic plant tissue in a protective and nutritive...

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Physical and Chemical Properties of Silver Rasbora Bekasam Using Various Types of Processed Rice as Fermentation Media

Anugerah Dany Priyanto, Sri Djajati

The most frequent problem in increasing demand of fishery products is rapidly quality decline of fresh products. Therefore, obligatory right handling is required to maintain the fish quality. Aims of this study was to determine the type of processed rice as fermentation media in silver rasbora bekasam...

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Proportion Study of Wheat Flour and Purple Yam Flour and Addition of Egg on Making of Dry Noodle

Enny Karti Basuki Susiloningsih, Rosida Rosida, Ariska Febrianita

The purpose of this study was to determine the effect of the proportion of wheat flour: purple yam flour and egg addition on the quality of dried noodles produced. This study used a completely randomized design factorial pattern with 2 factors, namely the proportion of wheat flour and purple yam flour...

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Characteristics of Dried Noodles from Modified Sorghum Flour (MOSOF) (Sorghum bicolor)

Riski Ayu Anggreini, Ulya Sarofa, Rosida Rosida

Consumption of noodles in Indonesia is increasing and this has an impact on increasing imports of wheat flour. Sorghum is considered to have the potential to be used as a substitute for wheat flour, because it has a fairly good nutrient content. However, it has anti-nutritional properties which can reduce...

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Design of Automatic Harvest System Monitoring for Oyster Mushroom Using Image Processing

Diana Rahmawati, Fiqhi Ibadillah, Miftachul Ilum, Heri Setiawan

The aim of this study is designing a system which can automatically detect the harvest time of the plant, using data from camera, using image processing. Phase one of our project depends on designing a harvest time

decision maker system using image processing. Phase 1, plant grown using Smart greenhouse...

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Cow Weight Estimation Using Local Adaptive Thresholding Method And Connected Component Labelling

Rosida Vivin Nahari, Novita Subagiarti, Achmad Jauhari, Riza Alfita, Kunto Aji Wibisono, Achmad Fiqhi Ibadillah, Mirza Pramudia

The development of technology, information and communication provides a new alternative to predict cow weight through Image Processing. This study utilizes Image Processing in visualizing the measurement of Chest Circumference and cow body length automatically. The cow weight estimation are very dependent...

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The Association Rule of Corn Disease Symptoms by Using Frequent Pattern Growth and Random Forest

Achmad Yasid, Budi Dwi Satoto

Despite proper soil health management, pests and diseases control is also an important task in corn farming for improving both the quality and the quantity of the crops production. One way to address this challenge is to identify the emerging symptoms accurately to help define the appropriate solution....

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Effectiveness of Moringa Oleifera Seed as Phytocoagulant in Wastewater Treatment of Batik Industry

Erina Rahmadyanti, Elizabeth Titiek Winanti, Indiah Kustini

Test results with SEM-EDX show that the deposition time affects the copper content of the MWCNT. With a deposition time of 15, 30 and 60 minutes, copper content was 1.141 %, 3.227 % and 33.56 % by weight. The XRD test results showed that with 15 minutes deposition time, there was 97 % MWCNT and 3 % copper...

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Taxa composition of Insects in Peat Agricultural area Kalamangan sub-district Central Kalimantan Indonesia

Adventus Panda, Siti Aisiah, Kornelia Marlina Sosiayu, Rotua Novera Simbolon, Agus Haryono

Insects are one of taxa within Animal. Despite of their high adaptability, this group also cover vast areas. Nevertheless, they are played an ecological role. This is suggest, that this taxa having a sizable proportion over animal kingdom. Data from agricultural area, their existence most often reported...

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Albumin, Globulin Concentration and Total Protein Colostr Mother Pig Superovulation before Breeding

Revolson A Mege, Nonny Manampiring, Debbie J. J. Rayer, Friska M. Montolalu

This research aimed to study the effect of PMSG and hCG injection breeding albumin, globulin concentration and total protein colostrum mother of pig. This research using 6 months piggy descent of land care with 30 pigs total and the weight average 95-105 kg. Hormone in used are MMSG and hCG before breeding...

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The Effect of Stirring Time and Cast Thickness on Morphology, Permeability, and Thermal Stability of Polysulfone/Polyvinylidene Fluoride Blended Membranes

Pirim Setiarso, Nita Kusumawati, Supari Muslim, Maria Monica Sianita, Ruwanti Dewi Cahya Ningrum

Polysulfone/Polyvinylidene fluoride blend (PSf/PVDF) membranes with composition PSf/PVDF/NMP/NH₄Cl (wt.%) of 8/6/84/2 supported on gauze fabric were successfully synthesized by a phase inversion method and immersion precipitation technique. Variations of stirring time and cast thickness were used to...

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Usage Of Zeolite And Chitosan Composites As Slow Release Fertilizer

Dina Kartika Maharani, Kusumawati Dwiningsih, Raisza Tarida Savana,

Puma Manggala Virga Andika

The research with the title usage of zeolite and chitosan composites as slow release fertilizer had been done. In this research, fertilizer was made by mixing zeolite with NaNO_3 as a source of macro nutrients (nitrogen) and chitosan as a crosslinks which will later be used to provide slow release function...

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Antioxidant Activity of Palmitic Acid And Pinostrobin From Methanol Extract Of *Syzygium littorale* (Myrtaceae)

Nurul Hidajati, Tukiran Tukiran, Dian Arista Setiabudi, Andika Pramudya Wardana

This study presents a research of klampok watu plant (*Syzygium littorale*) including the Myrtaceae family. As far, only a few report about *Syzygium littorale* in leaves, fruit, stem bark or other parts. The stem bark of plant was extracted with an organic solvent and then fractionated (isolated) using...

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PROFILE OF THE ACADEMIC COMPETENCY OF CHEMISTRY EDUCATION STUDENTS

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

This article reports the results of a limited trial on the academic competence of students in chemical education. This limited trial also measured the level of student confidence and the truth of chemical concepts from a sample of 24 class 2014 chemistry education students who would and were taking thesis...

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A Real-Time System for Monitoring Methane Level in Biogas Production A Preliminary Study

Meta Yantidewi, Utama Alan Deta, Nurita Apridiana Lestari

Methane is one of the flammable natural gas that can be found in biogas. Because of its flammable property, methane is mostly used as fuel. This research designed a monitoring system that can monitor the methane concentration level. The instrument system consisted of a methane gas sensor as a gas detector,...

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A Preliminary Design: "assessment as learning" to accelerate students' achievements

Wahyu Budi Sabtiawan, Elok Sudibyoy, Tutut Nurita

Assessment is a part of educational process. One of the assessment roles is "assessment as learning" (AaL). The study aims to introduce a preliminary design for implementing AaL. The research, as developmental research, has been in a design step. The design was developed based on the genetic of AaL viewing...

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Scientific Thinking Skills: Why Junior High School Science Teachers Cannot Use Discovery and Inquiry Models In

Classroom

Erman Erman, Wasis Wasis, Endang Susantini, Utiya Azizah

This study aims to describe the difficulty of the teacher in distinguishing the implementation of discovery and inquiry learning models in science learning and the factors that led to the scientific thinking skills of junior high school science teachers. The case study design used in this study involved...

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Analysis of Contaminant and Nutritional Content of Red Galangal (*Alpinia purpurata* K. Schaum) Simplicia

Mirwa Adiprahara Anggarani, Nita Kusumawati, Roy Januardi Irawan, Rusijono Rusijono

This study has been conducted analysis of contaminant and nutritional content of red galangal (*Alpinia purpurata* K. Schaum) simplicia. Simplicias as one of post-harvest processed form. Simplicia is a material to produce herbs medicine. So that, simplicia quality must be considered. The quality of simplicias...

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Implementation of learning model map concept with inquiry strategy in an effort to train high-order thinking skills of chemistry education students

Ismono Ismono, Sri Poedjiastoeti, Suyatno Sutoyo

Higher order thinking skills (HOTs) are needed by the students of chemistry education, because they will become teachers who will be able to teach HOTs to the This research is the application of concept map learning models with

inquiry strategies to train higher order thinking skills of chemical educa

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The Implementation of Interactive Multimedia and Kits on Food Topic to Facilitate Chemical Students with Hearing Impairment

Dian Novita, Sri Poedjiastoeti, Sukarmin Sukarmin, Achmad Lutfi

The research aimed to describe the implementation of interactive multimedia and kits to facilitate students with hearing impairment. The kit consists of student activity sheet, tools, and materials for experiment. Student activity sheet of chemistry on foods consists of five experimental titles. The...

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Tracing Individual Conception in Conceptual Change Stages Using Module Assistance

Suyono Suyono, Wahyu Budi Sabtiawan, Wike Kusuma Wardani

misconceptions have been the problem in educational field until now days. Tracing them will be an important part to solve the problems. The study aims to trace the individual conception using module assistance. The method was implementing a module of M3CGK containing conceptual change strategic to 16...

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Cr (VI) Removal Using Cow Bone Waste Adsorbent

Raden Kokoh Haryo Putro, Vansa Nopy Rahardi, Okik Hendriyanto
Cahyonugroho, Aussie Amalia

Pollution caused by Cr(VI) metal is harmful because it is toxic and carcinogenic. Utilization of cow bone waste is considered not optimal. One of the utilization is as an adsorbent of Cr(VI) metal. This research aims to determine the adsorption capacity by bone waste bone adsorbent in lowered Cr(VI)...

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Modeling of Isoterm Phosphate Adsorption in Laundry Wastewater Using Anion Resin

Aussie Amalia, Pritho Ajeng Maharani, Euis Nurul Hidayah, Raden Kokoh Haryo Putro

The excess content of phosphate in laundry wastewater can cause eutrophication. Ion exchange is a method that has been widely used to remove pollutants in wastewater. The study of ion exchange equilibrium is generally carried out by means of adsorption isotherms modelling. The use of adsorption isotherms...

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Effect of Acid Type on Si-K-HAs Gel Characterization

Srie Muljani, Bambang Wahyudi

The effect of both citric acid and hydrochloric acid on the Si-K-HAs gel characterization was studied with various pH gelation. The Si-K-HAs gel

obtained from acidification of the mixture of potassium silicate and potassium-humic substance solution by polymerization process. The humic substance was obtained...

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Polyphenon Extraction Process From In vitro Culture of Camellia Sinensis L Callus With Ethyl Alcohol

Sutini Sutini, Widiwurjani Widiwurjani, Djoko Agus Purwanto, Wirdhatul Muslihatin

The purpose of this study was to obtain a polyphenon profile from callus extract obtained from in vitro culture of Camellia sinensis L. Polyphenon is one of the bioactive compounds found in Camellia sinensis L plants which can also be produced through in vitro culture. Polyphenon as a bioactive is often...

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Study of Humic Acid and Multiantagonis of Streptomyces Sp, Trichoderma Sp Application Techniques for Horticulture Plant on Marginal Soil

Penta Suryaminarsih, Wiwik Sri Harijani, Wanti Mindari, Widi Wurjani

Tomato, red pepper and melon are high-value horticultural crops. Crop production will be decrease cause of pathogenic microorganism and Pest .Some soil saprophytic microorganisms are natural enemies of soil-borne pathogenic microorganisms and pests. Streptomyces sp., Trichoderma sp. is a biological agent,decomposer,...

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Modeling and Optimization of Struvite Crystal Scaling Using Experimental Design Methodology For Maleic Acid

D. S. Perwitasari, A.P. Bayuseno, J. Jamari, S. Muryanto

This paper presents results of an investigation of scaling of magnesium ammonium phosphate hexahydrate (struvite) on a process batch crystallizer. In this study, variables, namely temperature (30-40oC), stirring speed (200-400 rpm), maleic acid concentration (1-20 ppm) were optimized using RSM (response...

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Effect of Acidic salts on Characteristics of Precipitated Silica from Geothermal Sludge

Srie Muljani, Ely Kurniati

This research was carried out to produce precipitated silica from sodium silicate using acidic salt as precipitator. The aim of this research is to study the effects of acidic acid on precipitated silica characterization. The sodium silicate solution was produced by extraction of geothermal sludge using...

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Application of Ion Exchange Method on Removal of The Ca²⁺, Mg²⁺, K⁺ and SO₄²⁻ Salt Solution

Caecilia Dwiastuti, Ketut Sumada, Yustina Ngatilah

Salt product of Indonesian country is produced through the process of evaporation and crystallization of seawater. The salt product contains sodium chloride (NaCl) levels ranging between 80-92% and the other are

impurities such as magnesium chloride (MgCl₂), calcium carbonate (CaCO₃), potassium chloride...

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Characterization of Humat Compounds Spectroscopy Under Different Soil Management Systems on Mount Bromo West Slope

Purnomo Edi Sasongko, Wanti Mindari, Purwanto Purwanto, Widyatmani Sih Dewi, Ramdan Hidayat

Soil organic matter (OM) is very important in its function, but information about the chemical composition, chemical structure and the changes caused by anthropogenic factors in the processing system is still in the research. The research objective is to examine the characteristics of organic materials...

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Automatic Liquefied Petroleum Gas Leakage Control System Using Proportional Integral Derivative (PID) Proportional

Haryanto Haryanto, Achmad Fiqhi Ibadillah, Umar Faruq, Lilik Anifah

Along with the development of technology and information, human needs toward kerosene stove in household sector change over to Liquefied Petroleum Gas (LPG) stove, which is cheaper and more effective. However, the use of LPG stove should consider precised procedures as the gas is easy to

explode. One...

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Adsorption of $[\text{AuCl}_4]^-$ on Iron Sand Magnetic Material Coated with Aminobenzimidazol Modified Silica

Abraham Laurens Rettob, Nuryono Nuryono, Yenni Pintauli Pasaribu, Yorinda Buyang, Richard Samuel Warembwa

Adsorption of $[\text{AuCl}_4]^-$ using aminobenzimidazole modified silica coated on iron sand magnetic material (MMSA) was carried out. MMSA was synthesized via sol gel process. MMSA was characterized by Fourier Transform Infrared (FT-IR) spectrophotometer and X-ray diffractometer. The ability of MMSA to adsorb...

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The Effect of Citric Acid ($\text{C}_6\text{H}_8\text{O}_7$) and Flow Rate to the Growth and Transformation of Crystal Phase of CaCO_3

Christian Wely Wullur, Peter Sahupala

Scale formation, especially of calcium carbonate (CaCO_3) is a serious problem faced by many industrial processes, such as chemical, desalination and oil industries. This paper discusses crystallization scaling of CaCO_3 in pipes. The crystallizing solution was made by mixing equimolar solution of CaCl_2 ...

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Phytochemical Screening of Ant Plant *Myrmecodia rumpi* Becc.

Yenni Pintauli Pasaribu, Yorinda Buyang, Abraham Laurens Rettob, Reinyelda Latuheru, Ingrid Marlissa

Ant plant *Myrmecodia rumphii* Becc. is an epiphytic plant that is widely used by local people as an herbal medicine to treat various diseases such as rheumatic and tumors. Methanol extract of *M. rumphii* Becc. showed high cytotoxicity against shrimp larvae *Artemia salina* Leach and antioxidant potential...

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Formulation Syrup of Extract of Sarang Semut Plant (*Myrmecodia rumphii* Becc.) From Merauke

Yorinda Buyang, Yenni Pintauli Pasaribu, Ivyentine Datu Pallitin, Ni Luh Sri Suryaningsih, Taslim Ersam, Yatim Lailun Ni'mah

Sarang semut (*Myrmecodia rumpii* Becc.) plants from Merauke Regency generally live on bus wood (*Eucalyptus* sp.). The results of previous studies found that sarang semut plants from Merauke have the potential as antioxidants in warding off free radicals of 92.6601%. The high antioxidant content encourages...

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Liquid Chromatograph – Mass Spectrophotometer and Anti Uric Acid Potential Studies of Ethyl Acetat Extract of *Archidendron bubalinum* (Jack) I.C. Nielsen Fruit Seed Shell
Erna Styani, Candra Irawan, Hanafi Hanafi, Lilis Sulistiawaty, Imalia Imalia

This study focused on identifying the types of compounds contained in t ethyl acetate extract of seed shell of Archidendron bubalinum (Jack) I.C. Nielsen (AbJICN) from Lampung Indonesia using Liquid Chromatograph Mass Spectrophotometer (LC-MS) and determining the potential of anti-uric acid in the...

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The Influence and The Analysis Of Alkyl Ketene Dimers (AKD) to Paper Resistance in Water Absorption and Chemical Solution Penetration

Henny Rochaeni, Candra Irawan, Mira Nurfitri, Poppy Sri Lestari, Unang Rosdianan

The sheet paper has been made with variations of addition of Alkyl Ketene Dimers (AKD) of 0, 10, 12, and 14 kg/T. The result was a paper with gramatures of ± 70 g/m². The analysis of the paper sheet to its durability in absorbing water and penetrating the chemical solution of the mixture of NH₄SCN₂ 2%...

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Effects of malonic acid on calcium carbonate crystalline phases and morphology

Stefanus Muryanto, S. Sutanti, E. Supriyo, W.A. Putranto

Calcium carbonate (CaCO₃) crystals are in much demand as low-priced fillers and brightening agents. For example, the pulp and paper industries use CaCO₃ as fillers to enhance opacity, brightness, smoothness and printability. Such enhancement is regulated by the crystal properties: morphology, crystalline...

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Identification and Mitigation of Waste Construction Project Material (Case Study of Building Projects in Badung Regency)

I G A I Mas Pertiwi, W Sri Kristinayanti, K Wiwin Andayani, AA Putri Indrayanti

Construction projects contribute to the damage to nature, among others, from material extraction, material processing, material distribution, construction processes, land acquisition for buildings and energy consumption in building operations. Besides that, construction activities also produce high enough...

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Evaluation And Maintenance of Road Damage In Sidotopo Surabaya Road Using Pavement Condition Index (PCI) Method

Ibnu Sholichin, Nugroho Utomo

Road damage is caused by overloaded and repeated traffic loads, heat or air temperature, water and rain, as well as poor asphalt quality, so the road must be maintained properly in order to serve traffic growth during the life of the plan. Routine and periodic road maintenance needs to be carried out...

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Mapping Porosity Values on Coast of Sampang District Using Satellite Image Data

Dian Purnamawati Solin, Hendrata Wibiscana, Siti Zainah

Porosity soil is well known as soil properties and an indicator of the quality of soil. Applying porosity test in coastal area of Sampang District is highly needed, considering that the livelihoods of the people in Sampang are mostly farmers and also the development of village has recently grown rapidly....

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Labor Planning of Farmer Households

Endang Yektiningsih, Sigit Dwi Nugroho, Eko Nurhadi, Sugiarto Sugiarto

This research aims to identify the working time allocation of vegetable farm households and arrange a labor planning model specially at vegetable farming households. This research was held in Tutur Sub-District, Pasuruan Regency with a total sample of vegetable farming households as many as 60 persons....

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The Mathematical Model of Salinity Concentration In The Coastal Area of Sampang District Using Remote Sensing Data

Siti Zainab, Dian Purnamawati Solin, Hendrata Wibisana

Salinity is one of the parameters needed by farm workers and farmers to determine groundwater quality. High salinity values

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The Analysis of Retaining Wall Strengthening on Small

Reservoir at Pilangbango Madiun as an Alternative of Exis Design

Wahyu Kartini, Sumaidi Sumaidi, Faishal Zhafiry

In 2016 the government of Madiun city carried out the construction of the reservoir in Pilangbango village, Kartoharjo sub-district, Madiun, East Java. The reservoir construction work has been carried out according to the schedule, however, several wall collapse and land subsidence have arisen. To date,...

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Flood Control Using Polders, Case Study: Watershed of Sadar River, Mojokerto, Indonesia

Minarni N. Trilita, Iwan Wahjudijanto, Lantanu Baggas Marsono, Novie Handajani

Flooding is a problem experienced in area. In the Sadar river watershed are urban areas and mountainous areas. Sadar river has many tributaries. The flow characteristics have a large flow velocity. Sadar river passes through urban areas and empties into the Brantas river. Floods often occur in the Mojokerto...

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Application of Model View Controller Architecture in Hospital Inventory Logistic Management

Iwan Santosa, Firman Kurniawan, Eza Rahmanita, Aeri Rachmad

An inventory control system is a system to determine stock inventory at a

certain time. This happens because there are several problems, namely t difficulty in finding out information on requests, receipts, usage, and stoc consumables. This happens because the data is not stored in a good file...

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Match Between Students' Anthropometry and Furniture Dimensions in the Library Reading Area at University of Trunojoyo Madura

Mahrus K. Umami, Halimatus Zahroh, Imron Kuswandi, Teguh Prasetyo, Mirza Pramudia

The compatibility between the dimensions of furniture and users' body is crucial in keeping the users' performance. The objective of this study is to identify whether the furniture dimensions in the library reading area at University of Trunojoyo Madura (UTM) are appropriate/inappropriate to the students'...

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FATIGUE FLEXURAL BEHAVIOR RC BEAMS STRENGTHENED USING GFRP-SHEET AFTER SEAWATER IMMERSION

Arbain Tata, Anthonius Frederik Raffel, Muhammad Ihsan, Rudy Djamaluddin

Bridges or docks on coasts often fail due to fatigue loads. Sea waves striking bridge or the dock give a fatigue effect to the structure thus accelerating structural failure. This study aims to analyse glass fibre reinforced polymer (GFRP) reinforcement on reinforced concrete beams under fatigue and...

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Study Of Multi Layers Testing For Pavement

Sabaruddin, Muhammad Jamil

Multi layers in civil engineering has diverse meanings and uses for example on pavement has been used as a medium that provides theoretical information about the response of the pavement layer when receiving load in the middle, side and in the corner. In the other hand, multi-layers as a concept has...

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Application of Pavement Condition Index (PCI) on The Assessment of The Kalumata – Fitu Highway Section of Southern of Ternate City

Sabaruddin, Rabial Awaludin

In general, roads are built as infrastructure to facilitate mobility and accessibility of socio-economic activities in society. The existence of the highway is very necessary to support the rate growth of the economy, agriculture and other sectors. Considers to the benefits that are very important, therefore,...

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Folajikusesurabi Traditional House Study as An Environmentally Friendly Housing

Endah Harisun, M. Amrin MS. Conoras

The exploitation of natural resources and the environment these days, which only prioritizes economic growth, has given degradation of other elements of The expected benefit of this research is to introduce the traditional North Maluku architecture as one of the solutions in the construction of environmental...

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The Effects Of Volcanic Ash On The Strength And Permeability Mortar

Fitro Darwis, Ilham Banggu, Mufti Amir Sultan

Cement replacement materials have been widely used to reduce adverse environmental impacts, increase the strength and durability of concrete, such as fume silica, slag, fly ash or natural pozzolan (volcanic ash). Volcanic ash is material that released from the earth when volcanic eruptions occur. Volcanic...

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Flood Risk Assessment and Its Vulnerability in Coastal Villages, Central Halmahera District – North Maluku

Mohammad Ridwan Lessy, Nurhalis Wahiddin, Nani Nagu

Floods that occurred in Central Halmahera district had given a significant impact on environmental damage. This study aims to assess the risk level of flood and calculate vulnerability in study areas. The vulnerability will calculate based on social, economic and environmental aspects. Furthermore, the...

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Spatial and Environmental Condition of Bajo Tribe Settlement in South Halmahera

Mustamin Rahim, Ardi Basri, Hendra Fauzi

This study aims to identify the spatial characteristics of Bajo Tribe settlement around coastal areas in South Halmahera, environmental analysis and settlement conditions by literature review and field observation. The results show that the existence of Bajo Tribe in North Maluku deployment in coastal...

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Roadworthiness Test For Traffic Safety

Nurwidyasari Usman, Muhammad Rizal, Edward Rizky Ahadian, Nani Nagu

Road growth must provide security and safety for road users. Article 23 of the Law of the Republic of Indonesia No.22 of 2009 states that the government as a road operator is obliged to provide a sense of security and safety for service users. The data analysis technique used in this project is qualitative...

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Proposed Empirical Calculation to Predict Bearing Capacity of Embankment on Reinforced Wooden Stems as Mattress

Overlying Soft Soil

Suyuti Suyuti, Mufti Amir Sultan, Zulkarnain K. Misbah

Indonesia is an archipelago country that there are about thirty percent lowlands covered by deposit soft soils or peat soil. Local government has been built road infrastructure, but the soft soil layer has problem for soil stiffness. Ministry of Public Works has published guideline for road construction...

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Solid Waste Management: Mapping of Temporary Waste Sites and Potential Wild Solid Waste in Ternate City

Nani Nagu, Edward Rizky Ahadian

Garbage is a classical problem faced by all cities in Indonesia. The same problem also found in Ternate due to various aspects including population growth and rapid urbanization, inadequate number of facilities, lack of landfill management systems based on environmentally, and the implementation of reduce,...

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Stability Analysis of Underwater Pipeline Inter Island for Drinking Water

Wati Asriningsih Pranoto, Tri Suyono

Indonesia is an archipelago with more than 17 thousand islands, both large and small islands. Some inhabited small islands do not have the potential of fresh water as a source of drinking water, so it needs special treatment in drinking water supply. Provision of drinking water with high technology such...

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Towards Eco Green Construction With Pumice Fine Aggregate Concrete

Abdul Gaus, Imran Imran

Concrete production in construction work is one of the causes of damage to the environment. the use of local materials as aggregates in concrete mixes is expected to be more eco green in construction. With the uniqueness of the pumice it is tried to serve as a fine aggregate for concrete mixing with...

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Analysis of the Effects of Traffic Volume on the Pavement Condition in the Educational Zone of Merauke Regency

Dewi Sriastuti Nababan, Herbin Florensus Betaubun, Theresia Widi Asih Cahyanti, Budi Doloksaribu, Jeni Paresa

Among types of land use vital for the development of Merauke Regency is the land use intended to provide its population with education. Land use for educational purposes (the educational zone) in Merauke Regency, such as the one in Pendidikan Road, Kamizaun Road, and Ternate Road, constitutes important...

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The Selection of Rain Distribution Analysis Method in (Bengawan Solo Watershed)Downstream Sub-Watershed

Dina Limbong Pamuttu, Umboro Lasminto, Daud Andang Pasalli, Yuli Helena Margaritha Rada, Abner Doloksaribu

Hydrological factor causes flood. Thus, it needs to be examined through rain frequency analysis by using continuous chance distribution. The location of this research is at the downstream sub-watershed of Bengawan Solo River. Average rainfall inflow area is calculated by Polygon Thiessen method with...

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The Feasibility of the Kancingan House Structure in Merauke City

Sari Octavia, Henry Soleman Raubaba, Yashinta Irma Pratami Hematang, Anton Topan

Kancingan house is a house made of wood materials as its main structure but the walls are still made of bricks. The use of wood as the concrete-replacing materials is due to the relatively lower cost than the permanent structure made of concrete as the main structure since the concrete materials composed...

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Study on Compressive Strength of Sarmayam Clay Stabilized with Cement and Polypropylene Fiber

Suyadi Suyadi, Hairulla Hairulla, Philipus Betaubun, Agustan Agustan, Dina Pasalolo

Land is the place where a structure or construction is established, both

construction of buildings and roads. What often causes problems is if the soil has bad properties such as high plasticity and a large potential for shrinkage. One way to improve the shrinkage properties is to stabilize the soil...

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Mapping of Historical Building in Merauke uses a Geographic Information System (GIS) as a Form of Collaboration of Engineering Science

Yashinta Irma Pratami Hematang, Izak Habel Wayangkau

Despite being located on the border area, Merauke has a very important architectural historical heritage. However, if its current existence is not well-preserved, it will lead to extinction. In fact, the historic building provides an image or identity and increases the tourism value of a city. The Old...

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Correlation of Embankment Density Degree with Slopes Landslides Safety Factor

Suryanegara Dwipa, I Gede Sastra Wibawa, I Nyoman Ramia, I Wayan Wiraga, I Wayan Arya

The purpose of this study was to find the relationship between density D and safety factor SF of the embankment against landslides. If the relation between D and SF is known, then we could simplify the slope stability calculation. The safety factor against landslides could be determined by only entering...

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The Effect of Performance-Based Practical Assessment Model Towards Students' Competency Level at Civil Engineering Workshop in Kupang State Polytechnic

Wayan Sri Kristinayanti, Wira Ditta Lokantara, I Made Anom Santiana, N K Suciiani

A formal education pathway should include a comprehensive assessment that oversees students' competence not only in terms of cognitive aspect, but also the students' psychomotor. Performance-based assessment was developed in this paper and aimed to improve student's all-round performance in their studies...

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Analysis of the Selection of Alternative Work Methods for Structural Work Using the Zero-One Method at the Guest Room Building Development Project in Sanur, Bali

Ni Ketut Evi Kusumadewi, I Wayan Sudiasa, Made Sudiarsa

There were various alternative construction work methods that could be chosen as the most suitable in order to achieve the project's final goal by using the resources efficiently with an optimum result (cost, quality, and time). The alternative work methods could be applied on various projects, such...

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Ergonomics for Sustainable Groundwater Conservation Program

Lilik Sudiajeng, I Wayan Wiraga, Made Mudhina, I Gede Nyoman Suta Waisnawa

This article aims to describe the importance of ergonomics implementation for the sustainability of groundwater conservation programs. Ergonomics concept has been applied in research on groundwater conservation in Denpasar City, Bali, Indonesia (2013-2018), started from problem identification, data collection...

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Earthquake Prediction System using Neuro-Fuzzy and Extreme Learning Machine

Basuki Rahmat, Fitri Afiadi, Endra Joelianto

Knowledge of earthquake predictions is very important, especially to recognize patterns of occurrence. This paper proposes an earthquake prediction system, in the form of b-value predictions as parameters that indicate the potential for earthquakes. The methods used are neuro-fuzzy with ANFIS structure...

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Replies Identification in Question Answering System using Vector Space Model

Intan Yuniar Purbasari, Fetty Tri Anggraeny, Masti Fatchiyah Maharani

Automatic question answering system is an information retrieval system designed to return an answer to a specific question. It is a base system for a chatbot application. This research aims to identify responses in a question

answering system using Vector Space Model (VSM). The system compared query...

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Understanding the Dominant Factors towards the Intention to Use Youtube continuously in Indonesia

Nur Cahyo Wibowo, Tri Lathif Mardi Suryanto, Asif Faroqi, Rizka Hadiwiyanti

Abstract-YouTube as the world's largest video content service provider that can be accessed by various groups of people provides facilities to share videos easily widely to its consumers. With the development of YouTube as a social network site (SNSs), this study aims to identify the motivations of consumers...

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Analysis of Simple Data Imputation in Disease Dataset

Fetty Tri Anggraeny, Intan Yuniar Purbasari, M. Syahrul Munir, Faisal Muttaqin, Eka Prakarsa Mandiyarta, Fawwaz Ali Akbar

In the statistical data collection it is very possible that there are variables that do not respond or in other words empty, called missing value, that can cause problems in data analysis. In this research we will analyze some simple imputation technique to solve the missing value problem, are zero imputation,...

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Training Algorithm for Dendrite Morphological Neural Network Using K-Medoids

Yisti Vita Via, Chrystia Aji Putra, Ronggo Alit

Pattern classification is one of the relevant problems in Artificial Intelligence. Neural networks have been studied as one of the most successful methods for pattern classification. Classical perceptron can only solve linear classification problems. Morphological Neural Networks (MNN) is an alternative...

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Implementation of Constraint Satisfaction Problem Methods on Course Scheduling in High School

Sugiarto Sugiarto, Mohammad Idhom, Ronggo Alit, Akhmad Fauzi

Course scheduling in high schools is a complex and complicated activity to solve. Complexity can be seen from the distribution of course, teachers, time, and also classrooms in one teaching and learning activity. In the subject scheduling process there are several things that must be considered. First,...

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An Identification of Teachers' Ability on Posing HOTS mathematics problems

Endah Budi Rahaju and Dini Kinati Fardah

Mathematics Department
Universitas Negeri Surabaya
Surabaya, Indonesia
endahrahaju@unesa.ac.id

Abstract—Higher-Order Thinking skills (HOTS) are needed to form our students to become more critical and creative individuals facing this sophisticated age. Teachers are required to be able to present learning that trains students to reason, think critically and creatively. This article presents the results of our research in the form of identifying the ability of teachers in compiling mathematical problems that requiring HOTS to solve. Seventeen teachers were trained in one-day workshops then given the opportunity to compile one HOTS problem in their own way. These problems were identified and categorized based on the topics, its compatibility with the criteria of assessing HOTS, and the category of cognitive processes and knowledge dimension according to Blooms' Taxonomy revised. The results showed that Numbers topic is mostly made by trainees (47.06%). The most cognitive dimension shown by the teachers is analyzing (47.06%). For the knowledge dimension, the problems posed by teacher are categorized as conceptual or procedural. Of all the participants, there were 1 person who still made mathematics problem that categorized as understanding level and 5 people who made problem that categorized as applying level.

Keywords—HOTS; mathematics problem; teachers' ability; problem posing

I. INTRODUCTION

Mathematics curriculum has been re-evaluated and needed to be developed as the world's demand changed these decades. Industry 4.0 issue has challenged teachers to prepare students more critical and creative to face this big data era. The ability to reason at higher levels is accepted and considered as a major instructional goal of education and is regarded as a motivating force behind efforts to reform education over the past two decades [1]. This has made the Higher-Order Thinking skill (Abbreviated as HOTS) of students needed to be developed so that our students will be flexible in facing the world changing. Though, teachers often find it difficult to make the transition from a traditional teaching-learning method that they know well to a method that develops HOTS [2]. It is because some educators have determined especially when standardized testing [3]. In accordance to this, a study of Mathematics Teachers' Level of Knowledge and Practice on the Implementation of Higher-Order Thinking Skills (HOTS) shows that the aspect of assessment was still at a non-satisfactory level as compared to curriculum and pedagogy

[4]. It means that teacher may still have difficulties in designing learning or assessment that involving HOTS. Higher-Order Thinking which is the ability to connect, manipulate, and transform the knowledge and experience that is already owned to think critically and creatively in an effort to determine decisions and solve problems in new situations is needed to be integrated into every 21st century subject learning. However, In fact, Indonesian students have not all had the opportunity to study mathematics by reasoning, creative thinking or critical thinking. Our teachers are still comfortable giving routine questions to their students. Teaching while developing HOTS is not a simple issue. To teach HOTS in an effective manner, a clear and accurate understanding of these skills is needed [5]. Therefore, some kinds of training or teachers development programs had to be utilized so that our will be more daring to give HOTS problems to their students. By joining these trainings, teachers' knowledge and understanding about how to design HOTS problem will be richer and their motivation to give HOTS problem to their students will increase. The criteria to characterize Higher-Order thinking problems was based on the requirement to apply multiple stages to solve a problem for which no certain formula or pattern could be directly administered [6]. According to Bloom's Taxonomy, problem that require HOTS is in the intersection between knowledge dimension of conceptual, procedural, and metacognitive and cognitive process dimension of analyzing, evaluating and creating. The illustration is shown in the figure 1.

		THE COGNITIVE PROCESS DIMENSION					
		REMEMBER Mengingat	UNDERSTAND Memahami	APPLY Menerapkan	ANALYZE Menganalisis	EVALUATE Mengevaluasi	CREATE Mencipta
THE KNOWLEDGE DIMENSION	FACTUAL Faktual						
	CONCEPTUAL Konseptual						
	PROCEDURAL Prosedural						
	METACOGNITIVE Metakognitif						
							KETERAMPILAN BERPIKIR TINGKAT TINGGI

Fig. 1. The illustration of HOTS

This paper combining those two resources to classified whether mathematics problem made by teachers after giving them one day workshop about constructing HOTS mathematical problem can be categorized as HOT problem or not.

II. RESEARCH METHOD

This is a qualitative research. This paper describe the research result descriptively. Seventeen secondary school mathematics teachers of Kediri Regency, Indonesia, were trained in a one-day workshop and given task in the end of the training. Teachers were given information about HOTS definition, how to assess HOTS, examples of HOT problem how to solve it, and how to generate HOT problems from routine problems. After question and answer session has ended, teachers were given a task to pose one problem that can be categorized as HOT problem of secondary school mathematics. These problems made by teachers then analyzed, identified, and classified as HOT problem or not by using Resnick and Bloom categorization as well as categorized based on the topics: algebra, numbers and pattern, geometry, statistics and probabilities according to Kisi-kisi Ujian Nasional SMP. Having HOT problems have been filtered, we identified further about which characteristics assessed by these problem and giving comment to the problems according to good question writing rules depending on the type of the question that teachers' made. Higher-Order Thinking skills that assessed by giving HOT problem to the students include the skill of: 1) transferring one concept to other concept; 2) Processing and applying information; 3) Finding a connection between some information given; 4) Using the information given to solve problem; and 5) study ideas and information critically. Generally, the method used in this research were analyzing, reducing data, coding, and making conclusion.

III. RESULTS AND DISCUSSION

Results of this research were divided into three main parts which are: 1) topics that selected by teachers; 2) classification of HOT problem including the cognitive process and knowledge dimension if it was categorized as HOT Problem; and 3) skill of HOT Problems that assessed.

A. Topics Selection

According to Kisi-kisi Ujian Nasional, the topics of mathematics subject in secondary school are algebra, number and pattern, geometry, and statistics & probability. From the problem made by the teachers, topic selection distribution of those four are shown in the TABLE I.

TABLE I. TOPICS SELECTION

Topics	Algebra	Number & Pattern	Geometry	Statistics & Probability
Number of problem(s)	5	8	4	0
Percentage (%)	29.41	47.06	23.53	0.00

In the TABLE I, it can be seen that most of teachers, made problems of Number and Pattern (47.06%). The number of

problems in Algebra and geometry are in balance. However, none of those teachers pose statistics and possibility problem. It seems that HOT problem in this topic is still unfamiliar to the teachers. Teachers may lack ability in this topic, so that further research can be conducted.

B. Classification of HOT problem, the cognitive process domain, and the knowledge domain.

Problems that posed by teachers were analyzed and classified into HOT problems or not and then identified which cognitive process domain and the knowledge domain were match in. The classification and the percentage of the problem constructed were shown in TABLE II.

TABLE II. PROBLEM CLASSIFICATIONS

Cognitive process domain	HOT problem	Non-HOT problem
Recalling (%)		-
Understanding (%)		5.88
Applying (%)		29.41
Analyzing (%)	47.06	
Evaluating (%)	17.65	
Creating (%)	-	

From TABLE II, it is shown that 35.29% from the teachers were still confused the characteristics of HOT problem. From this percentage, 29.41% of the teachers still consider that the problems they posed is categorized as HOT problem though actually it is still in the lower level of HOT problem or exactly it is in the applying category. While problems in the analyzing category are mostly posed by teachers. Only one teacher that try to generate problem in the evaluating category. The example of problem made by teachers in each category will be discussed after.

1) *Understanding categorized problem:* In this category, only one teacher who posed the problem as shown in Fig 2.

Perhatikan relasi di bawah ini; mana yang merupakan pemetaan...

A. $\{(-3,6) (-1,2) (1,2) (2,4)\}$
 B. $\{(-3,6) (-3,2) (1,2) (2,4)\}$
 C. $\{(-3,-6) (-1,-2) (1,2) (2,4)\}$
 D. $\{(-3,-6) (-1,2) (1,2) (2,4)\}$

Fig. 2. Understanding categorized problem

From the Fig. 2 we can see that teacher only assess the student's conceptual understanding by asking which one the function between the relations given. By understanding the definition of function, students will answer the question easily. There is something interesting to be discussed in this example. We can see the option made by the teachers. All the options given are function except B, yet teacher give the correct answer which is C. It can be concluded that the teacher was having misconception about the definition of function.

2) *Applying categorized problem:* In this category, five teachers posed the proble. One of the problem is as shown in Fig 3.

Ari, Banu dan Citra membeli penghapus dan penggaris di koperasi sekolah yang sama. Ari membeli satu penghapus dan tiga penggaris dengan membayar Rp 7.000. Banu membeli satu penghapus dan dua penggaris dengan membayar Rp 5000. Jika Citra membeli dua penghapus dan lima penggaris, maka jumlah uang yang harus Citra bayar adalah ...

A. Rp 10.000
 B. Rp 11000
 C. Rp 12000
 D. Rp 13.000.

Fig. 3. Applying categorized problem

In the Fig 3, it is shown that in solving the problems, student need to model the world problem into mathematics model and then try to solve it by applying method to get solution of two variables linear equation system then use the solution to get the unknown. There is no analysis process in this problem.

3) *Analyzing categorized problem:* This category is the most teachers used. There are seven teachers who made problems in this category. One of the problem is as shown in Fig 4.

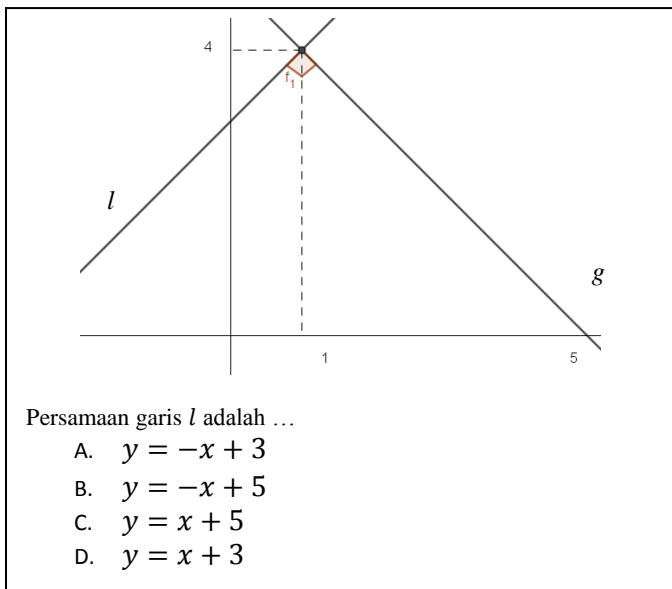


Fig. 4. Analyzing categorized problem

To solve problem in Fig.4, students need to study the information in the graphic critically. There are two lines which are perpendicular symbolized by the sign of right angle. One of them is given the absisca and ordinate of the intersection points with the other line, so that it is possible to determine the line equation. But, the other line (line l) only given the intersection point with the first line. If student does not investigate all the information in the figure given thoroughly including understanding the concept of two perpendicular line gradient, she/he cannot determine the equation of line l correctly.

4) *Evaluating categorized problem:* This category is the highest level made by the teachers. There are three teachers who made problems in this category. One of the problem is imperfect as shown in Fig 5. And one of the two others is acceptable as shown in Fig. 6

Sebuah persegi panjang luasnya sama dengan luas sebuah persegi yang kelilingnya 24cm. tentukan ukuran persegi panjang tersebut agar memiliki luas terbesar.

Fig. 5. Evaluating categorized problem (imperfect one)

The type of problem in the Fig. 5 is different from the previous examples in term of question type. The example in the Fig.2, Fig.3 and Fig. 4 are multiple choices while the example in the Fig.4 is essay question. Problem in fig.5 is imperfect as mentioned above. The question should be “determine the dimension of the rectangle so that maximum **perimeter** can be obtained”. The mistake has already confirmed to the teacher who posed this problem. This problem need analysis process to solve. Student need to make a relation between one topic to another. Concept of area is connected to concept of perimeter and the concept of square is connected to concept of rectangle. Student also needs to evaluate the dimension of the rectangle so that the maximum perimeter is obtained.

Ibu pergi ke sebuah toko membeli baju merk A dengan harga Rp 180.000,- dan diskon 10%, baju merk B dengan harga Rp 200.000,- dan dua kali diskon 10%+5%. Manakah baju yang dipilih Ibu agar mendapat baju dengan harga yang lebih murah?

Fig. 6. Evaluating categorized problem

The problem in the Fig.6 is interesting since it is contextual in our daily life. Some people is often trapped by “big sale prank” of some department store. Without thinking critically, by seeing the “10%+5%” sale, some people think that the price will be discounted 15%. It did happened in our daily life. Usually, 10% wrote bigger than the 5%. But for some people, they do not know and do not want to know what is the different. By managing the information, students will use their critical thinking to evaluate and judge which price is lower after the discount given. There are still many mistake in writing nominal symbol.

C. Skill of HOT that assessed

By analyzed the HOT problem posed by teachers, it can be identified which skill that can be assessed using those problems. From the results in table II, there is 47.06% of all teachers or exactly 8 of 17 teachers who posed analyzing categorized problem and 17.65% who posed evaluating categorized problem or exactly 3 of 17 teachers. The percentages of the skills that assessed by those 11 problems are shown in TABLE III.

TABLE III. SKILL OF HOT THAT ASSESSED

Skills assessed	Percentage (%)
Transferring one concept to other concept; and	36.36
Processing and applying information;	18.18
Finding a connection between some information given;	9.09
Using the information given to solve problem	18.18
Study ideas and information critically.	18.18

Transferring one concept to the other concept is mostly assessed by teachers utilizing the problem they posed (36.36%). But this percentage is not significant with other skill that assessed. It need further research that using more samples to get more data to see the distribution clearly.

IV. CONCLUSION

Giving task to the teachers to pose HOT problem we obtained some interesting results. There are still some teachers that confused to differentiate between applying categorized problems and analyzing, evaluating, or creating problems. Some teachers felt that the problems they made already in HOT level, but it is still in the applying categorized problem though. No one try to pose problems that categorized as creating. It is not a simple issue generating problems that encourage students to create. There is no teacher who posed statistics and probability problems as well. For further workshop, there are two suggestion we can deliver. The first one, it can be suggested to design a training that help teachers designing HOT problems that categorized as creating. The second, it is suggested to develop the mathematical content knowledge of teachers especially in statistics and probability topic.

ACKNOWLEDGMENT

All this works are conducted as part of community service in Kediri Municipality and Kediri Regency by the Mathematics and Science Faculty of Universitas Negeri Surabaya, year 2018.

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