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Welcome to the 1st Vocational Education International Conference (VEIC 2019), held on April 30, 2019, in Semarang, Indonesia. Topics of interest include, but are not limited to, the following: 1. Innovation in Building and Developing Vocational Education; 2. Innovation In Preparing and Developing Educators In Vocational Education; 3. Innovation In Preparing and Developing Skilled Workers; and 4. Developing Students Competencies Using E-learning.

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

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PREFACE

Vocational education plays a pivotal role increasing the employability of the young generation in Indonesia. The synchronicity between the vocational school and industry becomes the main issue of the vocational education. It determines the alignment between the competencies of the graduates and the needs of the industry. The high employability of the vocational school graduates could lead to the decrease the unemployment rate. However, vocational education is a multifaceted process of nurturing the skills and competencies of the young generation. It presents various challenges for many stakeholders. Therefore, the Vocational Education International Conference is aimed at discussing the challenges in vocational education and its problems by inviting stakeholders, scientists, and educational practitioners in the international forum. It is expected that the Vocational Education International Conference could generate practical and novel propositions to drive the vocational education forward.

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The Effect of Use of E-Learning on Competency Learning Outcomes Doing Work with Lathe Machine in Mechanical Engineering Education Student UNNES

Sudiyono, Ari Dwi Nur Indriawan Musyono, Angga Septiyanto

This study aims to determine the effect of the use of E-learning on the competence of doing work using a lathe on students of Mechanical Engineering Education UNNES. The type of E-learning used is Google Classroom which is a product of Google for Education. In addition to knowing the effect on student...

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The Effect of a Project-Based Learning Model to Guide Students to Make Blouses in Improving Students' Learning Outcome

Musdalifah, Hanny Erlani

The outcome of blouse making in SMK Tarunatama is not optimum since the teacher still uses the classical conventional learning method. The researchers propose a project-based learning model to teach students how to make blouses, specifically for the XI grade students in SMK Tarunatama. The population...

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The Effectiveness of Modern Hair Bun Styling Handout to Improve the Learning Outcome of Students in Hair Beauty Department of a Vocational High School

Marwiyah, Trisnani Widowati, Delta Apriyani, Nadia Ika Maharani

The handout gives students guidance on how to learn something. However, SMK Negeri 1 Salatiga, particularly from the Department of Beauty, does not provide the handout for the students. The researchers arranged the handout for modern hair bun styling to ease the students for independent learning. This...

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Learning Evaluation Concept for Environmental Engineering Subjects in the Building Engineering Education Study Program, Semarang State University

Nur Qudus, Triono Subagio

The concept of learning at Semarang State University is directed towards conservation-based learning. This concept is in line with the tagline of the Semarang State University as a conservation campus. The consequence of this implementation is that the concept of learning held at UNNES must strive for...

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Effects of the Technology Development, Socioeconomic Status,

Career Information, and Learning Process on the Career Aspiratic Vocational High School Students

Ari Dwi Nur Indriawan Musyono, Soenarto

This study aims to investigate: (1) the effect of the technology development on the career aspiration of vocational high school (VHS) students in Kebumen Regency, (2) the effect of the socio-economic status on their career aspiration, (3) the effect of the career information on their career inspiration,...

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Analysis Of Practical Assessment Sheet Needs In Beauty Education Programs In State University

Trisnani Widowati, Widya Puji Astuti, Ade Novi Nurul Ihsani³, Wulansari Prasetyaningtyas⁴, Lydia Katarina⁵, Anggie Cristanti⁶

Learning activities cannot be separated from assessment. To ensure the achievement of student competencies in carrying out practice, lecturers need to provide an assessment. Accordingly, lecturers need to use practice assessment sheet. This study aims to describe the analysis of practicum assessment...

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The Influence of Emotional Intelligence and Work Climate Toward Esprit de Corps to Enhance Teacher Performance

Sri Sukamta, Totok Sumaryanto Florentinus, Titi Prihatin, S. Martono

The existence of the industrial revolution 4.0 caused disruption of Education which was not realized by established organizations so that it disrupted the activities of old order. To meet these challenges, the Education system are required to change including in producing quality teachers in order to...

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Computer-Aided Drawing Learning Method to Improve Students' Cognitive and Psychomotor Aspects in Computer-Aided Drawing Competence

Triono Subagio, Nur Qudus

Computer Aided Design (CAD) drawing learning, especially 2-dimensional modelling, continues to be developed so that learning outcomes follow the standards accepted by the business world / the construction service industry. CAD learning methods are directed at improving aspects of CAD understanding and...

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Power Influence of Leadership on Lecturer Performance for University Quality Management

Sri Handayani, DYP Sugiharto, Joko Sutarto, Kardoyo

This review article give analysis about the relationship between path goal leadersip and job satisfaction of lecturers at the 4.0 revolution era. The leader uses the leadership pattern of the goal path in managing the lecturer. The job satisfaction of lecturers depends on the leadership behaviour of...

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The Influence of Teachers' Competence Toward the Learning Outcome of Students from the Beauty Department in a Vocational High School in Semarang

Ade Novi Nurul Ihsani

This research aims to unveil the correlation between teachers' pedagogical and professional skills towards the learning outcome of Beauty department program students in a Vocational High School in Semarang. The objectives include 1) the correlation between teachers' pedagogical skills to students' learning...

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Application of Systemic Functional Grammar for Sixth-Semester Students in Department of Mechanical Engineering, Faculty of Engineering, UNNES

Lelu Dina Apristia, Sarwi Asri, D. S. Danang, D.R. Winarno, D.S. Sartono, T.N. Agung

Bachelor degree study program of Mechanical Engineering Education, Department of Mechanical Engineering, Faculty of Engineering, Universitas Negeri Semarang (Unnes), is a study program that requires students to take general subject named Bahasa Inggris or English. By taking the subject, students are expected...

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Students' Perception Toward the Implementation of Blended Learning for Teaching ESP in Faculty of Engineering

Sita Nurmasitah, Abdurrachman Faridi, Pudji Astuti, Siti Nurrohmah

With the rapid movement of technology, teaching and learning process will no longer limited by the place and time. Universitas Negeri Semarang (UNNES) as a higher education institution encourages its lecturers and students to use Elena (UNNES e-learning system) or other Learning Management System (LMS)...

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Analysis of the Effect of Information Technology and Organizational Culture Through Motivation on Lecturer Performance Quality

Ulfah Mediaty Arief¹, Haryono², Dwi Yuwono Puji Sugiharto³, Achmad Rifai⁴

Lecturer performance can be influenced by several things such as the ability to use information technology, organizational culture, and self-motivation. This study aims to determine the effect of information technology, organizational culture on lecturer performance through motivation. The survey method

performance through motivation. The survey method...

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The Correlation Between Working Load and Pressure in the Practical Units for the Students of Family Welfare Education Department, Faculty of Engineering, UNNES

Saptarianna

According to President Regulation Number 8 the Year 2012 regarding the Framework of Indonesian National Qualification, the Educational Institution should cater to the needs of Vocational Education and Working Fields. Concerning the issue, the institution should conduct practical units to match students'...

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E-Learning Quality Evaluation Instrument for SPADA Indonesia

Hari Wibawanto

Evaluation of the quality of online learning needs to be done before the learning process is carried out by the instructor. The intrinsic quality and some contextual quality are evaluated to ensure the quality of the learning object itself and its pedagogical foundation in an online learning environment....

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Designing Educational Game of Indonesian Traditional Musical Instruments Based on Android Using Unity 3D

Ahmad Fashiha Hastawan, Putri Khoirin Nashiroh, Agung Adi Firdaus, Hanrian Rossa

Nowadays the knowledge of traditional Indonesian musical instruments is deficient. This happens because traditional musical instruments are rarely played and traditional musical instruments are increasingly scarce. Learning multimedia

applications Indonesian traditional musical instruments are made to...

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Developing Instructional Media of Android-Based Game to Teach Human Senses

Putri Khoirin Nashiroh, Ahmad Fashiha Hastawan, Tangguh Al Fatah, Aditya Permana

The use of conventional teaching methods in learning activity can decrease student motivation to learn because students receive learning passively, this situation can cause students to feel bored. Thus, the need for innovation in the learning process in order to form the learning process interesting and...

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Family Welfare Education in The Academic Perspective for Junior High School Students

Asih Kuswardinah

Family Welfare Education has the aim to build students' morality and character; it is a logical target since the education contains the material about knowledge, illustration, behaviour and manner required for children's daily life. The characteristics of the 2013 Curriculum is that the learning is using...

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The Effect of Completeness of Facilities on the Learning Outcome in Lathe Practice of the Students of Vocational High Schools in Kebumen Regency

Sarwi Asri, Andri Setiyawan, Ayub Budhi Anggoro

The research aims to reveal the effect of completeness of facilities on the learning

outcome in lathe practice of the students of vocational high school in Kebumen Regency. The research was ex-post facto research. The subjects were all of XI grade students of vocational high schools at machining competencies,...

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How Students' Understand the Linear Equation and Inequalities (Factual, Conceptual, Procedural Knowledge)

A. Sri Mardiyanti Syam

The research objective was to describe the students' understanding on the linear equation and inequalities related to factual, conceptual and procedural knowledge. This study was qualitative. The focus of the research is to describe the students' understanding of factual knowledge, conceptual and procedural. The...

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Comparing Between Political and Standard-Based Cut-Scores in Muhammadiyah Vocational High Schools

Jahidatu Lis Silmi I'la Alhaq, Haryanto

Vocational high school in Indonesia need a factual standard setting method to ensure their students achievements. This survey intended to compare both standard setting based on scientific methods and political motives. Moreover, the researcher wanted to show the most usable standard setting to determine...

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The Construct Validity of Skills for Learning Questionnaire to Measure the Skill Gap in Vocational High School

Muh. Faathir Husain Misba, Jailani

Using Confirmatory Factor Analysis (CFA), this research aims to test the construct validity of Skills for Learning Questionnaire to measure the gap of skill for learning among students of vocational school in Special Region of Yogyakarta context. The researchers used Normed Chi-square (χ^2/df), RMSEA...

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Optimization of Achievement Culture Through New Student Orientation Supporting Student Achievement

Pudji Astuti, Fakhrudin, Fatah Syukur, I Made Sudana

Students are members of the community who try to develop their potentials through the learning process that is available on major, levels and types of education. Good education provides an environment and encourages students to develop their potential so that they become outstanding students. On the...

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Pilot Project Intervention of Nutrition and Health Education for Mother and Provision of Energy-Dense Cookies in Early Childhood to Improve Their Nutritional Status

Siti Fathonah, Sarwi, Rosidah, Aris Handoyo, dan Titis Budi Rahayu

The purpose of this study was to determine the impact of nutrition and health education interventions and provision of energy-dense biscuits on the nutritional status in early childhood. Intervention nutrition education is done by 1) nutrition and health education for 2 × 2 hours and giving a practical...

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Implementation of the Critical Thinking Concept as an Effort to Strengthen Automotive Electrical Charging System Competency

Febrian Arif Budiman, Dwi Widjanarko, Abdurrahman, Basyirun

One of the practical activities at automotive education program is the practice of automotive electrical system. The practice of automotive electrical system studies the electrical charging system used in motorized vehicles, which must be mastered as a provision of competency for automotive education...

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Employability Skills for High School Students According to the Needs of Industry 4.0

Hadromi, Suwahyo, MD Saputra, B Setiaji

The candidates of vocational schools graduates (SMK) who suit the needs of industry should have the technical skills and employability skills, and the start of the learning process. This paper aims to reveal the characteristics of employability skills for vocational students according to the needs of...

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The Effect of Blended Learning to the Students Learning Achievements in Department of Mechanical Engineering

Andri Setiyawan, Taofan Ali Achmadi, Ayub Budhi Anggoro

Blended learning is a lecturer learning concept supported by e-learning so that it could be complement each other's in shortcomings. This study aims to determine the effect of blended learning on students learning achievement in Mechanical Engineering Department, including: (1) the significant improvement...

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Problem Solving Think Pair Share and Lesson Study Approach for

PROBLEM-SOLVING, THINK PAIR SHARE AND LESSON STUDY APPROACH TO Improvement of Practical Skill of Vocational Students

Noor Hudallah

Improvement of skill for students in vocational school is very important to face the new era of Industry 4.0. Students need the flexible ability and long-life problem-solving skill. In this work problem solving of assignment combined with think pair share and lesson study approach is proposed to be used...

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Effectiveness of the Use of Interactive Video Learning Media in Fashion Technology Courses

Roudlotus Sholikhah, Maria Krisnawati, Sudiyono

The purpose of this research is (1) To find out that there is a significant increase in student learning outcomes by using interactive video learning media better than using previous learning media. (2) To find out whether interactive videos are used as learning media in the learning process of Fashion...

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Development of Digital System Learning Media Using Digital Learning System

Terdy Kistofer, Ginanjar Setyo Permadi, Tanhela Zein Vitadiar³

In this research learning media developed are digital system learning media. Digital system learning in UNHAS, especially in Informatics Study Program Faculty of Information Technology still uses conventional systems with oral-based teaching systems so that the digital system learning process is less...

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Interest of Mechanical Engineering Students to Become Entrepreneurs Sunyoto

Entrepreneurship is one of the compulsory subject or course for students in mechanical engineering department, technical faculty in Semarang State University. It is expected that this subject can be used as a provision for students if after graduating they want to become entrepreneurs. But how many students...

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Teamwork Skills Improvement Through the Teaching Factory Model Sri Subekti, A Ana, M S Barliana, I Khoerunnisa

The employability skills needed to anticipate changes in labor market demand as a result of the industrial revolution are teamwork skills. Employers decide on teamwork skills as a condition that must be owned by prospective workers in the recruitment process. This research focuses on improving teamwork...

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A Learning Model-Oriented in Soft Skill Management to Improve Entrepreneurship Skill of Vocational High School Student Atika

The unemployment rate from Vocational High School graduate can be reduced by maximizing the role of Vocational High School to prepare the student to be an entrepreneur. It can be done by strengthening students' communication skill to interact with the environment suitable for their competence. That skill...

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The Role of Quality of Clothing Services on Customer Satisfaction Convection CV. Surya Permata Surabaya

Lailatul Hanifi Rahmah, Supari Muslim, Mein Kharnolis, Alfiatul Khasanah

In general, companies engaged in industry, aim to do business professionally so that the desired goals can be achieved. Customer satisfaction depends on many factors, including the consideration of service quality. How far is customer satisfaction with CV. Surya Permata Surabaya? This study aims to determine...

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Robotic Learning Media Development for D3 Students of Information Management Unesa

Samsul Huda, IGP Asto Buditjahjanto, Eppy Yundra

This study aims to design and create learning media of robotics, describing student responses to trainers developed and analyzing the feasibility of robotics trainers in digital electronics courses for D3 Informatics Management students at Surabaya State University. This research conducted with the development...

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Analysis of Student Science Process Skills in Faculty of Engineering State University of Surabaya

Niki Fadilla, Luthfiyah Nurlaela, Maspiah, Mohamad Nur

This study aims to obtain information about Science Process Skills in vocational education at the Faculty of Engineering, State University of Surabaya. Science Process Skills (SPS), is a very important skill for students, not only in learning but also has a positive impact on student life in the future....

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The Effectiveness of the Cooperative Learning Model of Jigsaw Type on the Results of Students Learned from Skills Critical Thinking of Vocational Schools

Ansheila Rusyda Subiyantari, Supari Muslim

The quality of education in Indonesia needs to be continuously improved, especially Vocational High School (SMK). One way to improve the quality of education is through improving the quality of learning. In connection with this, several questions arise as follows: (1) what is meant by the jigsaw type...

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Implementation of Competence Certification Test for the Improvement of Vocational School of Work Graduation Readiness

Latifahtur Rahmah, Supari Muslim

With the enactment of the ASEAN Economic Community, it allows increased mobility and competition for labor freely among ASEAN member countries. This is a challenge for the Government of Indonesia to produce vocational graduates who are competent and highly competitive through Presidential Instruction...

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Collaborative Problem-Based Learning Models Implementation in Vocational High Schools

Sudirman Rizki Ariyanto, Munoto, Supari Muslim, Muhaji

The low quality of vocational graduates and vocational graduates' competitiveness in Indonesia are influenced by various factors. Not only because of the lack of teachers who apply the authentic learning, but also the low of students' ability to collaborate and solve the problems. This research aims...

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Job Performance Apprenticeship in Housekeeping Department: An Implementation of Competency-Based Assessment Model

Yoyoh Jubaedah, Nenden Rani Rinekasari, Neni Rohaeni

The purpose is to implement the model of competency-based assessment on job performance of industrial practice in Housekeeping Department. The Specific targets of are implementation, competency achievement, and the quality competency-based assessment on job performance of industrial practice in Housekeeping...

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The Use of Polisher Machine on the Floor Cleaning Practices in Housekeeping Department: Implementation of Performance Assessment

Nenden Rani Rinekasari, Sri Wahyuningsih², Yoyoh Jubaedah³, Neni Rohaeni⁴

The implementation phase of performance assessment from the use of polisher machine on the floor cleaning practices in housekeeping department is validated by an expert. The study used a descriptive method with 27 students of vocational high school of hotel accommodation expertise as a selected sample...

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Electronic Rubrics Design to Assess Student Competence in Vocational Education

M Muktiarni, A Ana, C Yulia, Y Jubaedah

This research aimed at developing an instrument that contains a rubric on food and beverage service practice in vocational education that is valid, practical, and effective. Based on preliminary studies conducted on several universities, lecturers still using judgments with points or ratings without...

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Digital Literacy Qualitative Analysis in Vocational Teachers

S Saripudin, S. Sumarto, E.A Juanda, Ade Gafar Abdullah, A Ana, Tutin Ariyanti

The challenges of digital media in learning today are demanded better by the demands of the digital era which are increasingly high in people's lives today. Teachers provide teaching materials with traditional learning media which certainly has an impact on the asking and motivation of students in accepting...

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Competences of Industry 4.0: Is the importance of Leadership in the Food Service Industry?

A Ana, Vina Dwiyanti, Ellis E Nikmawati, Sri Subekti, DewiEka Murniati

This study discusses the competence of vocational education students in preparing themselves to enter the workforce. Prospective workers need to prepare themselves with various food service industry qualifications. Amid the 4.0 industrial era, competition between humans and robots is getting tougher...

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Learning Improvement of Wood Carving Skills in SMK for Preservation of Local Wisdom and Its Contribution in Furniture Industrial Sector in Jepara

Muh Fakhrihun Na'am, Taofan Ali Achmadi, Qori Zakiyyatussa'diyyah

Jepara wood carving is one of the riches of ancestral cultural heritage in the past, creating various types and distinctive carved ornaments as Jepara local wisdom. The structure of wood carving as an art form is sometimes juxtaposed with visual language, which is when someone learns to understand and...

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Analysis of Self Concept and Graduation Capability in the Era of Industrial Revolution 4.0 to Increase Absorption of Vocational Student Graduates

Amat Mukhadis, Andika Bagus Nur Rahma Putra, Windra Irdianto, Affero Ismail, Fendi Achmad

This study aims to: (1) map self-concept needs in the era of IR 4.0; (2) mapping the graduation capability needs in the era of IR 4.0; and (3) mapping the efforts of universities to increase the absorption of graduates of vocational students. The method used is a qualitative method. Data collection techniques...

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School and Industries Collaboration on Implementing Vocational Education Internship Program: Best Practice in Indonesia

Marsono, Muhammad Rizki Muzani, Basuki, Eddy Sutadji, Yoto, Siti Salina Mustakim, Sufri bin Pg Hj Ali, Fitria Khasanah

This study aims to describe the collaboration of schools and industry in planning student internship program, implementing student internship program, and evaluating student internship program. This study uses descriptive methods with a qualitative approach. Correspondents in this study include the Chairperson...

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Implementing Teaching Factory Learning to Increase Students' Achievement in Fashion Business Management Subject

Sicilia Sawitri

The graduate students of Fashion Education Study Program at Home Economic Department must have self-confidence to manage their own businesses. In the

Department must have self-confidence to manage their own businesses. In the curriculum of study program, there are some subject, one is The Fashion Business Management subject has 3-semester credit system it is not enough to create...

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The Level of Necessity and Mental Readiness by Fashion Department Students in Supporting Fashion Business Incubator

Sri Endah Wahyuningsih

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Agus Suryanto, Totok Sumaryanto², Fakhruddin³, Titi Prihatin⁴

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Robotic Learning Media Development for D3 Students of Information Management Unesa

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Keywords: Robotics learning media, digital electronics, information management unesa.

Abstract: This study aims to design and create learning media of robotics, describing student responses to trainers developed and analyzing the feasibility of robotics trainers in digital electronics courses for D3 Informatics Management students at Surabaya State University. This research conducted with the development of learning media referring to the 4D design model from Thiagarajan (1974). The four stages are the stage of defining, designing, developing and disseminate. The defining stage includes front-end analysis, student analysis, concept analysis, task analysis and specification of learning objectives. The design phase consists of the preparation test, media selection, format selection, and initial design (initial design). At the development stage in this study carried out by socializing learning media. Result of research showed (1) an average score of validation module is 3.59 (good); (2) an average score of trainer validation is 4.46 (good); (3) students showed a positive response to learning that indicated as many as 90% of students feel happy and motivated by using a learning module that is equipped with learning aids (trainer) and as much as 90% of students find it easy to understand the material by using a learning media robotics. Based on these results it can be concluded that learning media developed are feasible to be used in digital electronics lectures. The application of learning media in digital electronics courses is the subject of digital circuit applications in everyday life suitable for learning activities.

1 INTRODUCTION

Mobile robots (robots in motion) are robots that need an activator to move (Budiharto, 2006: 6). This mobile robot has a driving mechanism in the form of wheels and/or legs to be able to move from one place to another.

Hartini (2011) stated that the car robot is Wahana Nir Awak (WaNA) which has become a tool used by the military and civilians to carry out surveillance, exploration and supervision to places that are dangerous to humans.

The development of robotics in the country has been very encouraging. As a barometer, the success of the Indonesian Robot Contest (KRI), Indonesian Fire Extinguisher Robot Contest (KRPAI), Indonesian Football Robot Contest (KRSBI), Indonesian Dance Art Robot Contest (KRSTI) and Indonesian Flying Robot Contest (KRTI). The contests more than 40 major universities in Indonesia took part. But the development of the

robot is only limited to the contest and has not been developed as a learning media taught to all students of electrical engineering surabaya state university.

Theory and practice progress of the course Digital circuits along with their implementation (one of them microprocessors) provide an important role in the development of robotics technology. However, the process has not been widely applied evenly by Electrical Engineering students and is still limited to a number of students involved in (participating in) becoming members of the Unesa Robotic Team.

In an effort to introduce robotics technology to all university students especially in electrical engineering, this study aims to (1) design and create digital electronic learning devices as intelligent robot applications; (2) describe student responses during the application of digital electronic learning devices as intelligent robot applications. The benefits gained are providing knowledge and training skills to students in their understanding and

skills in the field of Robotics in the Department of Electrical Engineering at Unesa, in addition to teaching lecturers and instructors being able to dig deeper into each topic presented.

2 LITERATURE REVIEW

According to Gagne and Briggs (1979: 3). Instruction or learning is a system that aims to help students' learning process, which contains a series of events designed, arranged in such a way as to influence and support the occurrence of student learning processes that are internal.

According to Ratumanan (2004: 8) learning objectives essentially refer to the expected results after the learning process. It can conclude that in planning learning, the learning objectives are set first, all learning activities are directed towards achieving the goals to be achieved. Learning objectives classified into general goals and specific objectives.

Rahman (2007: 65) defines "media is a tool used to channel messages or information from the sender to the recipient of the message". From this understanding, media can be interpreted as an introduction or intermediary that channel messages or information from the sender to the recipient of the message. In learning activities, media can be interpreted as something that can bring information and knowledge in the interactions that take place between educators and students.

According to the Ministry of National Education (2008: 3), modules are printed teaching materials designed to study independently by learning participants. Module also called media for independent learning because they have instructions for self-study. It can be interpreted that the reader can carry out learning activities without the presence of the teacher directly. This media called independent instructional material.

According to the Ministry of National Education (2008: 3), module writing has objectives including: clarifying and facilitating the presentation of messages, overcoming limitations (space, time, and sense power) for both students and teachers, enabling students to learn independently according to their abilities and interests, and allows students to be able to measure or evaluate their own learning outcomes.

Noting the above goals, the module as teaching material will be as effective in face-to-face learning. Writing a good module as if it were teaching students about a topic through writing.

Robot is one form of technological advancement that has many varieties and functions. Almost no one knows no robot. However, everyone has a different understanding of the meaning of robots. In general, intelligent robots are mechanical or biomechanical equipment that can produce movements, both using human supervision and control/using predetermined programs (artificial intelligence). The term robot comes from the Czech language "robota" which can be interpreted as a tireless worker. The tasks carried out by robots are usually repetitive, dirty, heavy, and dangerous jobs.

Most robots used in industrial fields, such as car assembly. Along with the development of the times, robots have entered into various fields, such as education, entertainment, banking, and so on. Robot technology itself has been developed long before the word robot introduced by the North Korean Tired. In the past, robot lovers knew it as automata (automaton). Etymologically, "automata" comes from Greek, automatos, which means moving on its own accord. This word often used to describe non-electronic moving machines, especially those designed to resemble human or animal movements (Pram, 2013: 2).

Robots applied to life actually designed in a form that suits their needs. For example, a robot to move goods on a conveyor is designed as an arm and sensors, and is not equipped with wheels or legs because it does not require mobility, but a freight robot that moves on a flat field will be equipped with wheels, and robots moving on irregular terrain will be equipped with feet. In short, in order to obtain a robot with an economical design, the robots only designed according to their needs. In this case, a human-shaped robot (android) often used for demo purposes or as a receptionist (Nalwan, 2012: 1).

3 RESEARCH METHOD

This type of research is development research aims to produce learning media of robotics for students of D3 MI Unesa. This research conducted at Surabaya State University and the time of implementation in the odd semester of 2013/2014. As a subject in this study were D3 Informatics Management students at the Electronics Engineering Department at Surabaya State University consisting of 20 students.

This module development research design uses qualitative and quantitative methods as a support with a development model called 4-D (Four D Models) which consists of 4 stages, namely: (1)

Definition (Define), (2) Design (3) Development (Develop), (4) Dissemination (Disseminate).

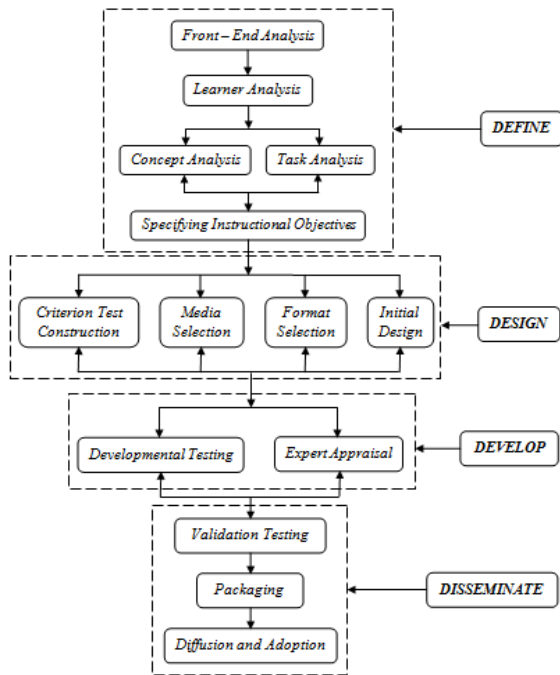


Figure 1. 4-D Model.

The instruments in this study included module validation sheets, validation sheets for trainers and student response questionnaires. The data collection technique done by submitting a module and trainer along with a validation sheet to the Validator. Then the results of the validation sheet used to revise the learning module and trainer. After the module and trainer revised, followed by a trial of a small group of learning modules and trainers in a number of student samples. In this case, the sample conducted on 20 students to find out the student's response to the modules and trainers used.

Analysis of the Module Validation Sheet for the assessment score (SP) of each component was carried out descriptively then averaged. The results of the average score described in the following categories (Ratumanan & Laurens, 2006):

- 1,0 ≤ SP ≤ 1,5 = Not Good: Not yet usable
- 1,6 ≤ SP ≤ 2,5 = Pretty good: Can be used with major revisions
- 2,6 ≤ SP ≤ 3,5 = Good: Can be used with small revisions
- 3,6 ≤ SP ≤ 4,0 = Very Good: Can be used without revision.

Analysis of the Trainer Validation Sheet for the assessment score (SP) of each component was carried out descriptively then averaged. The results

of the average score described in the following categories (Ratumanan & Laurens, 2006):

- 1.0 ≤ SP ≤ 1.5 = Not Good: Not yet usable
- 1.6 ≤ SP ≤ 2.5 = Poor: Can be used with major revisions.
- 2.6 ≤ SP ≤ 3.5 = Pretty good: Can be used with moderate revisions.
- 3.6 ≤ SP ≤ 4.5 = Good: Can be used with a slight revision.
- 4.6 ≤ SP ≤ 5.0 = Very good: Can be used without revision.

Analysis of Student Response Results are based on the results of student response questionnaires distributed after the learning activities, student response questionnaires are used to obtain data about student opinions or comments about the tools developed by the researcher. To calculate the percentage of answers from students are done by calculating the proportion of existing answers divided by the number of students who receive questionnaires multiplied by 100%.

$$P = \frac{F}{N} \times 100\% \text{ (Arikunto:2006)} \quad (1)$$

Information:

P = Percentage of respondents' answers

F = Number of respondents' answers

N = Number of respondents

4 RESULTS AND DISCUSSION

Literature study in reviewing the Digital Electronics curriculum in Unesa's Department of Electronics Engineering in the form of SAP and Syllabus for Digital Electronics courses.

4.1 Learner Analysis

Students in this study were Surabaya State University students, Electrical Engineering Department, Information Management D3 Study Program, 2013/2014 who were on average 20 to 21 years old. According to Jean Piaget in Trianto (2008: 43). The stage of cognitive development is included in the formal operation stage (11 years to adulthood). At this stage students have characteristics that can think abstractly and purely, are able to form concepts that are not dependent on physical reality, and can solve problems through the use of systematic experimentation.

4.2 Concept Analysis

Analysis of this concept by identifying the main concepts to taught. The main concept of the material taught in the robotics module is the subject of digital electronics.

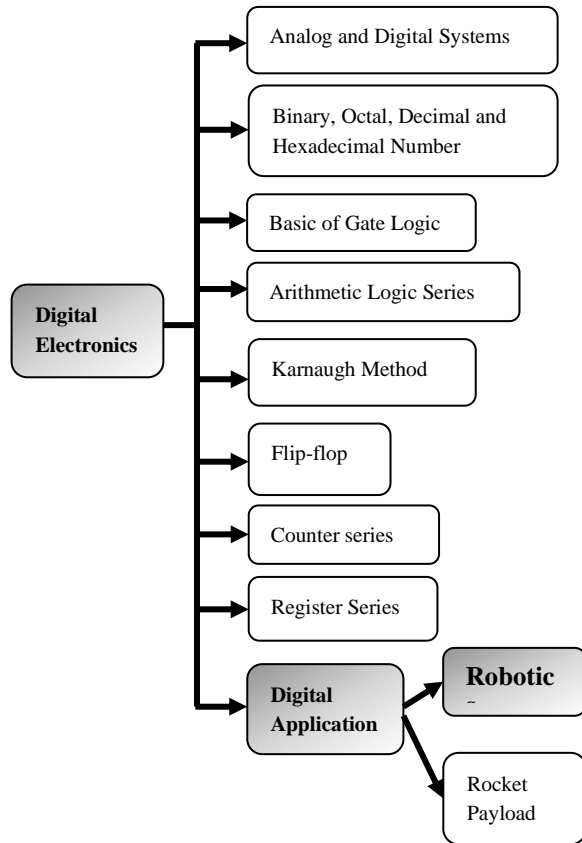


Figure 2. Robotics module concept map as digital electronics applications.

The activity carried out is to determine the tasks of students as learning experiences that are in accordance with the subject matter of digital electronics as an intelligent robot application, so that indicators of learning outcomes can achieved.

Basic competencies (KD) and indicators of the modules developed are as follows:

Basic Competency 1 is without opening a book, 80% of students can understand the microcontroller, Code Vision AVR and Proteus 7.10 Professional software properly and correctly. Indicators are (1) independently, 80% of students can explain the usefulness of each port on the ATmega32 microcontroller properly and correctly; (2) Without opening the book, 80% of students can explain the tools in Code Vision AVR at least four tools; (3)

independently, 80% of students can make digital electronic circuit schemes using proteus 7.10 Professional software properly and correctly.

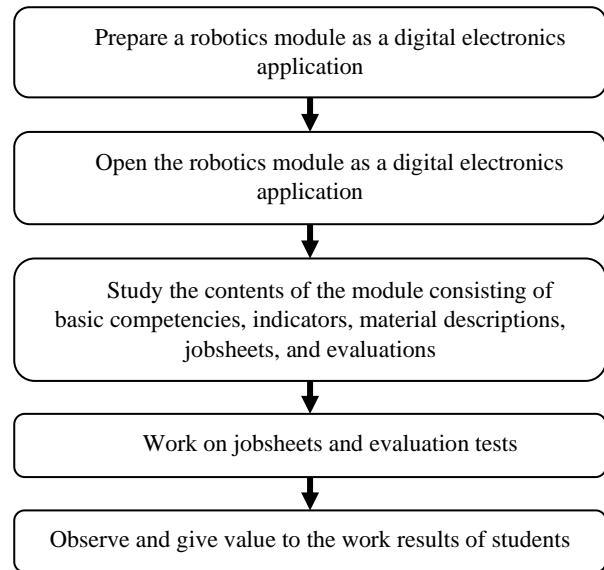


Figure 3. Procedure for using the robotics module as a digital electronics application.

Basic Competence 2 is independently, 80% of students can make microcontroller programs using Code Vision AVR and do simulations on Proteus 7.10 Professional properly and correctly. The indicators are (1) independently, 80% of students can make the Input and Output (I/O) program properly and correctly; (2) independently, 80% of students can make the LCD Display display program properly and correctly; (3) without looking at the book, students can simulate I / O and LCD Display programs on the Proteus 7.10 Professional software properly and correctly.

Basic Competence 3 is without looking at books, students can understand the application of proximity sensors, proximity sensors and fire sensors with a microcontroller properly and correctly. The indicators are (1) without looking at books, 80% of students can make a program to display proximity sensor data according to the answer key; (2) independently, 80% of students can make a program to display proximity sensor data properly and correctly; (3) without looking at books, students can create programs to display fire sensor data properly and correctly.

Basic Competency 4 is that without opening a book, students can understand the application of a fan/extinguisher, a servo motor and a vexta motorbike properly and correctly. The indicators are

(1) independently, 80% of students can make a program to activate fan/extinguisher according to the answer key; (2) independently, 80% of students can make programs with servo motor properly and correctly; (3) without looking at books, students can make programs with vexta motorcycles properly and correctly.

The robotics module as an application of digital electronics learns four things, namely: (1) Introduction of microcontrollers, software Code Vision AVR and software Proteus 7.10 Professional, (2) programming microcontrollers using Code Vision AVR and Simulation on Proteus 7.10 Professional, (3) application of proximity sensors proximity sensors, and fire sensors with microcontrollers, (4) fan/extinguisher applications, servo and vexta motors with microcontrollers.

Next is Figure 4 will show the cover of robotics module asa digital electronic application.

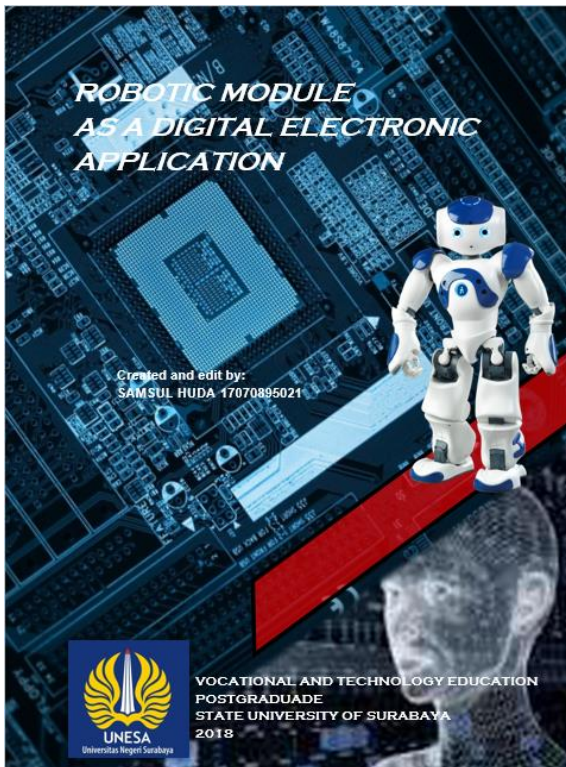


Figure 4. Cover the Robotics Module as a Digital Electronics Application.

ERC Trainer Version 1.0 is a trainer that will used to learn several competencies taught in the robotics module as a digital electronics application. Following is Figure 5 will explain the parts of ERC Trainer V1.0.

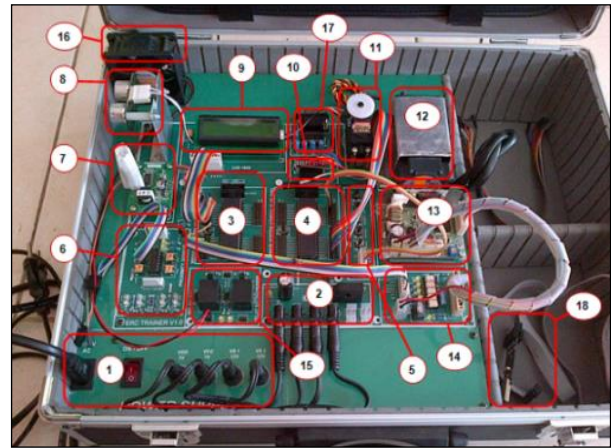


Figure 5. ERC Trainer V1.0.

Description of ERC Trainer V1.0 are (1) power supply is used to supply power of circuit; (2) power management is used to connect power supply with circuits; (3) minimum system ATmega32 (master) is a minimum system series that has been accompanied by output from all PORTs contained in ATmega32; (4) minimum system ATmega32 (Slave) is a minimum system series that has been accompanied by output from all PORTs found in ATmega32.(5) Buttons module are series of push button functions; (6) proximity sensors are electronic circuits to distinguish the color of black and white lines; (7) hamamatsuUVTron fire sensor is a circuit module that serves to detect the intensity of Ultra violet Light or Fire; (8) distance sensor SRF04 is a circuit module that serves to detect distances by using ultrasonic; (9) LCD display 16x2 is a circuit module used to display characters; (10) bargraph LEDs are LED circuit modules.(11) Servo motor is a dc motor that can be driven based on an angle that is equipped with a gearbox and driver circuit in it; (12) vexta motor is a brushless DC motor that has a large power that is equipped with a module driver to move it; (13) vexta motor driver is a circuit module used to drive a vexta motor; (14) optocoupler circuit is a circuit used to reduce the bias voltage caused by a rotating vexta motor by separating the ground of the microcontroller circuit with the ground of vexta motor.(15) Relay module is a relay circuit to activate Fan or Extinguisher; (16) fan is a tool used to extinguish fire in intelligent robot applications; (17) serial circuit is a series used for communication needs of microcontrollers with computers or laptops; (18) USBasp is a circuit module used to insert AVR programs into the AVR microcontroller chip.

4.3 Validation

4.3.1 Module Validation by Expert Lecturers

The feasibility of the module used as learning media is determined from the results of validation by 3 expert lecturers. The feasibility of the robotics module as a digital electronics application assessed from six components, namely characteristics, content, language, illustration, format, and display. The following is a list of module validator names.

Table1:List of names of module validators and trainers

No.	Validator	Expert Field	Keterangan
1.	Lusia Rakhmawati, S.T., M.T.	Learning	Lecturer
2.	Joko Catur Condro Cahyono, S.Si., MT.	Programming	Lecturer
3.	Nur Kholis, S.T., M.T.	Electronics	Lecturer

Module Validation by Expert Lecturers. Full results of the validation module by expert lecturers in Table 2 below.

Table 2. Results of modul validation

No.	Rated aspect	Average	Category
1	Characteristics	3.53	Good
2	Contents	3.42	Good
3	Language	3.56	Good
4	Illustration	3.58	Good
5	Format	3.67	Very good
6	Cover	3.78	Very good
Total average		3.59	Good

Validation of Trainers by Expert Lecturers. Full results of the validation trainer by expert lecturers seen in Table 3 below.

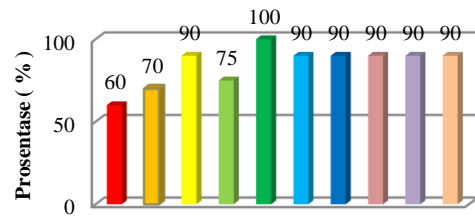
Table 3. Results of trainer validation

No.	Rated aspect	Average	Category
1	Changable and layout	4.56	Good
2	Trainer description	4.33	Good
3	Fill in the Trainer's Series	4.50	Good
Rata-rata Total		4.46	Good

Student response data obtained using questionnaire responses sheet instruments. This instrument used to find out the opinions of students on learning media developed in lectures on digital electronics, the subject of digital electronics

applications in everyday life. The student response questionnaire sheet was filled by 20 students from the Department of Electrical Engineering, Engineering Faculty, Unesa. The results of the student response analysis shown in Figure 6 below.

Student Response Questionnaire Results



- Students understand robotics as a digital electronics application
- Students understand about robotics equipment
- Competence of robotics as digital electronics applications need to be taught
- Competence of robotics as digital electronics applications taught in the Department of Information
- Students are interested in the existence of a robotics module as a digital electronics application
- Students are interested in using computers for simulations of trainers and modules
- Students are interested in the robotics trainer as a digital electronic application used in the module
- Students find it easy to understand the material using robotics module as digital electronics applications
- Students feel happy and motivated by learning using modules equipped with trainers
- Students need to use modules and trainers in learning robotics as a digital electronics application

Figure 6. Results of Student Response Analysis Diagram

5 CONCLUSIONS

Based on the analysis and discussion conclusions are obtained (1) Based on the results of the assessment of 3 expert lecturers, it shows that the average score of all module components is 3.59 and the average value of the trainer validation results is 4.46 which is included in the good category with little revision.

This shows that the learning media is feasible to be used in digital electronics lectures on the subject of digital circuit applications in everyday life; (2) Students show a positive response, this is indicated by 90% of students feeling happy and motivated by

learning using modules equipped with learning aids (trainers) and 90% of students think that digital electronics lectures using instructional media developed can facilitate understanding lecture material.

Based on the results of data analysis and findings described earlier, the authors suggest that (1) learning activities using learning media can be used as an alternative in an effort to improve student learning outcomes; (2) development of learning media can be used as an example for instructors / lecturers who want to develop learning media to be used on other subjects or other appropriate subjects.

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