PROCEEDING

THE 8TH INTERNATIONAL CONVENTION OF INDONESIAN ASSOCIATION OF TECHNOLOGICAL AND VOCATIONAL EDUCATION (APTEKINDO) AND 19TH INDONESIAN CONGRESS OF FT/FPTK-JPTK


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FACULTY OF ENGINEERING
STATE UNIVERSITY OF MEDAN
NORTH SUMATERA, INDONESIA
Preface

We feel thankful to Allah for the blessing so that the book of proceeding of National Seminar completely compiled in relating to the 8th National Convention of Indonesian Association of Technological and Vocational Education (APTEKINDO) and 19th Indonesian Congress of FT/FPTK-JPTK 3 - 6 August 2016 in State University of Medan.

The main objectives of the seminar is to improve the capability in vocational technology in theme: The role of educational technology and vocational in Asean Economic Community (AEC) which is adopted from the researches in order to upgrade the graduates to be International standard so that the output of LPTK-PTK be able to compete in AEC. Therefore, the National seminar, convention and workshop of Indonesian LPTK-PTK may emerge the thoughts how to strength the role of LPTK to improve the quality of the vocational teachers in Indonesia.

Hopefully this proceeding book will be useful to develop technology, art, and culture. This book also can be as a reference to intensify the National development.

The committee would express our gratitude to all participants and stakeholders in supporting the National seminar, convention and workshop of Indonesian LPTK-PTK

Medan, 6 August 2016
Chairman,

Prof. Dr. Abdul Hamid K, M.Pd.
NIP. 195802221981031001
Proceeding Identity
Preface
Content

**Keynote Paper**
*Globalization of Human Resource Management: The Challenges of Reforming Vocational Educational and Training*
By: Prof. Dr. Jailani Bin Md. Yunos (Vice President of RAVTE Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia)

**Main Paper**
*The Role of Vocational Education and Training in Technological Innovation, Entrepreneurship and Productivity Improvement through Technology Transfer and Know-How Development*
By: Fuad Paul Forghani (The University of Queensland, St. Lucia QLD 4072 Australia)

The opportunity and challenge of vocational education in facing Asean Economic Community (AEC)
By: Dr. Bruri Triyono, M.Pd. (Dean of Engineering Faculty, UNY)
DAFTAR ISI

Prakata ........................................................................................................................................ i

Susunan Panitia .......................................................................................................................... ii

Daftar Isi ......................................................................................................................................... v

Sub Thema1 : Capacity Development of Technical and Vocational Teachers

EI-01-001 An Overview of Vocational Education Training in Germany
D. Prastiyanto, State University of Semarang

EI-01-017 ANALYZE THE CONSTRUCTIVIST APPROACH : RADICAL AND SOCIAL
CONSTRUCTIVISM IN THE RELATIONSHIP BY USING THE IMPLEMENTATION
CAREER LEVEL ON THE VOCATIONAL EDUCATION
Haryadi, Iskandar, Dicky Nofriansyah, State University of Padang

EI-01-008 IMPLEMENTING PROJECT-BASED LEARNING (PBL) IN FINAL COLLECTION TO
IMPROVE THE QUALITY OFFASHION DESIGN STUDENT
Indarti, State University of Surabaya

EI-01-016 THE ROLE OF COSMETOLOGY LABORATORY IN PREPARING COMPETENT
GRADUATES
Dewi Lutfiati, State University of Surabaya

EI-01-012 REDEFINING VOCATIONAL TEACHERS COMPETENCE: IMPLICATE TO PREPARE
VOCATIONAL TEACHERS CURRICULUM IN INDONESIA
Wagiran, Yogyakarta State University

EI-01-015 THE IMPROVEMENT OF LEARNING INTEREST AND MASTERY ON WOODEN TRUSS
PLANNING USING TEAM ASSISTED INDIVIDUALIZATION LEARNING METHOD
Sri Handayani, dan Rini Kusumawardani, State University of Semarang

EI-01-018 OPTIMIZATION OF STUDIO LEARNING SYSTEM FOR ARCHITECTURE STUDENTS
Teguh Prihanto, State University of Semarang

EI-01-003 APPLICATION OF ANALYTICAL HIERARCHY PROCESS (AHP) METHOD FOR
TEACHERS PERFORMANCE EVALUATION VOCATIONAL HIGH SCHOOL (SMK)
Yenny Desnelita, dan Irwan, State University of Padang

EI-01-009 USEFULNESS OF DRILL AND PRACTICE STRATEGY FOR EDUCATION OF PRE-
SERVICE VOCATIONAL TEACHER
Lutfiyah Hidayati, State University of Surabaya

EI-01-005 PARADIGM OF INNOVATION AND MANAGEMENT OF TECHNOLOGICAL AND
VOCATIONAL EDUCATION IN INDONESIA
Yoto, State University of Malang
EI -01-004  THE IMPLEMENTATION OF INDUSTRIAL INTERNSHIP PROGRAM FOR TEACHERS OF AUTOMOTIVE PROGRAM TO ESTABLISH THE LINK AND MATCH PROGRAM
Sutijono, State University of Malang

EI -01-011  STUDIES ON THE IMPLEMENTATION OF ELECTRONIC BASED LEARNING TO IMPROVE THE QUALITY OF VOCATIONAL TECHNICAL EDUCATION
Nurmi Frida Dorintan B. Pakpahan, State University of Surabaya

EI -01-010  STUDY OF THE IMPACT OF QUALITY IMPROVEMENT PROGRAM AND TEACHER PROFESSIONALISM THROUGH DECONCENTRATION SUBSIDY FUND FOR TEACHER QUALIFICATION IMPROVEMENT TO S1/D4
Mochamad Cholik, Universitas Negeri Malang

EI -01-013  AN IMPACT OF VHS TEACHER CERTIFICATION ON TEACHER PERFORMANCES
Sutopo, Yogyakarta State University

EI -01-002  IMPROVEMENT OF TECHNOLOGY AND VOCATIONAL EDUCATION AND REGIONAL DEVELOPMENT REQUIREMENTS
Hasan Maksum, State University of Padang

EI -01-019  IMPROVING STUDENT’S SOFTSKILL OF CONSTRUCTION ENGINEERING VOCATIONAL EDUCATION PROGRAM ON SEMARANG STATE UNIVERSITY IN PREPARING PROFESSIONAL PROSPECTIVE TEACHER (THE STUDY OF 2015 CURRICULUM IMPLEMENTATION)
Eko Nugroho Julianto, State University of Semarang

EI -01-006  EFFECTIVENESS OF LEARNING MANAGEMENT SYSTEM (LMS) ON COMPUTER ASSISTED LEARNING COURSE OF STUDENTS OF PROGRAM IN INFORMATICS ENGINEERING EDUCATION
Syaad Patmanthara, State University of Malang

EI -01-014  PRODUCTIVE PERFORMANCE OF TEACHERS OF VOCATIONAL SECONDARY SCHOOL’S MECHANICAL ENGINEERING MAJOR : SURVEY ON VOCATIONAL SCHOOL TEACHER’S PERFORMANCE AT THE REGENCY AND CITY OF MOJOKERTO
Soeryanto and Johan Nurfauzan, State University of Surabaya

Sub Thema 2 : Strategies and Approaches to Improve The Quality of Graduates in The Era of AEC

EI-02-002  EDUCATIONAL PROGRAM EVALUATION BY USING CIPP MODEL
Warju, State University of Surabaya

EI-02-004  OPTIMIZATION OF STUDIO LEARNING SYSTEM FOR ARCHITECTURE STUDENTS
Teguh Prihanto, State University of Semarang

EI-02-013  DEVELOPMENT OF MODULAR DYNAMIC OBJECT ORIENTED LEARNING ENVIRONMENT AS AN EFFORT TO E-LEARNING AT SMK IN SOUTH SULAWESI
Mustari S. Lamada, and Sugeng A. Karim, State University of Makassar
IMPLEMENTATION OF MACHANICAL ENGINEERING CURRICULUM FOR 3 AND 4 YEARS VOCATIONAL HIGH SCHOOL WITHIN THE LEARNING PROCESS IN SCHOOL AND INDUSTRY TO INCREASE GRADUATES QUALITY IN ASEAN ECONOMIC COMMUNITY ERA
Amiruddin, Djoko Kustono, Syamsul Hadi, dan Djuanda, State University of Malang

LESSON STUDY IN MICRO TEACHING APPROACH TO IMPROVE TEACHING SKILLS FOR PRE SERVICE TEACHER IN VOCATIONAL EDUCATION TRAINNING
I Gede Sudirtha, Ganesha University of Education

IMPLEMENTATION OF MULTIMEDIA ANIMATION IN IMPROVING CONCEPT MASTERY ON THE MATERIAL ABOUT METAL REINFORCEMENT IN ENGINEERING MATERIALS COURSE
Ariyano and Amay Suherman, Indonesia University of Education

THE INDUSTRIAL DEVELOPMENT OF LEARNING COMPETENCE BASED APPROACH ON SEWING IN SMK
Mally Maeliah, Indonesia University of Education

BETWEEN EXPECTATION AND REALITY, PROCESS OF LEARNING AND TRAINING IN VOCATIONAL HIGH SCHOOLS WEST SUMATERA
Nizwardi Jalinus, Muhibbudin and Aznil Mardin, State University of Padang

IMPLEMENTATION OF META ROUTER MIKROTIK ON COURSE PRACTICUM LEARNING COMPUTER NETWORK
Raimon Efendi & Tri Monarita Johan, State University of Padang

DESIGN AND DEVELOPMENT OF COMPUTER BASED TEST (CBT) FOR NEW STUDENT RECEPTION AT MUHAMMADIYAH RIAU UNIVERSITY
Resmi Darni, Muhammadiyah Riau University

THE DESIGN AND THE IMPLEMENTATION OF 3D EDUCATION GAME BY USING UNITY 3D GAME ENGINE
Nofriadiman, Dwilsen Genedi, State University of Padang

TEACHING PHYSICS IN ENGINEERING FACULTY (REVIEW)
Fadhilah, State University of Padang

LEARNING CYCLE: LEARNING MODEL FOR MECHANICAL ENGINEERING IN VOCATIONAL HIGH SCHOOL
Purnomo, State University of Malang

OPTIMIZING FASHION LABORATORY MANAGEMENT IN EFFORTS TO IMPROVE GRADUATES' QUALITY
Idah Hadijah, State University of Malang
A STUDY OF CERTIFIED VOCATIONAL TEACHER PERFORMANCE ON ENGINEERING MAJOR IN MALANG OBSERVED FROM PROFESSIONAL TEACHER STANDARD COMPETENCIES
Hary Suswanto, State University of Malang

ANALYSIS OF STUDENTS INDIVIDUAL VARIABLES TOWARD GRADUATES COMPETENCE ACHIEVEMENT AT VOCATIONAL HIGH SCHOOL
Hakkun Elmunysah, Syarif Suhartadi, & Linda Kurnia S, State University of Malang

IMPROVING LEARNING OUTCOMES HYDROLOGY COURSE IN CIVIL ENGINEERING STUDENTS STATE UNIVERSITY SURABAYA
Nurhayati Aritonang, State University of Medan

DEVELOPMENT LEARNING MEDIA BASED ON INTERNET USING MOODLE ON DATA COMMUNICATION’S COURSE AT THE STATE UNIVERSITY OF SURABAYA
Eppy Yundra, State University of Surabaya

CUTVIEWER USE SOFTWARE TO IMPROVE SKILLS AND LEARNING OUTCOMES CNC COURSE IN MECHANICAL ENGINEERING EDUCATION STUDY PROGRAM FKIP UNS SURAKARTA 2015/2016
Budi Harjanto, Nyenyep Sriwardani, & Rahmat Cahyo Yulianto, Sebelas Maret University

THE ROLE OF CRITICAL THINKING FOR ENGINEERING FIELD IN THE WORKING WORLD
Sucipto, State University of Semarang

THE IMPROVEMENT OF LEARNING ELECTRICAL CIRCUITS ANALYZE USING PREZI MEDIA IN VOCATIONAL HIGH SCHOOL
Ali Basrah Pulungan, Sukardi, Ruki Rahman, & Hastuti, State University of Padang

IMPLEMENTATION OF COOPERATIVE TEACHING METHODS TO INCREASE OF TEACHING THE UNDERSTANDING OF BASIC ELECTRONICS SUBJECTS IN ELECTRICAL DEPARTMENT SMK NEGERI 1 PARIAMAN PADANG
Aswardi, State University of Padang

PROJECT BASED LEARNING: Learning Competency Skills Machining Production Technology (Pembelajaran Kompetensi Keahlian Teknologi Produksi Pemesinan)
Eko Indrawan, State University of Padang

THE DEVELOPMENT OF MIKROPROCESSOR LEARNING MODLE USING LMS APPLICATION BASE ON MOBILE AT UNIVERSITY
Faiza Rini, Stmik Nurdin Hamzah Jambi
EI-02-043 PEMBANGUNAN WEBSITE SUMBER DAYA ALAM SEBAGAI WUJUD KONTRIBUSI DALAM PERCEPATAN PERKEMBANGAN DAN PEMERATAAN AKSES INFORMASI BAGI MASYARAKAT PEDESAAN
Erdisna, Sularno, & Fenny Purwani, State University of Padang, University Putra Indonesia “YPTK” Padang

EI-02-045 COMPLAINT SYSTEM IMPLEMENTATION OF PATIENTS HOSPITAL TREATMENT OF SERVICE USING SMS GATEWAY GAMMU
Febriyanno Suryana, & Erdisna, University Putra Indonesia “YPTK” Padang

EI-02-048 INFLUENCED FACTORS OF ENTREPRENEURSHIPS INTEREST OF ALUMNI OF FASHION STUDY PROGRAM AT DEPARTMENT OF FAMILY WELFARE OF FACULTY OF ENGINEERING OF THE STATE UNIVERSITY OF PADANG
Ernawati & Tri Hutari, State University of Padang

EI-02-065 DEVELOPING SKILLS OF COMMUNICATION, AND COLLABORATION VOCATIONAL EDUCATION PROGRAM THROUGH THE DESIGN AND IMPLEMENTATION OF INNOVATIVE LEARNING DEVICE AND WEB-BASED INSTRUMENT AUTHENTIC ASSESSMENT
Dewanto, State University of Surabaya

EI-02-066 ELECTRICAL CIRCUIT LESSON OF MOBILE LEARNING IN ELECTRICAL ENGINEERING DEPARTMENT OF UNESA
Meini Sondang & Munoto, State University of Surabaya

EI-02-025 MULTIMEDIA ANIMATION IN IMPROVING CONCEPT MASTERY OF CRYSTAL DEFECTS IN ENGINEERING MATERIALS COURSE
M Komaro, A Djohar, A Setiawan, B Hasan & A W Kusuma, Indonesia University of Education

EI-02-026 DEVELOPMENT ON PRODUCTION BASED TRAINING ON AGRO INDUSTRY EXPERTISE COURSE TO IMPROVE STUDENTS’ COMPETENCIES IN FOOD DIVERSIFICATION BASED ON LOCAL RESOURCES
Sri Handayani, Mustika N. Handayani & Dewi Cakrawati, Indonesia University of Education

EI-02-044 PRACTICALITIES OF INTERACTIVE MEDIA BASED LEARNING SUBJECTS ANIMATION TECHNIQUES 2 DIMENSIONS VOCATIONAL HIGH SCHOOL (SMK)
Eril Syahmaidi & Ricky Pratama, State University of Padang

EI-02-051 DEVELOPING PHYSICS LEARNING INSTRUMENT FOR VOCATIONAL HIGH SCHOOL BY USING CONSTRUCTIVISM APPROACH
Tuwoso, State University of Malang
EI-02-050  PROTOTYPE APPLICATIONS OF BLENDED LEARNING ON THE LESSONS OF PROJECT MANAGEMENT INFORMATION SYSTEM (MPSI) IN COLLEGE
Riswan, State University of Padang

EI-02-053  MODEL OF BUILDING CONSTRUCTION CERTIFICATE USING REGIONAL MODEL COMPETENCY STANDARD SAND PROJECT-BASED LEARNING IN CONSTRUCTION SERVICE DEVELOPMENT INSTITUTION
Tri Kuncoro, State University of Malang

EI-02-058  SCHOOL BUILDING CONDITION AND PREVENTIVE MAINTENANCE OF VOCATIONAL SCHOOLS AS A MEANS OF ENHANCING COMPETENCE MILESTONE IN THE FIELD OF VOCATIONAL STUDENTS IN ORDER TO ENHANCING COMPETITIVENESS OF GRADUATES TO FACE MEA
H.A. Syafrudie, State University of Malang

EI-02-046  DEVELOPMENT OF LEARNING MEDIA USING INTERACTIVE MULTIMEDIA SUBJECT ASSEMBLY ON COMPUTER IN SMKN-8 PADANG
Muhammad Giatman, Sukardi Umar & Andika Riyadi Jasril, State University of Padang

EI-02-006  THE NEED OF VOCATIONAL TEACHER STANDARD COMPETENCIES AND PROFESSIONALISM CONCEPT IN INDONESIAN VOCATIONAL EDUCATION SYSTEM
Yuyun Estriyanto, Sebelas Maret University

EI-02-008  IMPROVEMENT STUDENTS LEARNING ACTIVENESS AND ACHIEVEMENT THROUGH THE APPLICATION OF THE JIGSAW TYPE COOPERATIVE LEARNING MODEL
Ranto, Indah Widiastuti & Ihsan Fahrizal, Sebelas Maret University

EI-02-009  DRAWING WITH CAD INTERACTIVE VIDEO ANIMATION LEARNING MEDIA FOR BUILDING ENGINEERING VOCATIONAL HIGH SCHOOL
Taufiq Lilo Adi Sucipto, Waluyo & Ragil Hayan Saptiono, Sebelas Maret University

EI-02-015  ELIMINATING THE IMAGE OF SECONDARY VOCATIONAL SCHOOLS AS A SECOND CHOICE THROUGH EXPERTISE PACKAGE DEVELOPMENT BASED ON LOCAL EXCELLENT POTENTIAL AND COMMUNITY NEEDS ASSESSMENT
Rusli Ismail & Sunardi, State University of Malang

EI-02-011  INVOLVING STUDENT IN THE LEARNING PROCESS: LEARNING JOURNAL OF FERMENTATION TECHNOLOGY TO IMPROVE ACADEMIC WRITING SKILL OF STUDENT
Wara Dyah Pita Rengga, Megawati and Widi Astuti, State University of Semarang
EFFECTIVITY OF INVOLVING OF UNNES COOKERY EDUCATION UNDERGRADUATED STUDENT ON COMMUNITY SERVICE PROGRAM “PENDIDIKAN SARAPAN SEHAT ANAK SD GUNUNGPATI KOTA SEMARANG 2016”
Muhammad Ansori and Adhi Kusumastuti, State University of Semarang

DEVELOPMENT OF COMPUTER SECURITY INSTRUCTIONAL MEDIA USING INTRUSION DETECTION SYSTEM WITH ASSOCIATION RULE METHOD BASED ON USER ACCESS PATTERN
Roni Sanjayad & Jeprimansyah, STIKOM Pelita Indonesia Pekanbaru, UMMY Solok

IMPLEMENTATION OF DATA PROCESSING IN SCHOOL EXTRACURRICULAR ACTIVITIES TO IMPROVE THE QUALITY AND PERFORMANCE OF TEACHER STUDENT GRADUATES
Sri RestuNingsih & Misdar Putra, State University of Padang

THE APLICATION OF COMPUTER TECHNOLOGY FOR ONE-CONDUCTOR OPEN FAULT ANALYSIS IN POWER ELECTRICAL ENGINEERING EDUCATION
Rahmaniar, Agus Junaidi, Hermansyah & Fitria Nova Hulu, UNPAB, State University of Medan

ANALYZE THE CONSTRUCTIVIST APPROACH : RADICAL AND SOCIAL CONSTRUCTIVISM IN THE RELATIONSHIP BY USING THE IMPLEMENTATION CAREER LEVEL ON THE VOCATIONAL EDUCATION
Haryadi, Iskandar, & Dicky Nofriansyah, State University of Padang

THE ROLE OF VOCATIONAL EDUCATION IN DEVELOPMENT OF THE NATION
Selamat Riadi, Hasbullah Panggabean and Yussa Ananda, State University of Padang

ANALYSIS AGAINST TECHNICAL LEARN ACHIEVEMENT OF THE STUDENT AT FACULTY OF TECHNIQUE STATE UNIVERSITY OF MANADO
Taslim Pantondate, State University of Manado

REQUIREMENT ANALYSIS AND DESIGN OF AUGMENTED REALITY BASED LEARNING OF COMPUTER SYSTEM FOR VOCATIONAL HIGH SCHOOL
I Made Suartana, Yeni Anistyasari, & Ricky Eka Putra, State University of Surabaya

DEVELOPING STUDENT WORKSHEET BASED ON HIGHER ORDER THINKING SKILLS ON THE TOPIC OF TRANSISTOR POWER AMPLIFIER
Lusia Rakhmawati & Luckey Sardia Ratna Kusuma, State University of Surabaya

CAUSE IDENTIFICATION OF COLLEGE STUDENT INABILITY TO APPLICATE CONSTRUCTION MANAGEMENT USING ROOT CAUSE ANALYSIS
Kemala Jeumpa, State University of Padang
EI-02-073  CHANGE MANAGEMENT VOCATIONAL HIGH SCHOOL NEGERI 1 TOMOHON, NORTH SULAWESI THROUGH LEARNING IN SMK OF PROGRESS MAKER
Rolly R. Oroh & Luckie Sojow, State University of Manado

EI-02-075  THE COMPETITIVENESS OF SMK AND DIPLOMA 3 GRADUATES OF HOSPITALITY AT THE ENTRY LEVEL AND EMPLOYABILITY SKILLS IN DEVELOPING CAREER PATHWAYS
Femmy Indriany Dalimunthe, Malang State University & Eddy Sutadji, State University of Malang

EI-02-076  STUDY PROGRAM CURRICULUM DEVELOPMENT MODEL HOME ECONOMIC EDUCATION (PKK) CANDIDATE FOR SECONDARY SCHOOL
Sri Endah Wahyuningsih & Trisnani Widowatil, State University of Semarang

EI-02-079  ERGONOMIC WEB : DESIGN LAYOUT USING CONCEPT TRI ANANGGA AS A BALINESE LOCAL WISDOM IN THE CONTEXT INTERACTION OF HUMAN AND COMPUTER
Agus Aan Jiwa Permana & Luh Joni Erawati Dewi, Ganesha University of Education

EI-02-094  THE USE OF PROBLEM BASED LEARNING MODEL (PBL) TO IMPROVE LEARNING OUTCOME ON THE SUBJECT OF THE CONSTRUCTION FINISHING IN SMK N 2 PURWODADI 2015
Aris Widodo, State University of Semarang

EI-02-095  CONTRIBUTION OF CRITICAL THINKING ABILITY, THE INTEREST OF LEARNING AND ACHIEVEMENT MOTIVATION TOWARD STUDENT LEARNING OUTCOMES ON COMPETENCE TO FIX HYDRAULIC SYSTEMS AND COMPRESSORS
Sanggam R.I. Manalu, Palangkaraya University

EI-02-096  DETERMINING THE EFFECTS OF INTRODUCTION TO PROGRAMMING LANGUAGE FOR ELEMENTARY SCHOOL STUDENTS ON PROBLEM SOLVING
Ricky Eka Putra, Ibnu Febry Kurniawan, Yeni Anisyasari, Rina Harimurti, Anita Qoiriah, State University of Surabaya

EI-02-080  ANALYSIS OF LEARNING SCIENTIFIC APPROACH IMPLEMENTATION TO DISCOVERY LEARNING MODEL AND CONTEXTUAL TEACHING AND LEARNING MODEL IN CURRICULUM 2013
Yatti Sugiarti, PujiRahmawati Nurcahyani & LilingDwiHarini, Indonesia University of Education

EI-02-081  THE USE OF TECHNOLOGY IN DISTANCE LEARNING
Naim Rochmawati & Asmunin, State University of Surabaya
**EI-02-082** IMPROVEMENT OF LEARNING QUALITY OF ELECTRONIC CONTROL LAB WORKS USING LESSON STUDY
   Totok Heru T.M, Herlambang S.P., Ariadie C.N. & Muhfizaturrahmah, Yogyakarta State University

**EI-02-093** DESIGN AND IMPLEMENTATION OF HYBRID E-LEARNING MODEL WITH INTEGRATED PEDAGOGIC ASPECT
   Agus Efendi, Sebelas Maret University

**EI-02-109** THE USED OF VULCANIC ASH IN CONCRETE MORTAR
   Ernawati Sri Sunarsih & Sri Sumarni, Sebelas Maret University

**EI-02-110** INFLUENCED FACTORS OF ENTREPRENEURSHIPS INTEREST OF ALUMNI OF FASHION STUDY PROGRAM AT DEPARTMENT OF FAMILY WELFARE OF FACULTY OF ENGINEERING OF THE STATE UNIVERSITY OF PADANG
   Ernawati & Tri Hutari, State University of Padang

**EI-02-099** THE INFLUENCE OF RECITATION METHOD ON THE IMPROVEMENT OF CREATIVITY AND SKILLS OF HAIRPIECE SUBJECT BEAUTY GOVERNANCE STUDIES PROGRAM HOME ECONOMIC FACULTY OF ENGINEERING SEMARANG STATE UNIVERSITY
   Trisnani Widowati, State University of Semarang

**EI-02-100** DESIGN MEDIA INTERACTIVE LEARNING FOR DAILY PRAYERS BASED MOBILE DEVICE WITH RAPID APPLICATION DEVELOPMENT METHOD (RAD)
   Fenny Purwani & Erdisna, State University of Padang

**EI-02-101** MODEL DEVELOPMENT OF LEARNING DIGITAL TECHNIQUES PRACTICUM IN VOCATIONAL HIGH SCHOOL USING SIMULATION PROGRAM
   Irwan Yusti, Muhammad Ihsan & Yahfizham, State University of Padang

**EI-02-014** IMPROVING THE COMPETITIVENESS OF VOCATIONAL HIGH SCHOOL GRADUATES IN THE FACING THE ASEAN ECONOMIC COMMUNITY THROUGH PLANTING OF EMPLOYABILITY SKILLS
   Darmawang, Haris Anwar Syafrudie, Tuwoso, Muhammad Yahya, State University of Malang, State University of Makassar

**EI-02-102** THE ROLE OF COSMETOLOGY LABORATORY IN PREPARING COMPETENT GRADUATES
   Dewi Lutfiati, Arita Puspitorin, OK Pritasari, & Biyan Yessi W, State University of Surabaya

**EI-02-097** THE USE OF INTERACTIVE WORKSHEET ON IMPROVING THE EFFECTIVENESS OF FINANCIAL ACCOUNTING PRACTICES IN TEACHING RESTAURANT
   Aisyah Larasati, & Apif M. Hajji, State University of Malang
EI-02-098  THE EFFECTIVENESS OF IMPLEMENTATION LEARNING MODEL WITH WORK VALUES EMBEDDED FOR JUNIOR HIGH SCHOOL STUDENTS
Muhammad Yahya, State University of Makassar

EI-02-103  THE IMPROVEMENT OF LEARNING INTEREST AND MASTERY ON WOODEN TRUSS PLANNING USING TEAM ASSISTED INDIVIDUALIZATION LEARNING METHOD
Sri Handayani, & Rini Kusumawardani, State University of Semarang

EI-02-104  THE APPLICATIONS OF PSYCHOMOTOR DOMAIN LEARNING STRATEGIES AT VOCATIONAL HIGH SCHOOL
Edy Suprapto, University of Nusa Cendana

EI-02-105  LEARNING E-LEARNING IN HIGHER EDUCATION BASED LEARNING MANAGEMENT SYSTEM (LMS)
Lita Sari Muchlis, State University of Padang

EI-02-034  MEDIA DEVELOPMENT BASED LEARNING INTERACTIVE MULTIMEDIA SKILLS SUBJECT CRAFTS
Dina Ampera & Efnarayi Artania Siagian, State University of Medan

EI-02-106  THE INFLUENCE OF LEARNING STRATEGY AND THE TYPE OF PERSONALITY AGAINST LEARN RESULT IN THE FIELD OF MATHEMATICS IN LESSON YEAR OF 2013-2014 (Experiment Study at SMK II Manado)
Djubir Ruslan Edy Kembuan, State University of Manado

EI-02-107  COMPLAINT SYSTEM IMPLEMENTATION OF PATIENTS HOSPITAL TREATMENT OF SERVICE USING SMS GATEWAY GAMMU
Febriyanno Suryana & Erdisna, Putra Indonesia University

EI-02-087  THE COMPABILITY LEVEL OF FACILITIES AND INFRASTRUCTURE OF LABORATORIUM TO STUDENTS’ MANUAL ENGINEERING DRAWING IN SMK NEGERI 2 PURWODADI
Agung Sutarto, State University of Semarang

EI-02-086  COMPETENCE IMPROVEMENT BY ASSIGNMENT METHOD ASSISTANCE GROUP BASED ON COURSE OF WOODEN STRUCTURE II IN STUDY PROGRAM S1 PTB
Endah Kanti Pangestuti & Sri Handayani, State University of Semarang

EI-02-088  RELATED BETWEEN VOCATIONAL SECONDARY SCHOOL (SMK) WITH JOB AVAILIBILITY IN CENTRAL JAVA
Yeri Sutopo & Mursid Zuhri, State University of Semarang

EI-02-108  TASK INTERPRETATION TO IMPROVE THE STUDENTS’ LEARNING OUTCOMES OF FAMILY WELFARE SCIENCE COURSE
Luthfiyah Nurlaela & Ita Fatkhur Romadhoni
Sub Thema 3 : Developing Entrepreneurship Pedagogy in Vocational Education

EI-03-001  THE EFFECTIVENESS OF PROJECT-BASED LEARNING ON ENTREPRENEUR SUBJECT AT FASHION EDUCATION STUDY PROGRAM  
Sicilia Sawitri, Ade Novi Nurul Ichsani, & Siti Nurrohmah, State University of Semarang

EI-03-002  THE ROLE OF VOCATIONAL SCHOOL TEACHERS TO GROW THE COMPETITIVENESS IN ENTREPRENEURSHIP OF VOCATIONAL SCHOOL STUDENTS STUDY PROGRAM OF BEAUTY MANNER  
Ade Novi Nurul Ihasani, State University of Semarang

EI-03-003  STUDY PROGRAM CURRICULUM DEVELOPMENT MODEL HOME ECONOMIC EDUCATION (PKK) CANDIDATE FOR SECONDARY SCHOOL  
Sri Endah Walyuningsih & Trisnani Widowatil, State University of Semarang

EI-03-004  THE INTEGRATION OF ENTREPRENEURSHIP LEARNING INTO OTHER COURSES TO STABILIZE ENTREPRENEURSHIP SKILL  
Pudji Astuti, State University of Semarang

EI-03-005  ENTREPRENEURSHIP EDUCATION AT SENIOR EDUCATION SCHOOL AND CHALLENGES ENTREPRENEUR NEED IN INDONESIA  
Didik Nopianto Agung Nugradi, State University of Semarang

EI-03-006  THE DEVELOPMENT VOCATIONAL STUDENTS INTENTION OF ENTREPRENEURSHIP AND ITS CONTRIBUTION TO THEIR READINESS TO BE ENTREPRENEURS  
A. Muhammad Idrkhan, Andi Muhammad Irfan, & Sunardi, State University of Makassar, State University of Malang

EI-03-007  INNOVATION IN LEARNING BASIC COMPETENCE OF VOCATIONAL SKILLS IN ELECTRONIC INDUSTRIES BASED PROBLEM SOLVING IN SUPPORTING ASEAN ECONOMIC COMMUNITY (AEC)  
Purnamawati & Syahrul, State University of Makassar

EI-03-008  CONTRIBUTION OF LEARNING MANAGEMENT CLOTHING BUSINESS OF READINESS PLANTING BUSINESS TEXTILE CRAFT  
Marlina, Indonesia University of Education

EI-03-009  E-COMMERCE SYSTEM MODEL FOR ENTREPRENEUR FROM DIGITAL NATIVES GENERATION WITH NON INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) BACKGROUND (CASE STUDY ON INDONESIA UNIVERSITY OF EDUCATION STUDENTS)  
Enjang A. Juanda, Ali Ibnun Nurhadi, Bambang Trisno, & Arjuni B.P., Indonesia University of Education
EI-03-010  ANALYSIS OF PROGRAM DEVELOPMENT OF ENTREPRENEURSHIP IN SOUTH KOREA  
Alvia Wesnita, State University of Padang

EI-03-011  INCLUDATE TECHNOPRENEURSHIP IN THE STUDENT VOCATIONAL FACING ASEAN ECONOMIC COMMUNITY  
Rusli Saputra & Febriyano Suryana, State University of Padang

EI-03-012  BUSINESS PROCESS MODELLING OF INTERNAL QUALITY ASSURANCE SYSTEM FOR DIPLOMA PROGRAMS: CASE STUDY  
Yulherniwati & Aidil Ikhsan, State University of Padang, Bung Hatta University

EI-03-013  MINANG TRADITIONAL FOOD DEVELOPMENT AS A FORMULA IN THE IMPROVEMENT OF CHILD NUTRITIONAL STATUS OF CHILDREN IN WEST SUMATRA  
Yuliana & Asmar Yulastri, State University of Padang

EI-03-014  OBSERVING THE TOURISM POTENCY IN KENAGARIAN SIMABUR, DISTRICT OF PARIANGAN TANAH DATAR REGENCY, WEST SUMATRA  
Ira Meirina Chair, State University of Padang

EI-03-015  GROWING UP THE ENTREPRENEURIAL POTENTIAL LIFE OF THE STUDENTS THROUGH INTERNSHIP IN BUSINESS CENTER IN SMALL INDUSTRIES OF PUDAK, GRESIK - EAST JAVA  
Rita Ismawati, State University of Surabaya

EI-03-016  DEVELOPMENT OF ENTREPRENEURSHIP FOR HOME ECONOMIC STUDENT AS FUTURE TEACHER IN VOCATIONAL EDUCATION  
Juhrah Singke, State University of Surabaya

EI-03-017  DEVELOPMENT ON PRODUCTION BASED TRAINING ON AGRO INDUSTRY EXPERTISE COURSE TO IMPROVE STUDENTS’ COMPETENCIES IN FOOD DIVERSIFICATION BASED ON LOCAL RESOURCES  
Sri Handayani, Mustika N. Handayani, & Dewi Cakrawati, Indonesia University of Education

EI-03-018  THE INTEGRATION OF ENTREPRENEURSHIP LEARNING INTO OTHER COURSES TO STABILIZE ENTREPRENEURSHIP SKILL  
Pudji Astuti, State University of Semarang

EI-03-019  STRENGTHENING PARTNERSHIPS WITH INDUSTRIES FOR VOCATIONAL EDUCATION EFFECTIVENESS AND EFFICIENCY  
Nurhening Yuniarti, Yogyakarta State University
**Sub Thema 4**: Establishment of Vocational Education Through Mental Revolution Approach

**EI-04-001** Preparing Educational Institution’s Graduates to Compete in ASEAN Economic Community  
*Saptriana*

**EI-04-002** Dual System Education Program Review With Stake's Countenance Model At Vocational High School (SMK) Public School 2 Kupang  
*I Made Parsa, Nusa Cendana University*

**EI-04-003** EVALUATION OF PROGRAM WORK PRACTICE IN INDUSTRY (PRAKERIN) IN THE ERA OF CENTRALIZED VOCATIONAL EDUCATION IN THE WEST SUMATRA USING CIPPO MODEL  
*Ambiyar, State University of Padang*

**EI-04-005** THE APPLICATION OF PROBLEM BASED LEARNING MODEL IN VOCATIONAL EDUCATION IN ORDER TO SET ENTREPRENEUR MENTAL  
*Dyah Nurani Setyaningsih, State University of Semarang*

**EI-04-006** THE PLACEMENT MODEL AND THE SELECTION OF INDUSTRIAL WORKING PRACTICE PLACE THAT RELEVANT AS AN EFFORT TO PREPARE STUDENTS OF VOCATIONAL HIGH SCHOOL PROGRAM FASHION EXPERIENCE TO FACING ASEAN ECONOMIC COMMUNITY  
*Agus Hery Supadmi Irianti, State University of Malang*

**EI-04-007** THE DEVELOPMENT OF ENTERPRENEURSHIP CHARACTERISTIC BY INTEGRATING GOOD CHARACTER BASED PROJECT “THE SIX” IN BUSINESS MANAGEMENT (Study of strong-willed to success; action and result oriented; and consistent)  
*Any Sutiadiningsih, A. Sonhadji K.H, Eddy Sutadji, & Luthfiah Nurlaela, State University of Surabaya, State University of Malang*

**EI-04-008** SYNERGY OF SKILLED LABOR PREPARATION: A CASE STUDY IN BUILDING ENGINEERING PROGRAM VOCATIONAL HIGH SCHOOL  
*Isnandar, State University of Malang*

**EI-04-012** STUDY ON MARINE CURRENT WITH APPROACH OF A NUMERICAL MODEL FOR MARINE CURRENT POWER PLANT IN THE BANGKA STRAIT NORTH SULAWESI  
*Parabelem Tinno Dolf Rompas, Heindrich Taunaumang, Ferry Jhony Sangari, State University of Manado*

**EI-04-009** STUDY DESCRIPTIVE ABOUT STUDENT’S VOCATIONAL INTEREST AND THEIR PARENT’S OCCUPATION  
*Nurhasan Syah, Aster Devy Kumalasari, & Elrisfa Magistarina, State University of Padang, Padjajaran University*
EI-04-010 DEVELOPING INTERNSHIP PROGRAM
Nurhasan Syah, Aster Devy Kumalasari, & Elrisfa Magistarina, State University of Padang, Padjajaran University

EI-04-013 IMPLEMENTATION OF META ROUTER MIKROTIK ON COURSE PRACTICUM LEARNING COMPUTER NETWORK
Raimon Efendi, Tri Monarita Johan, State University of Padang

EI-04-014 IMPLEMENTATION OF MACHANICAL ENGINEERING CURRICULUM FOR 3 AND 4 YEARS VOCATIONAL HIGH SCHOOL WITHIN THE LEARNING PROCESS IN SCHOOL AND INDUSTRY TO INCREASE GRADUATES QUALITY IN ASEAN ECONOMIC COMMUNITY ERA
Amiruddin Djoko Kustono, Syamsul Hadi, Djuanda, State University of Makassar

EI-04-004 WORK BASED LEARNING TO IMPROVE THE QUALITY OF GRADUATES IN ERA OF ASEAN ECONOMIC COMMUNITY (AEC) FROM INDUSTRY PERSPECTIVE THE CASE OF MEDAN TOURISM ACADEMY
Windra Aini, Djoko Kustono, Ahmad Dardiri, Waras Kamdi, State University of Malang

Sub Thema 5 : Innovation in Technology and Vocational Education

EI-05-001 PERANCANGAN APLIKASI EXPERT SYSTEM PADA PENENTUAN JURUSAN CALON MAHASISWA BARU MENGGUNAKAN PENDEKATAN BAYESIAN NETWORK DI UNIVERSITAS MUHAMMADIYAH RIAU
Vitriani, Universitas Muhammadiyah Riau

EI-05-002 EFFECTIVENESS OF CD INTERACTIVE LEARNING GRAPHIC DESIGN BASED MULTIMEDIA FOR VOCATIONAL SCHOOL STUDENT IN DHARMASRAYA
Kasman Rukun, Asrul Huda, & Yeka Hendriyani, State University of Padang

EI-05-003 ENTERPRISE ARCHITECTURE PLANNING TO DEVELOPMENT FACULTY OF INFORMATION SYSTEMS USING ZACHMAN FRAMEWORK METHOD
Syahtriatna, Zamzami, & Yogi Yunefri, State University of Padang

EI-05-004 THE DEVELOPMENT OF INSTRUCTIONAL MEDIA BASE ON E-LEARNING TO INCREASE THE CLASS EFFECTIVENESS IN VOCATIONAL HIGH SCHOOL
Hapsari Peni, Puput Wanarti, Euis Ismayati, & Yuni Yamasari, State University of Surabaya

EI-05-005 AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY
Yeni Anistyasari & Rina Harimurti, State University of Surabaya
EI-05-006 EVALUATION OF PRACTICE LEARNING COMPUTER SKILL COURSE DRAWING PROGRAM MODE CLOTHING EDUCATIONAL SYSTEM STATE UNIVERSITY MEDAN (UNIMED)
Netty Juliana, State University of Medan

EI-05-007 LEARNING SYSTEM IMPROVEMENT ON HYDRAULICS COURSES OF CIVIL ENGINEERING STUDENTS
Rumilla Harahap & Yusniati, State University of Medan, Islamic University of North Sumatera

EI-05-008 INVESTIGATING EMOTIONAL HONESTY THAT EFFECT LEADER BEHAVIOR: A CASE STUDY ON VOCATIONAL HIGH SCHOOL HEADMASTER
Nathanael Sitanggang & Putri Lynna A. Luthan, State University of Medan

EI-05-009 THE STUDY OF AVAILABILITY LAND USED TOWARD SUSTAINABLE CAMPUS DEVELOPMENT (CASE STUDIES IN SEVERAL LOCATIONS OF THE FKIP UNS CAMPUS)
Sukatiman, Sebelas Maret University

EI-05-010 INTEGRATING THE QUALITATIVE AND THE QUANTITATIVE SWOT FOR DEVELOPING THE EFFECTIVE STRATEGIES WITHIN THE TECHNOLOGYCAL AND VOCATIONAL EDUCATION
Suharno, Sebelas Maret University

EI-05-011 THE OVERBURDEN BLAST PLANNING STUDY OF BANKO BARAT PIT I MINE PT BUKIT ASAM (PERSERO) TBK, TANJUNG ENIM, SOUTH SUMATERA
Raimon Kop, Dedi Yulhendra, & Elsa Agustira, State University of Padang

EI-05-012 THE EFFECT OF ADDITIONAL ORGANIC MATERIAL AT TEMPERATURE ON ENVIRONMENT ROAD
Budi Siswanto, Sebelas Maret University

Danar Susilo Wijayanto, Ngatou Rohman, Ranto, & Husin Bugis, Surakarta State University

EI-05-014 MODULAR BEAM SEGMENT FOR BUILDING CONCRETE BEAMS
Chundakus Habsya, Abdul Haris Setiayawan, & M.Akhyar, Sebelas Maret University

EI-05-015 SOFT SKILL AND ENTREPRENEURIAL CAREER GUIDANCE MODEL FOR ENHANCING TECHNICAL VOCATIONAL EDUCATION AND TRAINING’S GRADUATES COMPETITIVENESS
Ahmad Dardiri, State University of Malang

EI-05-016 CLOUD COMPUTING BASED ONLINE LEARNING FOR STUDENTS VOCATIONAL EDUCATION (D-3) ELECTRONIC ENGINEERING DEPARTMENT
Sapto Haryoko & Hendra Jaya, State University of Makassar
EI-05-017 ADVANTAGE WASTE THE CEIBA PENTANDRA SEEDSTO ALTERNATIVE FUEL DIESEL ENGINNES
Muhaji, State University of Surabaya

EI-05-018 THE GEOGRAPHICAL INFORMATION SYSTEM (SIG) A RESIDENCY STUDENTS SMART FAST EDUCATION IN TEH CITY OF PEKANBARU WITH WEB-BASED
Eddis Syahputra Pane, Harianja, & Muhammad Sadar, State University of Padang

EI-05-019 THE EFFECTIVENESS OF SIX PRINCIPLES OF SOFT SKILLS INSTRUCTIONAL MODEL TOWARD SOFT SKILLS LEARNING OUTCOME OF STUDENTS MECHANICAL ENGINEERING VOCATIONAL SCHOOL
Suryo Hartanto, Ratih Fordiana, & Depi Suadi, Universitas Riau Kepulauan

EI-05-020 TECHNICAL AND ECONOMIC STUDY OF BLASTING USING MATERIALS OUTBREAKS AND HEAVY ANFO QUARRY MINING IN PT. CEMENT PADANG
Murad MS, State University of Padang

EI-05-021 AN ASSESSMENT OF ELECTRICITY CONSTRUCTION SERVICE INDUSTRIAL NEEDS-BASED ELECTRICAL INSTALLER
Sukardi, State University of Padang

EI-05-022 MANAGEMENT INSTITUTIONAL ALIGNMENT SMK COMPETENCE TO INDUSTRY
Heri Yudiono, State University of Semarang

EI-05-023 SAFETY EVALUATION OF CONSTRUCTION WORK ON BLASTING (CASE STUDY :KELOK 9 BRIDGE PROJECT, WEST SUMATRA)
Henny Yustisia, State University of Padang

EI-05-024 THE EFFECT OF ONLINE TRAVEL AGENCY CUSTOMER PERCEIVED VALUE TO SATISFACTION AND LOYALTY (A Case study at VALADOO.COM)
Pasaribu, State University of Padang

EI-05-025 PERFORMANCE MULTI BLADE WINDMILL PLANITER TRANSMISSION SYSTEM USING DIFFERENTIAL FOR ELECTRICAL ENERGY CONVERSION
Waskito, Hasanuddin, Purwantono, Ambiyar, & Hendri N, State University of Padang

EI-05-026 SAFETY SYSTEM DESIGN AS A SAFETY TRANSFORMER DIFFERENTIAL RELAY LABORATORY SYSTEM POWER ELECTRICAL ENGINEERING DEPARTMENT UNIVERSITY OF BUNG HATTA
Ija Darmana & Riki Adriadi, State University of Padang, Bung Hatta University

EI-05-027 STRUT-AND-TIE METHOD – ANALYSIS AND ITS APPLICATION IN DESIGNING OF REINFORCED CONCRETE STRUCTURE
Nevy Sandra, State University of Padang

EI-05-028 LEARNING INNOVATION PATTERN DESIGN SYSTEM FASHION COURSES UNIVERSITY STATE OF SURABAYA IN PREPARING VOCATIONAL TEACHERS
Ratna Suhartini, State University of Surabaya
EI-05-029  GROUNDING RESISTANCE REDUCTION OF PARALLEL ROD ELECTRODE AT UIN SUSKA RIAU
Liliana, Cahyono. K., State University of Padang

EI-05-030  THE EVALUATION OF LEARNING DEVICE IN THE EFFORT OF IMPROVING LEARNING QUALITY OF MATHEMATICS IN UNDERGRADUATE EDUCATION OF BUILDING ENGINEERING DEPARTMENT OF CIVIL ENGINEERING FACULTY OF ENGINEERING STATE UNIVERSITY OF SURABAYA
Ninik Wahju Hidajati, State University of Surabaya

EI-05-031  THE VOCATIONALISATION OF EDUCATION: SKILLS PROGRAM REVITALIZATION IN PRIMARY AND SECONDARY EDUCATION FOR BUILDING OF EARNING GENERATION
Ivan Hanafi & Purwanto Gendroyono, Jakarta State University

EI-05-032  EFFECT OF FLUIDIZATION RATIO ON THE PERFORMANCE OF AN INTERNALLY CIRCULATING AERATED FLUIDIZED BED GASIFIER WITH CONCENTRIC CYLINDERS
Janter Pangaduan Simanjuntak, State University of Medan

EI-05-033  BUILDING PLAN OF WIND POWER PLANTS MICRO TURBINE FOR RESIDENTIAL HOUSE IN LOW WIND VELOCITY AREA
Sepannur Bandri, Padang Institute Of Technology

EI-05-034  EXPERT SYSTEM FOR DETECTING BREATHING DISORDERS IN HUMANS
Elvira Arsl1J, Fajrizal, & Pauzun, Lancang Kuning University

EI-05-035  MODEL IMPROVING THE QUALITY OF VOCATIONAL SECONDARY EDUCATION THROUGH THE UTILIZATION OF ACADEMIC INFORMATION SYSTEM BASED ON INFORMATION TECHNOLOGY IN REMOTE AREA
Louisa Kandoli, Djoko Kustono, Eddy Sutadji, & Rina Rifqie Mariana, State University of Manado

EI-05-036  MEDIA DEVELOPMENT BASED LEARNING INTERACTIVE MULTIMEDIA SKILLS SUBJECT CRAFTS
Dina Ampera & Efnarayi Artania Siagian, State University of Medan

EI-05-037  AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY
Yeni Anistyasari & Rina Harimurti, State University of Surabaya
DEVELOPMENT OF LEARNING MEDIA USING INTERACTIVE MULTIMEDIA SUBJECT ASSEMBLY ON COMPUTER IN SMKN-8 PADANG

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ABSTRACT: The aim of research to develop an Interactive Multimedia good for the subjects of computer assembly and Networking Computer Engineering Department at SMK N 8 Padang. This study research and development by the method of Instructional Development Institute (IDI). This study begins by defining the problems that occur in the learning process, and continued to develop a multi-media interactive learning is able to overcome the problems. Furthermore, the resulting media testing the validity, practicalities, and effectiveness. Research result: (1) Providing an Interactive Multimedia on the subjects of computer assembly majoring in computer engineering and networks, (2) Multimedia Interactive declared invalid on the content aspect with good criteria (72.8%), and the aspect of the design is very good (74.9%), (3) Test practicalities of interactive Multimedia based on the response of Master stated practical with a value of 89.38%, while on the practicalities of interactive Multimedia based student response is otherwise very practical with a value of 90.28%, and (4) Effectiveness of instructional media interactive multimedia in terms of the percentage complete learn student of 32 students, there are 28 students with grades above KKM and 4 students with grades below KKM with a percentage of 87.5%.

Keywords: Interactive Multimedia, Validity, practicalities, Effectiveness

I. INTRODUCTION

Sekolah Menengah Kejuruan (SMK) or Vocational High School is a technology and vocational education at the level of upper secondary education (SLTA), with the aim of producing graduates who are skilled and competent in the field of technology and vocational skills in accordance with the chosen spectrum. Vocational graduates are expected to become the supplier of labor-power professionals that are needed in support of national development, and able to compete professionally in the era of the Asean Economic Community (AEC), which has been in effect since the early 2016’s.

One characteristic of vocational education, students are not only provided the science and knowledge is sufficient, but must be equipped with the skills to apply that knowledge in human life. Therefore science and the ability to implement equal importance in vocational education. That requires a variety of techniques and methods of effective learning in every learning process. Each method of learning requires a good learning media and effective for the learning process can run smoothly and effectively in achieving the learning objectives.

One of the subjects taught in vocational especially in the department of Computer Engineering Network (TKJ) is the assembly of the computer. Computer assembly is one of the subjects of the group C2 (Productive). Based on observations made on the subjects of computer assembly TKJ Department at SMK Negeri 8 Padang, there are still many learning outcomes of students who are under the minimum completeness criteria (KKM). The percentage of student learning outcomes in subjects Computer Assembling class X TKJ-1 only 44.8% of the 29 students who passed the boundary
KKM, while in class X TKJ 2 only 37% of the 27 students who passed the boundary KKM. This shows that student learning outcomes are low because there are many students who do not reach the limit KKM.

In addition, interviews were conducted on students and teachers in mind there are a number of factors that make the learning outcomes of students does not meet the standards KKM, including: (a) Less interactive learning media exist, (b) the difficulty of explaining material particular subject in the abstract without support effective media, and (c) the relatively low motivation of students to learn. Because the learning process requires knowledge of computer assembly supporting the much more abstract in its mechanisms and procedures, so it is often ditemuai difficulty in explaining to the students effectively, so it would need to develop a medium that can help students better understand existing learning materials. Actually, there are a number of media slide show has been used by teachers in the learning process, but the media used it still has the disadvantage that only contains learning materials without any video / audio support and training / quiz therein so that the lack of interaction of students in learning. While learning media is one tool to facilitate the process of transfer of knowledge from the teacher to the student, in the learning process there are some important things that should always be considered by the teacher that is, teachers should not be focused on the media and teachers should develop instructional media that make students feel interested and motivated to learn.

Based on the background of the problem, the problem is formulated as follows:

a. What kind of interactive multimedia line with the subject computer assembly?
b. How is testing the validity, practicalities, and the effectiveness of interactive multimedia that has produced them?

The purpose of this study are:

a. Developing interactive multimedia on the subjects of computer assembly.
b. Measure the validity, practicalities, and the effectiveness of interactive multimedia that has developed it.

II. LITERATURE STUDY

Media is anything that can be used to deliver a message from the sender to the receiver so that it can stimulate the mind, feelings, concerns, and interests as well as the student's attention such that the learning process occurs (Sadiman, 2012:7). Fleming (1987: 234) states the media serves to set an effective relationship between the two parties, namely students and content. Furthermore Latuheru (1988:14) states that the media is learning materials, tools, or techniques used in teaching and learning activities with the intent to educate the communication process of interaction between teachers and students can take place in appropriate and useful. Based on those opinions, it can be the sense that the learning media is all materials, tools, methods or techniques used to convey information
from the source (the teacher) to recipients of information (students) during the learning process so as to achieve the learning process better and effective.

While multimedia is taken from the word multi and media. Multi means many and media means media or intermediary. Multimedia is a combination of several elements of text, graphics, sound, video and animation that produces an interesting presentation. Vaughan (2006:2) states that "Multimedia is a combination of text, art, sound, animation and video delivered to users with computers or electronic equipment and other digital manipulation". This is in line with the opinion of Hofstetter (2001:2) which states that "Multimedia is the use of computers to display the information they combine text, graphics, audio and video so that users can navigate, interact, create, and communicate with the computer".

From the opinion of some experts can be concluded multimedia is the use of computers to create and combine text, graphics, audio, video and animation, where the result of the merger of these elements will display information that is more interactive.

The development of learning tools is a set of processes or activities undertaken to produce a learning device based on the theory of development that has been there. There are several models of development that are often used, among other things: (a) model of software development according to Kemp, (b) development model of learning by Dick & Carey, (c) Development Model 4-D, and (d) Model IDI.

IDI Model (Instructional Development Institute) developed by the University Consortium for Instructional Development and Technology (UCIDT). IDI Model has been validated by a consortium of four universities: Michigan State University, Syracuse University, the United States International University, and the University of Southern California. At IDI models prinsi principles apply a systems approach that involves three stages, namely invention (define), development (develop), and evaluation (Evaluate).

Of the four models of the development of learning tools described above, each of which has advantages and disadvantages, researchers are using IDI development model because this model according to the problem of the background for this study. Model IDI has steps are clear, simple and sequentially in conducting a research and development has been validated by a consortium of four universities.

III. DEVELOPMENT METHOD

This research included in research and development (research and development). According Sukmadinata (2005: 164), and Sugiyono (2012) research and development is a process or steps to develop a new product or improve existing products, which can be accounted for. The development model used is a model of Instructional Development Institute (IDI). According to Gustafson and Branch (1997: 58), IDI apply prinsi guiding systems approach that involves three
stages, namely invention (define), which contains step-by-step analysis of the background and problem identification, development (develop) which contains the preparation of the initial form (prototype) products and validation of the product, while the step third stage is the stage of evaluation/assessment (evaluate) which contains the steps of testing and analysis of test results coba.dengan research procedures as described in the chart below (Figure-1).

The data used in the development of this media is the primary data, meaning that the data obtained directly from the research subjects from experts/media experts, expert learning content, from students and teachers who are implementing learning with interactive multimedia. Data retrieved through the deployment of instrument and through statistical formulas. The instruments developed in this study through a validation process instrument and practicality test process through a team of experts.

Data analysis techniques used in this research is descriptive data analysis technique by describing the validity, practicality and effectiveness of using interactive multimedia. Data obtained from the questionnaire validity test material validation and media obtained from the experts/specialists.

**Figure 1. Research Procedure Flow Chart**

1. Analysis of needs
   - Observation
   - Analyzing the syllabus and RPP
   - Analyzing reference books
   - Studying student characteristics
   - Student characteristics and interactive media

2. Designing a prototype of a learning multimedia interactive (initial design)

3. Expert validation

4. Test on class X and TKJ SMKN 8 Padang

5. Analysis of Test Results

6. Media learning multimedia interactive that is valid, practical, and effective

The data is then analyzed using Cohen's kappa coefficient with SPSS to determine the level of agreement of the experts/specialists in assessing the validity of. The test data obtained from the
practicalities of teachers, while the media keterpakaian level of students. Analysis by the practicalities of teachers and students using the following formula:

\[ \text{Nilai Praktikalitas} = \frac{\sum \text{Skor masing - masing item}}{\sum \text{Skor maksimum item}} \times 100\% \]

As for determining the level of practicality guided by the following table (Table-1).

**Table 1. Category practicalities of Interactive Multimedia**

<table>
<thead>
<tr>
<th>No</th>
<th>Tingkat Kepraktisan (%)</th>
<th>Kategori</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥80</td>
<td>Praktis</td>
</tr>
<tr>
<td>2</td>
<td>≤79</td>
<td>Tidak Praktis</td>
</tr>
</tbody>
</table>

*Source: Modified from Purwanto (2009: 82)*

Analysis of efficacy seen from the results of learning by measuring the level of mastery learning students obtained from the multiple-choice test. If the individual student learning outcomes is greater than or equal to the minimum completeness criteria (KKM), the students declared complete. Learning is said to be effective when the number of students who achieve mastery greater than or equal to 85% in the classical style.

**IV. RESULTS AND DISCUSSION**

Steps being taken in the development of interactive multimedia learning media, according to the model used IDI.

A. Development Results

a. The discovery phase

The discovery phase (define) is performed to get a picture of the conditions in the field. This stage is to analyze the needs (needs analysis) required for the process of making media interactive multimedia learning.

b. Stage of Development

The results of the discovery phase (define) is used for the next stage of the development stage (develop). At this stage the following steps:

1) Designing a prototype (preliminary draft)
2) The design of the display

After the process of making media interactive multimedia learning is completed, the next media interactive multimedia learning is validated by experts who will assess the validity of instructional media are subject matter experts and media experts. Each expert validation completed questionnaires that had been developed based on the aspects that have been determined. In the questionnaire provided the stuffing part to give suggestions for improvement of this interactive multimedia learning media. Therefore, from the questionnaire will be obtained by reference to the revision and improvement of
interactive multimedia learning media. Some of the visual results of the development are shown in the following (Figure 2).

![Figure 2: Several Main Display Design Interactive Multimedia](image)

1. **Evaluation Results**
   a. **Validity test**

   Results of the assessment of each aspect of the indicator is given validator summed and calculated according to the percentage of votes aspect that has been made. Results validari validator concluded that both agreed on 11 aspects of the indicators provided, eight aspects of interactive multimedia content validation indicator located on the criteria of good and very good with a percentage of 72.8%, so the validation of interactive multimedia contents can be declared invalid.

   While the design validation validator concluded that both agreed on 12 aspects of the indicators provided, 9 aspects of interactive multimedia design validation indicator located on the criteria of good and very good with percentages of 74.9%, thus validating the design of interactive multimedia can be declared invalid.

   b. **Test practicalities**

   Test practicalities of interactive multimedia on the subjects of computer assembly taken from a questionnaire had been distributed and the teachers and students.

   1) Test the practicalities based on the response the practitioner / teacher

   Practicalities related to the ease of use of interactive multimedia developed. The practicalities of data obtained through questionnaires filled out by two teachers TKJ SMK Negeri 8 Padang, from stuffing the questionnaire can be viewed practicality media. The results of an assessment of the practicality of multimedia in the aspect Ease of use on average 90% (practical), a 77.5% effectiveness (not practical), and the interpretation of the media 95% (practical), with an average of 86.33 (Practical).

   2) Test the practicalities based on responses Students
Student test results obtained on the practicalities of the ease of use of the media 90.83% (practical), the look and appeal of the media 88.33% (practical), and the efficiency of 91.67% with a mean time-rata 90.28% (Practical).

c. Test Effectiveness

In this study, the effectiveness of the test is done by looking at the percentage of students in the classical learning completeness, value posttest followed by 32 students, there are 28 students with grades above KKM and 4 students with grades below the KKM. Thus the percentage of students who reached the KKM is 87.5%. According to the theory, "A class is said to be complete learning (classical completeness) if in the class are ≥ 85% of students who have completed their study" (Trianto, 2010). So it can be concluded that the use of interactive multimedia learning media on the subjects of effective computer assembly.

B. DISCUSSION

The results of the research and development of multimedia interactive learning media use which do have in common the results of relevant research conducted by Delianti (2013) about the development of instructional media Interactive Multimedia CD on the subjects of the first semester of ICT class X SMAN 2 Bukittinggi. Validity test results, the practicalities and effectiveness of Interactive Multimedia CD was declared valid, practical, and effective to be used as a medium of ICT. Similarly Maulana (2015) conducted a study on the development of instructional media CD Interactive on training eye Basic Networking computer and network engineering. Results obtained from this research and development as follows: (a) The validity of Interactive CD expressed very valid on the content aspect, and interest, whereas the aspect of media and languages declared invalid (b) the practicalities of Interactive CD based on the response of teachers after going through the validation otherwise practical, while on the practicalities of Interactive CD based on the responses of students after going through the validation is otherwise very practical (c) Effectiveness of Interactive CD affective from their improving student learning outcomes characterized by an increasing number of students who passed the KKM as many as 28 students.

The results of this study and the results of relevant research states that the interactive multimedia learning media can be used in various fields of science, by adjusting the teaching materials that will be developed with interactive multimedia designed. So it can be concluded that the Interactive Multimedia is one of the media that a valid, practical, and effective for use in the process of studying the subject of computer assembly department of Computer and Network Engineering class X semester of I.
V. CONCLUSION AND SUGGESTIONS

A. Conclusions

Based on the results of research and discussion it can be concluded as follows

a. Interactive multimedia instructional media for subjects Assembling Computer has is developed using a model of Instructional Development Institute (IDI).

b. Interactive Multimedia has been developed to support the subjects Computer Assembling turned out to meet the requirements of test validity, practicalities and effectiveness that deserve to be a good medium of learning.

B. Suggestion

Based on the development constraints obtained during field trials, can be suggested some of the following:

a. Suggested the teachers who teach the assembly of the computer to use this interactive multimedia learning media, in order to help improve student learning outcomes and support from the school to facilitate the use of multimedia tools are required of teachers

b. For students who use this interactive multimedia learning media in order to further explore the potential of self so as to develop the understanding, skills-expertise, and creativity

REFERENCE


Certificate
This is to certify that

Muhammad Giatman
Has participated as
PRESENTER

International Seminar
"The Role of the Technological and Vocational Education in Asean Economic Community (AEC)"
at the 8th National Convention of Indonesian Association of Technological and Vocational Education (APTEKINDO) and 19th Indonesian Congress of Engineering Faculty / EPTK-JPTK
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