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Theme:
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PROCEEDINGS
4th International Conference on Technical and Vocational Education and Training (TVET)

Theme: Technical and Vocational Education and Training for Sustainable Societies

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FOREWORD

Welcome for all respected scholars, researchers, post graduate studentsand especially Keynote Speakers to the 4 ICTVET. The theme of the conference focus on Technical and Vocational Education and Training for sustainable societies and consist of six subthemes. i.e Development of learning model on TVET, Workplace Learning and entrepreneurship, Innovation on applied engineering and information technology, Management and Leadership on TVET, Vocational and Technical Teachers education, and Assessment and Evaluation on TVET.

Sustainable society should be followed by the improvement of various factors that have impacts to the quality of vocational and technical education and training, particularly to overcome the competitiveness of the world business. As we have already known the rapid change of technology as well as the change of demography, having a great effects to the life of peoples in this world. The competitiveness need a collaborativeness to survive the life of millions peoples who lost their jobs. Young peoples as a productive generation have to be creative and innovative to face the competitiveness. So this proceeding contents consist of various findings of research in the field of vocational and technical education as well as applied technology and mainly based on the subthemes of the conference.

Finally, we would like to thank a million for all participants of this conference and all parties who support the success of this conference. Hopefully the seminars and scientific work of this seminar can be a reference material for basic education and elementary school teacher education in Indonesia.

Padang, July 2, 2018

Tim Editor
1. THE PROSPECT OF OFFSHORE IRON SAND IN TIRAM BEACH PADANG PARIAMAN REGENCY WEST SUMATERA
Adree Octova, Ansosry, Yoszi Mingsi Anaperta and Indah Elok Mukhlisah.............................. 1-7

2. OPTIMIZE OF LEAST-SQUARE INVERSE CONSTRAIN METHOD OF GEOFACIAL RESISTIVITY WENNER-SCHLUMBERGER FOR INVESTIGATION ROCK STRUCTURES IN MALALAK DISTRICTS OF AGAM WEST SUMATRA
Akmam, Amir Harman, Putra Amali.............................................................. 8-13

3. CLUSTER ANALYSIS DISTANCE INTER DISTRICT USING SINGLE LINKAGE METHOD FOR DETERMINATION OF MPLIK CAR OPERATION ZONE IN MEDAN CITY
Ali Ikhwan, Yasmin Mohd Yacob, Solly Aryza ................................................. 14-16

4. EFFECT OF MIND MAPPING LEARNING METHODS ON LEARNING OUTCOMES
Almasri ........................................................................................................ 17-21

5. DESIGN OF SKILL ASSESSMENT IN COMPUTER NUMERICAL CONTROL PROGRAMMING SUBJECT
Ambiyar, Febri Prasetya, Yufrizal.................................................................... 22-26

6. MODIFICATION OF INPUT PUSHER ASSEMBLY OF LASER MARKING MACHINE
Arif Rahman Hakim ...................................................................................... 27-34

7. COLLABORATIVE PROJECT-BASED LEARNING: AN INSTRUCTIONAL DESIGN MODEL IN THERMODYNAMICS ON TECHNICAL VOCATIONAL EDUCATION AND TRAINING (TVET)
Arwizet K, Nizwardi Jalinus, Krismadinata................................................... 35-39

8. DEVELOPMENT OF EMPLOYEE INFORMATION SYSTEM-BASED WEB IN MAN 1 PADANG
Asrul Huda, Rendy Harisca ........................................................................... 40-46

9. DECISION SUPPORT SYSTEM (DSS) WITH WP AND MFEP METHODS IN SELECTION OF BEST BABY CLOTHES
Asyahri Hadi Nasyuha, Rahmat Sulaiman Naibaho, Saniman............................ 47-53

10. IMPROVING LEARNING MOTIVATION THROUGH IMPLEMENTATION PROBLEM SOLVING LEARNING STRATEGY
Budi Syahri, Primawati, Syahrial ..................................................................... 54-58

11. THE MODELING OF MASSIVE LIMESTONE USING INDICATOR KRIGING METHOD (CASE STUDIES OF MASSIVE LIMESTONE IN PT SINAR ASIA FORTUNA)
Dedi Yulhendra, Yoszi Mingsi Anaperta ....................................................... 59-65

12. ELECTRONIC COMPONENT TESTER AS A LEARNING MEDIA FOR CLASS X STUDENTS AUDIO VIDEO ENGINEERING SMKN 1 SUMBAR
Delsina Fa'iza, Thamrin, Ahmaddul Hadi, Yongki Saputra.................................. 66-74
13. EFFECTIVENESS OF INTERACTIVE INSTRUCTIONAL MEDIA ON ELECTRICAL CIRCUITS COURSE: THE EFFECTS ON STUDENTS COGNITIVE ABILITIES
Doni Tri Putra Yanto, Sukardi, Deno Puyada ................................................................. 75-80

14. EVALUATION OF LEARNING PROCESS USING CIPP MODEL
Dwi Sudarno Putra, Misra Dandi Utama, Dedi Setiawan, Remon Lapisa, Ambyar .............. 81-86

15. IMPLEMENTATION OF CONTEXTUAL TEACHING AND LEARNING ON ANALYZING ELECTRICAL CIRCUITS SUBJECT
Dwiprima Elvanny Myori, Citra Dewi, Erita Astrid, Ilham Juliardif ................................. 87-91

16. DOMESTIC EMPLOYMENT PROCESSING SYSTEM ON WORKING PROTECTION AND TRANSMIGRATION USING GEOGRAPHIC INFORMATION SYSTEM (GIS)
Eddis Syahputra Pane, Kori Cahyono ............................................................. 92-98

17. CONDUCTING LABOR MARKET ASSESSMENT IN ENGINEERING CURRICULUM DEVELOPMENT
Edi Septe, Suryadimal, Wenny Marthiana, Nizwardi Jalinus, Ramli................................. 99-105

18. DIFFERENCES IN LEARNING OUTCOMES IN THE PRACTICE OF MICROCONTROLLER SYSTEM USING MCS51 MICROCONTROLLER TRAINER KIT
Edidas, Dedy Irfan ........................................................................................................... 106-108

19. MICROCONTROLLER SKILL TRAINING FOR SMKN 2 PAYAKUMBUH AND SMKN 1 SUNGAI RUMBAI
Edidas, Legiman Slamet and Ilmiyati Rahmy Jasril ......................................................... 109-113

20. THE EFFECT OF ISLAMIC WORK ETHICS AND SPIRITUAL LEADERSHIP ON EMPLOYEE’S COMMITMENT IN PADANG SHARIA HOTELS
Eka Mariyanti, Rasidah Nasrah ......................................................................................... 114-120

21. THE DESIGNING OF THE PROTOTYPE OF THE AIR QUALITY MEASURING HELMET
Eko Hariyanto, Solly Ariza Lubis, Zulham Sitorus, M. Iqbal ................................................ 121-124

22. REVIEW DEVELOPING OF PROJECT BASED AS INNOVATION INSTRUCTIONAL
Eko Indrawan .................................................................................................................... 125-130

23. IMPROVING THE ESP STUDENTS’ VOCABULARY BY USING PICTURES IN CIVIL ENGINEERING STUDY PROGRAM AT FIRST SEMESTER OF EKASAKTI UNIVERSITY PADANG
Elda Martha Suri ............................................................................................................. 131-133

24. INTEGRATED SERVICES SYSTEMS ELECTRONIC DEVELOPMENT FACULTY OF ENGINEERING PADANG STATE UNIVERSITY BASED ON JAVA DESKTOP
Elfi Tasrif, Asrul Huda ..................................................................................................... 134-137

25. THE EFFECT OF STRATEGY OF TRAINING MODELS IN LEARNING ELECTRICAL INSTALLATION
Elfizon, Syamsuarnis, Oriza Candra .................................................................................. 138-141
26. SOFTWARE DEVELOPMENT OF CONCENTRATION SELECTION WITH INTEREST TEST BASED ON INTELLIGENT SYSTEM
Elin Haerani ................................................................. 142-149

27. NEEDS ANALYSIS ON INCREASING COMPETENCY TEST RESULTS STUDENTS IN S1 PROGRAM OF PUBLIC HEALTH SCIENCES STIKES HANG TUAH PEKANBARU
Emy Leonita, Nopriadi, Ahmad Satria Efendi, and Niswardi Jalinus ........................................ 150-155

28. THE READINESS OF STUDENT TO ENTREPRENEUR THROUGH INCORPORATION OF THE PILOT PROJECT PRACTICE
Ernawati ................................................................................ 156-161

29. EFFECT OF PROJECT BASED LEARNING MODEL IN IMPROVING STUDENT LEARNING RESULT
Erwinsyah Simanungkalit .......................................................... 162-166

30. DESIGNING LEARNING TOOLS BY USING PROBLEM BASED INSTRUCTION (PBI) MODEL ON ENERGY RESOURCE MATERIAL INTEGRATED TO ENERGY SAVING CHARACTER
Estuhono ............................................................................... 167-170

31. THE DESIGN OF LECTURER PERFORMANCE EVALUATION MODEL BASED ON ANALYTIC NETWORK PROCESS (ANP)
Fenny Purwani, Nizwardi Jalinus, Ambiyar ........................................................................ 171-175

32. DEVELOPMENT OF ONLINE EXAMINATION SYSTEM USING WONDERSHARE QUIZCREATOR BASED ON WEB
FitriYanti, Rijal Abdullah, Krismadinata .............................................................................. 176-180

33. THE VALIDITY OF TRAINER ON MATERIALS SCIENCE AND DEVICES SUBJECT AT DEPARTMENT OF ELECTRICAL ENGINEERING
Fivia Eliza, Dwiprima Elvanny Myor, Hastuti .................................................................... 181-185

34. TRAINING MODEL-BASED KNOWLEDGE MANAGEMENT SYSTEM FOR VOCATIONAL HIGH SCHOOL TEACHERS SKILLS ENGINEERING COMPUTER NETWORK
Gunawan Ali, Kasman Rukun, Syahril ............................................................................ 186-193

35. FUZZY LOGIC BASED CONTROLLER FOR BUCK CONVERTER
Habibullah, Irma Husnaini, Asnil ..................................................................................... 194-200

36. A NEW DESIGN OF HANDLESS STIRRED DEVICE
Hanne Aulia, Riki Mukhaiyar ...................................................................................... 201-204

37. ACADEMIC INFORMATION SYSTEM OF STIKES PERINTIS PADANG
Harleni, Marisa ...................................................................................... 205-209

38. DESIGN OF ELECTROMAGNETIC REGENERATIVE SHOCK ABSORBER AS A TOOL OF HARVESTING VIBRATION ENERGY ON VEHICLE
Hasan Maksum, Aslimeri, Putra Jaya, Wanda Afnison .................................................................. 210-213
39. THE EFFECTIVENESS OF USING POSTER AND VIDEO MEDIA IN EDUCATION ABOUT DANGERS OF SMOKING ON KNOWLEDGE AND ATTITUDES OF SENIOR HIGH SCHOOL 12 PEKANBARU STUDENTS
Hastuti Marlina, Reno Renaldi .......................................................... 214-217

40. A MODEL PREVENTIVE MAINTENANCE CONTROL IN THE MACHINE TURNING AT WORKSHOP THE FACULTY OF ENGINEERING OF THE STATE UNIVERSITY IN PADANG
Hefri Hamid, Nizwardi Jalinus, Syahril, Ambiyar, Febri Prasetya ................. 218-224

41. INVESTIGATION OF CHEMICAL FEASIBILITY AND DISTRIBUTION OF IRON SAND RESERVE REGIONAL AREA OF AGAM DISTRICT FOR CEMENT RAW MATERIAL IN PT. SEMEN PADANG
Heri Prabowo, Sumarya................................................................. 225-227

42. THE DEVELOPMENT OF INTERACTIVE MULTIMEDIA-BASED LEARNING MEDIA USING ADOBE FLASH CS3 AND CAMTASIA IN PROBLEM-SOLVING LEARNING IN ELEMENTARY MATHEMATICS OF IN STUDENT PGSD STKIP ADZKIA IN PADANG
Ika Parma Dewi, Lativa Mursida, Rizkayeni Marta ................................ 228-235

43. ART EDUCATION THROUGH FREE EXPRESSION APPRECIES, DISCIPLINE SCIENCE, AND MULTICULTURAL AS EFFORTS TO IMPROVE STUDENT CREATIVITY
Indra Irawan ................................................................. 236-242

44. THE INFLUENCE OF USING ANIMATION MEDIA AND LEARNING MOTIVATION TOWARD LEARNING RESULT OF AUTOMOTIVE STUDENTS IN SMK N 2 PAYAKUMBUH
Indra Wahyu, Fahmi Rizal, Rijal Abdullah ......................................... 243-248

45. INFORMATION SYSTEM AND REPORT VALUE PROCESSING BASED MICROSOFT VISUAL BASIC 6.0 ON SENIOR HIGH SCHOOL (CASE STUDY AT SMAN 12 PADANG)
Indra Wijaya, Isra Mouludi, Fandy Neta, Yaslinda Lizar, Satria Ami Marta ........ 249-256

46. DESIGN OF SIMULATOR FOR REPLACEMENT OF TOOLSPRACTICE DIGITAL ENGINEERING IN THE VOCATIONAL SCHOOL
Irwan Yusti, Ganefri, Ridwan .......................................................... 257-259

47. CELL ROTATION TO RESOLVE THE WEAKEST CELL DAMAGE IN THE BATTERY PACK IN DISCHARGING PROCESS
Irwanto Zarma Putra, Citra Dewi ..................................................... 260-263

48. IMPROVEMENT OF CONCRETE QUALITY WITH ADDITION OF SUNUA PASIR PADANG PARIAMAN WEST SUMATRA
Iskandar G. Rani, Widya Salmita ..................................................... 264-268

49. SIMPLE WATER PURIFIER USING MULTILEVEL SYSTEM
Jasman, Nelvi Erizon, Syahrul, Junil Adri, Bulkia Rahim ........................ 269-272
50. DESIGN OF LIBRARY INFORMATION SYSTEM USING BARCODE ON SMAN 1 SOLOK CITY  
Jeprimansyah ........................................................................................................... 273-280

51. THE DESIGN OF THE SIGNAL MEASUREMENT DEVICE OF BODY’S BIOELECTRICAL IMPEDANCE By USING THREE ELECTRODES  
Juli Sardi, Hastuti, Ali Basrah Pulungan ................................................................ 281-286

52. PATIENT INFORMATION SYSTEM DESIGN ON MATERNITY HOSPITAL RESTU IBU PADANG  
Jusmita Weriza ......................................................................................................... 287-293

53. IDENTIFICATION THE IMPORTANCE OF LEARNING TOOLS DEVELOPMENT ON ENERGY-EFFICIENT BUILDING INNOVATIONS USING ROOT CAUSE ANALYSIS  
Kemala Jeumpa ......................................................................................................... 294-297

54. DECISION SUPPORT SYSTEM FOR RECOMENDATION CERTIFICATION TEACHER ON VOCATIONAL HIGH SCHOOL  
Khairul, Rahmad Budi Utomo .................................................................................. 298-302

55. IMPACT OF THE TWI LEARNING MODEL IN LEARNING STONE AND CONCRETE CONSTRUCTIONS ON VOCATIONAL EDUCATION  
Kinanti Wijaya, Daniel IrvansiusTampubolon .......................................................... 303-307

56. THE EFFECT OF SOFTWARE MASTERCAME TOWARD MECHANICAL ENGINEERING STUDENTS PERFORMANCE IN MAKING PRODUCT WITH CNC MILLING MACHINE IN VOCATIONAL HIGH SCHOOL 1 PADANG  
Kms. Muhammad. Avrieldi, Suparno, Nofri Helmi .................................................... 308-310

57. LEARNING BROADCAST VIDEO SYSTEM WITH H264 VIDEO ENCODING RASPBERRY PI  
Leni Marlina, Aswandi .................................................................................................. 311-315

58. OPTIMIZATION OF EXTERNAL LIGHTNING PROTECTION SYSTEM DESIGN IN BUILDING CENTER FOR INFORMATION TECHNOLOGY AND DATA BASE (PTIPD) UIN SUSKA RIAU  
Liliana, Afriani, Anwardi .......................................................................................... 316-322

59. A NEW MODEL MOBILE LEARNING MANAGEMENT SYSTEM BASED ON MOODLE IN UNIVERSITY  
Lita Sari Muchlis, Kasman Rukun, Krismadinata, Yahfizham ...................................... 323-327

60. DEVELOPMENT OF MECHANICAL TECHNOLOGY LEARNING MODULE PROGRAM EXPERTISE OF SMK ENGINEERING  
M. Giatman, Waskito, Maruli Sihombing ..................................................................... 328-332

61. SECURITY OF MEDICAL RECORD WITH RIVEST SHAMIR ADLEMAN (RSA) METHOD  
M.Syaifuddin, Ahmad Fitri Boy, Ali Ikhwans .................................................................. 333-336

62. RAHMATAN LIL ALAMIN, THE CONCEPT OF MULTICULTURAL EDUCATION  
Muh. Barid Nizarudin Wajdi, Achmad Fathoni Rodli ................................................. 337-340
63. LESSON STUDY FOR IMPROVING A LEARNING QUALITY
Muh. Barid Nizarudin Wajdi, Andi Mursidi ................................................................. 341-345

64. THE ROLE OF INFORMATION TECHNOLOGY IN THE IMPROVEMENT OF TEACHER'S COMPETENCIES AND TEACHING LEARNING PROCESS EFFECTIVENESS IN ESA SEJAHTERA SCHOOL PEKANBARU
Muhammad Luthfi Hamzah, Hamzah, Astri Ayu Purwati ................................................. 346-350

65. IMPLEMENTATION OF PROJECT BASED LEARNING MODEL IN COURSE WEB DESIGN
Muhammad Sabir Ramadhan, Neni Mulyani, Muhammad Amin ..................................... 351-357

66. MEASUREMENT MODEL OF CONTRIBUTED FACTOR AND INDICATOR TOWARDS VOCATIONAL EDUCATION PRODUCTIVITY
Mulianti, Ambiyar, Generousdi and Rodesri Mulyadi ........................................................ 358-364

67. ORNAMENTS ON THE TRADITIONAL ACEHNES HOUSE IN CENTRAL ACEH, ACEH PROVINCE
N Novita, M Mukhirah, R Dewi, Fitriana, F Noer, F Fadillah, E Erni ................................ 365-368

68. DESIGNING STRATEGY MAPS FOR PRIVATE ENGINEERING COLLEGE
Nanang Alamsyah, Larisang, Muhammad Ansyar Bora ................................................. 369-376

69. DESIGN OF INTERACTIVE MEDIA INTERACTIVE EYELESSONS FOR CLASS III SD N 04 BARINGIN PADANG CULTURAL FLOOR BASED ON MULTIMEDIA
Nelda Azhar, Putra Jaya, Asrul Huda, Etika Fahmidyah ................................................... 377-383

70. DEVELOPMENT OF MALAY FRUIT ORNAMENT
Netty Juliana .......................................................................................................................... 384-387

71. THE CONTRIBUTIONS OF DISCIPLINE AND ENVIRONMENTAL KNOWLEDGE ON CLEAN BEHAVIOR OF STUDENTS IN PUBLIC ELEMENTARY SCHOOL KAMPUNG BARU PARIAMAN, WEST SUMATERA
Nurhasan Syah, Sanny Edinov .............................................................................................. 388-393

72. ANALYSIS OF VOLUME AND STRONG CONCRETE IMPROVEMENT ON NON-SAND CONCRETE MIXED WITH ADDITION BAKING POWDER
Nurmaidah ........................................................................................................................... 394-398

73. BRACING CROSS SECTION EFFECT TO DISSIPATION ENERGY BY NUMERICAL ANALYSIS
Prima Zola, Rahmat, Fitra Rifwan ......................................................................................... 399-405

74. DEVELOPMENT OF MODEL OF PROPELLER-CROSS FLOW WATER TURBINE FOR PICO HYDRO POWER GENERATOR TITLE
Purwantono, Refdinal, Hendri, Syahrul .................................................................................. 406-408

75. THE POTENTIAL OF RENEWABLE ENERGY (STUDY CASE IN TOMUAN HOLBUNG VILLAGE, ASAHAN REGENCY OF SUMATERA UTARA PROVINCE)
Rahmaniar, Agus Junaidi ....................................................................................................... 409-413
76. VIRTUAL LAB IMPLEMENTATION QOS METAROUTER ON COMPUTER NETWORK LEARNING
Raimon Efendi................................................................. 414-418

77. BLASTING DESIGN DEVELOPMENT AREA DECLINE CIBITUNG AND CIKONENG UNDERGROUND MINE PT CIBALIUNG SUMBERDAYA BANTEN
Raimon Kopa, Afdhal Husnuzan, Bambang Heriya........................................ 419-423

78. ANALYSIS OF LEARNING COMPETENCY ENGINEERING STUDENTS VOCIATION D 3 FT UNP
Ramli, Febri Prasetya ............................................................. 424-429

79. FACTORS AFFECTING THE AUTOMOTIVE ENGINEERING STUDENTS’ INTEREST ON TEACHING PROFESSION
Rasinov Chandra, Anggi Aprianto, Mawardi, Reza Rahmadani............................... 430-435

80. AN EXPERIMENTAL STUDY ON THE EFFECT OF CENTRIFUGAL CLUCTH COOLING GROOVE ON MOTORCYCLE PERFORMANCE
Remon Lapisa, Hendika Syahputra, Irma Yulia Basri, Rifdarmon, Hendra Dani Saputra 436-440

81. EXPERT MODEL SYSTEM ON ENTREPRENEURSHIP PERSONALITY
Resmi Darni, Z. Mawardi Effendi and Selamat Triono........................................ 441-446

82. THE ANALYZED OF TAR AS WASTE MATERIAL OF BITUMINOUS COAL GASIFICATION BY USING GASCHROMATOGRAPHY
Rijal Abdullah and Hengki Ade Satria ..................................................................... 447-450

83. EMPLOYEE PRODUCTIVITY IN TWO CROSS CULTURES BASED ENTREPRENEURSHIP
Riki Adriadi, Ganefri and Fahmi Rizal ..................................................................... 451-455

84. DEVELOPMENT OF INTERACTIVE MULTIMEDIA CD OF INSTRUCTIONAL MEDIA ON BUILDING CONSTRUCTION
Rizky Indra Utama, Nurhasan Syah, Rijal Abdullah.................................................. 456-458

85. MULTIMEDIA INTERACTIVE IN WEB PROGRAMMING SUBJECTS
Rusli Saputra, Sophan Sophian, Delia Putri ............................................................. 459-464

86. PREDICTED VULNERABILITY ASSESSMENT OF NON ENGINEERED HOUSES BASED ON DAMAGE DATA OF THE 2009 PADANG EARTHQUAKE IN PADANG CITY, INDONESIA
Rusnardi Rahmat Putra, Junji Kiyono and Aiko Furukawa ....................................... 465-472

87. TWO SPECIES OF TERMITE DAMAGING TO BUILDING AND HOUSES AT BANDA ACEH (SUMATRA, INDONESIA)
S Syaukani, M Bahi, M Muslim, M Shabri Abd Majid, D Sutekad, Y Yasmin, N Novita 473-476

88. PERSONNAL MANAGEMENT IN INFORMATION SYSTEMS APPLICATIONS WITH TOGAF FRAMEWORK
Safrian Aswati, Saleh Malawat, Suhendrar, Iskandar, Yessica Siagian, Arridha Zikra Syah 477-482
89. ANALYZING OF TECHNICAL CUTTING OF EMPTY PALM BUNCHES
Safril, Dedi Wardianto.............................................................. 483-492

90. DESIGNING AND MANUFACTURE OF RADIUS PAJI HAIRERS (PAHAT RADIUS POST) ON LATHE MACHINE FOR LABORATORY AND MODULES TEACH
Saiful Anwar, Rindi Genesa Hatika, B.Herawan Hayadi............................... 493-498

91. MATERIAL SELECTION ANALYSIS AND MAGNET SKEWING TO REDUCE COGGING TORQUE IN PERMANENT MAGNET GENERATOR
Sepannur Bandri, M. Aldi Tio........................................................... 499-506

92. COMPARISON OF DECISION TREE ALGORITHM METHOD (C4.5) AND NAIVE BAYES TO IDENTIFY STUDENT LEARNING RESULTS WITH COOPERATIVE LEARNING MODEL
Sri Restu Ningsih........................................................................ 507-511

93. ONLINE ASSESSMENT TOOLS FOR 2013 CURRICULUM BASE ON INFORMATION TECHNOLOGY
Suartin, Hambali, Oriza Chandra ....................................................... 512-517

94. GAME BASED LEARNING TO IMPROVEMENT TEACHERS KNOWLEDGE FOR TEACHING STRATEGY IN THE CLASS
Suherman...................................................................................... 518-523

95. LEARNING RESPONSE OF JOURNEY LEARNING COOPERATIV LEARNING AND LEARNING MODULE IN EDUCATION MEDIA LEVEL
Suparno, Bulkia Rahim, Zonny Amanda Putra, Junil Adri, Jasman ...................... 524-528

96. NEED ANALYSIS APPLICATION ON THE FEASIBILITY STUDY OF THE HYDROELECTRIC POWER SELECTION (CASE IN SOLOK, PESISIR SELATAN AND SIJUNJUNG REGENCY)
Suryadimal, Edi Septe, Wenny Martiana, Fahmi Rizal, Nizwardi Jalinus.................. 529-534

97. DEVELOPING SOFT SKILLS LEARNING MODELFOR MECHANICAL ENGINEERING STUDENTS OF VOCATIONAL HIGH SCHOOL
Suryo Hartanto .............................................................................. 535-538

98. IMPACT OF WORK-BASED LEARNING OF CONCRETE STONE WORK PRACTICE ON DIPLOMA-III CIVIL ENGINEERING STUDENTS
Syafiatun Siregar ........................................................................ 539-543

99. DEVELOMPENT OF WEB-BASED DECISION SUPPORT SYSTEM FOR SCHOLARSHIP RECIPIENTS SELECTION USING ANALYTICAL HIERARCHY PROCESS (AHP) METHOD
Titi Sriwahyuni, Dedi Irfan, Ika Pharma Dewi and Hanny Maharani .................... 544-552

100. EFFECT OF ENGINE TEMPERATURE CHANGES ON INJECTION TIME OF FUEL AND GAS EMISSION OF GASOLINE ENGINE
Toto Sugiarto, Dwi Sudarno Putra, Wawan Purwanto......................................... 553-557
101. EARTHQUAKE AND TSUNAMI DISASTER MITIGATION TRAINING FOR ELEMENTARY SCHOOL STUDENTS IN THE COASTAL AREA OF PADANG PARIAMAN DISTRICT WITH KYOTO INTERNATIONAL DISASTER PREVENTATION SCHOOL METHOD
Totoh Andoyono, Fitra Rifwan, Revian Bodi, Prima Zola, Annisa Prita
558-560

102. FUNCTIONAL MEMBERSHIP ANALYSIS OF FUZZY INFERENCE SYSTEM SUGENO IN ANEMIA CLASSIFICATION
Tri Monarita Johan
561-563

103. DEVELOPMENTAL OF MEDIA LEARNING BASED ON TUTORIAL VIDEO AT CHARACTER MAKE UP SUBJECT IN SMKN 6
TyasAsih Surya Mentari, Murni Astuti, and Linda Rosalina
564-570

104. PSYCHOLOGICAL FACTORS INFLUENCING THE DECISION MAKING OF PURCHASING PRODUCTS VIA ONLINE
Ulfa Annida Damanik, Sri Wening
571-577

105. IMPROVING TEACHERS’ PROFESSIONALISM APPROPRIATE TO NEW CURRIRULUM 2017 FOR VOCATIONAL SCHOOLS BY CAPACITY BUILDING AND WORKSHOP ABOUT PREPARING LOCAL GOVERNMENT FINANCIAL STATEMENT; AN EXPERIMENTAL STUDY ON ACCOUNTING TEACHERS’ FROM VOCATIONAL SCHOOLS IN WEST SUMATERA PROVINCE
Vita Fitria Sari, Mayar Afriyenti, Mia Angelina Setiawan
578-585

106. THE DEVELOPMENT OF VIT (VOCATIONAL INTEREST TEST) MODEL USING DECISION SUPPORT SYSTEM (DSS) TECHNIQUE
Vitriani
586-590

107. ANALYSING INFORMATION SYSTEM OF ACADEMIC SERVICES IN THE UNIVERSITY
Wahyu Prima, Ganefri, Krismadinata
591-595

108. RESOURCE SHARING–BLENDED PROJECT BASED LEARNING (RS-BPBL©) MODEL DEVELOPMENT IN VOCATIONAL HIGH SCHOOL
Wahyudi
596-602

109. DEVELOPMENT ASSESSMENT MODEL TO HIGH ORDER THINKING SKILL ORIENTATE FOR EVALUATION STUDENT COMPETENCY
Wakhinuddin S, Bahrul Amin, Waskito
603-605

110. USE OF GEARBOX VIAR ON FISHING SHIPS
Wakhinuddin S, Donny Fernandez, Andrizal, M Nasir, Rifdarmon
606-609

111. THE APPLICATION OF SIMPLE STRAIN GAUGE DYNAMOMETER IN LEARNING STYLE CUTTING LATHE
Wenny Marthiana, Suryadimal, Edi Septe, Duskiardi, Andika
610-613

112. DESIGN OF ANDROID BASED INTERACTIVE BOOK IN INTEGRATED ISLAMIC ELEMENTATY SCHOOL OF LAN TABUR PAGARALAM CITY
Yadi, Efan, Sigit Candra Setya
614-617
113. SMART CLASSROOM DESIGNS IN THE SMART EDUCATIONAL ENVIRONMENT
Yasdinul Huda, B Herawan Hayadi ................................................................. 618-626

114. BUILD AND DESIGN OF BUSINESS INTELLIGENCE UNIVERSITY SYSTEM AS
DECISION SUPPORT ACADEMIC
Yaslinda Lizar, Asriwan Guci ........................................................................ 627-636

115. SOIL STABILITY USING CEMENT PCC IN LUBUK MINTURUN PADANG,
INDONESIA
Yocky Syaida Adha Putra, Tengku Ahmad Fauzan Syah ............................... 637-642

116. INFLUENCE THE LEARNING STRATEGY AND ENTRY BEHAVIOR TO YIELD
LEARNING BUILDING CONSTRUCTION AND DRAWING 1 OF STUDENT
Yuwalitas Gusmareta, Fahmi Rizal, Nurhasan Syah .................................. 643-646

117. IMPLEMENTATION OF DISASTER PREPARED SCHOOL (SSB) IN WEST
PASAMAN DISTRICT WEST SUMATERA PROVINCE
Yuwalitas Gusmareta, NurhasanSyah, Laras Andreas Oktavia, RizkyIndraUtama,
MuviYandra ................................................................................................. 647-649

118. USING MOBILE TELECOMMUNICATIONS -2000 INTERNATIONAL FOR
ANALYZING TECHNOLOGY NETWORK ERA 4G-LTE
Zulham Sitorus, Ganefri, Nizwardi Jalinus .................................................. 650-653

119. FACTORS AFFECTING STUDENTS IN CHOOSING COMPUTER ENGINEERING
DEPARTMENT IN STT PAYAKUMBUH
Zulkifli, Dilson, Rahmad Al Rian ............................................................... 654-659

120. FACTORS EFFECTING ELEMENTARY SCHOOL TEACHER READINESS ON
IMPLEMENTING CURRICULUM IN WEST SUMATERA
Zuryanty, Hamimah, Mulyani Zein .............................................................. 660-665
THE DEVELOPMENT OF INTERACTIVE MULTIMEDIA-BASED LEARNING MEDIA USING ADOBE FLASH CS3 AND CAMTASIA IN PROBLEM-SOLVING LEARNING IN ELEMENTARY MATHEMATICS OF IN STUDENT PGSD STKIP ADZKIA IN PADANG

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ABSTRACT: This research was motivated by the low class PGSD STKIP Adzkia Padang students in Problem Mathematics Problem Solving (Problem Solving). This is due to lack of utilization and innovation of learning resources as well as Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia. The method used in this research is the Research and Development (R & D) by using a development model ADDIE which includes five stages: (1) Analysis: needs analysis, (2) design: the design of the product, and (3) development: the development of the product. (4) implementation: implementation of the product (5) Evaluation: the effectiveness of the student. Results obtained from this research and development are as follows (1) The product resulting from this research is a product based on Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia in Problem Solving Learning Mathematics SD (2) Development of Interactive Multimedia has passed the stage of media validation experts, validation experts materials, and language validation experts. The validation results of the three experts are said to be valid. (3) Development of Interactive Multimedia Based Learning Media has been through the practical phase of the lecturer's response with the result of the percentage is 83.40%, and the practicality of the student response with the result of the percentage is 87.81% then it is practically categorized. (4) the development of Interactive Multimedia Based Learning Media has been through the effectiveness stage shows the value of 87.46% of students reach the Minimum Criteria of Completeness, it can be categorized effective.

Keywords: Interactive Multimedia Based Learning on Adobe Flash CS3 and Camtasia, Research and Development, Validity, practicalities and effectiveness

1. INTRODUCTION

Entering the 21st century discussed a lot about character education in Indonesia which decreases increasingly day by day. The low quality of character of this nation is the concern of all parties. Education serves to help students in their development that is the development of all potential, skills and personal characteristics to the positive both for himself and his environment. Based on interview with one of the lecturers of mathematics in the department of PGSD STKIP Adzkia Padang, mathematics is one of the subjects that has a very important role in education. The evident is more hours of math lessons than any other subject. In School learning Mathematics aims to train students to think systematically, logically, critically, and creatively in communicating the ideas or problem solving. However, until now mathematics as the main science in learning still gives “fear” for learners. As a result, in the process of learning mathematics requires extra energy from both lecturers and learners. Therefore, the process of learning mathematics should be made as attractive as possible so that students do not quickly bored in learning Mathematics. In the teaching and learning activities, to facilitate the learning of character-based Mathematics education requires the existence of media that can direct and emphasize the realization of the values of student character. The authors are motivated to research and provide supplies for students of PGSD STKIP Adzkia Padang to create interactive learning media using Adobe Flash CS3 software and camtasia which are also character-based learning media. The rapid development of technology in the current era of globalization cannot be avoided on the world of education. Researchers try to do research with the title Development of Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia in Mathematics Problem Solving Elementary on PGSD Students PGSD STKIP Adzkia Padang.

2. METHODS

2.1 Time and Place of Research

The research hold on odd Semester 2017/2018. This research was located in the PGSD department of STKIP Adzia Padang.
2.2 Procedure of Development

This research was a research development by using 4-D model consisting of four stages. According to Thiagarajan in Trianto (2011: 189) the fourth stage was the definition, design, development, and disseminate.

2.3 Trial of Product

The type of experiment research was True-Experimental Design, in which the sample used for the experiment or as a control group was taken randomly from a specific population. The tests were conducted on the control and experiment classes before and after learning, the control class was the class without the treatment and the experiment class was treated using learning media.

2.4 Subject of Test

The subject of research in the development of Interactive Multimedia-based Learning Media on mathematics problem-solving elementary as a supporting of student learning with 17087 V_a and 17087 V_b session code of PGSD STKIP Adzkia Padang.

2.5 Type of Data

The type of data in research development of supporting media of learning Based on Interactive Multimedia was primary data, meaning that data obtained directly from the research subject that was from expert/media expert, content learning expert, from student and lecturer who implement learning with Interactive Multimedia Based Learning media. The data referred the result of qualitative research given by lecturer and student through questionnaire given the result is analyzed by using statistical formula.

2.6 Technique of Data Analysis

Technique of data analysis conducted in this research is descriptive data analysis technique. Namely by describing the validity, practicality and effectiveness of using learning media.

2.6.1 Analysis of Validity

The analysis of validity using Cohen Kappa analysis technique based on the validation sheet, using the formula:

$$KK = \frac{P_o - P_e}{1 - P_e}$$

With

$$Pe = \frac{1}{N^2} \sum (N_1)(N_2)$$

Table 1. Category of Validity based on Cohen Kappa Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>The Level of Achievement (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81-100</td>
<td>Very valid</td>
</tr>
<tr>
<td>2</td>
<td>61-80</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>41-60</td>
<td>Quite valid</td>
</tr>
<tr>
<td>4</td>
<td>21-40</td>
<td>Less valid</td>
</tr>
<tr>
<td>5</td>
<td>0-20</td>
<td>Invalid</td>
</tr>
</tbody>
</table>

Source: Modified from (Riduwan, 2010:88)

2.6.2 Analysis of Practicality

Practicality test data was obtained from data provided by lecturers and students. From all scores of items obtained, tabulated and searched the percentage by the formula :

$$KK = \frac{P_o - P_e}{1 - P_e}$$

With

$$Pe = \frac{1}{N^2} \sum (N_1)(N_2)$$

Table 2. Category of Practicality

<table>
<thead>
<tr>
<th>No</th>
<th>The Level of Achievement (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81-100</td>
<td>Very practical</td>
</tr>
<tr>
<td>2</td>
<td>61-80</td>
<td>Practical</td>
</tr>
<tr>
<td>3</td>
<td>41-60</td>
<td>Quite practical</td>
</tr>
<tr>
<td>4</td>
<td>21-40</td>
<td>Less practical</td>
</tr>
<tr>
<td>5</td>
<td>0-20</td>
<td>Inpractical</td>
</tr>
</tbody>
</table>

Source: Modified from (Riduwan, 2010:88)

2.7 Analysis of Effectivity

Analysis of media effectiveness was done twice before and after learning. The first analysis was conducted to determine the initial capability between the experimental and control groups. The testing using t-test. The second analysis was to find out the difference of learning outcome between control and experimental groups. The testing used t-test for two related sample.

Table 3. Pretest-Posttest Control Group Design

<table>
<thead>
<tr>
<th>R1</th>
<th>O1</th>
<th>X</th>
<th>O2</th>
</tr>
</thead>
</table>

Fakultas Teknik, Universitas Negeri Padang 229
### 3 RESULT OF PRODUCT DEVELOPMENT AND DISCUSSION

#### 3.1 Process of Product Development

The development of supporting media learning aims to increase the motivation and independence of student learning Section 17087 V PGSD STKIP Adzkia Padang, which is in accordance with the learning materials.

Supporting media learning on Mathematics problem solving Elementary has been through the phase of validity, practicality, and effectiveness. The validity test is done by seeking expert opinion of the media developed, so that obtained a valid support media learning for use in the learning process. The practicality test is done by asking opinion to lecturer of mathematics problem solving elementary and by questionnaire to students. While the effectiveness test is done by looking at the comparison between student learning outcomes before and after used the interactive multimedia-based learning.

#### 3.2 Define

##### 3.2.1 Observation

Observation that made at PGSD STKIP Adzkia Padang on Mathematics problem solving Elementary School problems the lecturer is more explaining the subject matter without much involving student when the process of learning, and the presentation of materials was less interesting. Lecturers use the lecture method and the learning process was still centered on lecturers, that causing the students to be passive, and only relying on lecturers to get the learning materials. The learning process is monotonous, and finally makes students easily to get and saturated.

##### 3.2.2 Analysis of Syllabus

Topics developed in the syllabus of Mathematics Problem Solving elementary is as follows: Meeting 3. Understanding problems and solving problems, types of math problems.

#### 3.2.3 Analysis and Review of Materials Required

Identification of materials required by the media was done by exchanging opinions with the lecturers of mathematics problem solving elementary on some learning materials of understanding problem and problem solving, and types of math problems.

#### 3.2.4 Design

a. Design of Opening Page

![Figure 1. Design Home Page](image1)

b. Design of Menu Page

![Figure 2. Design Loading Page](image2)
3.2.5 Develop

This stage aims to obtain a valid, practical, and effective product of learning media. Development stage consist of : test the validity of learning media, according to the validator assessment, and practicality test, according to the assessment of subject lecturers and students.

a. Validity phase of learning media

The data used to measure the validity of learning media on problem solving elementary mathematics is the data obtained through the input of the validator using a questionnaire.

<table>
<thead>
<tr>
<th>No</th>
<th>Validator</th>
<th>Position</th>
<th>Aspect Validated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Siti Ainin Lusti, M.Hum</td>
<td>Lecture FBSS</td>
<td>Language Validation</td>
</tr>
<tr>
<td>2</td>
<td>Nur Azmi Alwi, S.S., M.Pd</td>
<td>Lecture FIP</td>
<td>Language Validation</td>
</tr>
<tr>
<td>3</td>
<td>Titi Sriwahyuni, S.Pd, M.Eng</td>
<td>Lecture FT-UNP</td>
<td>Media Design</td>
</tr>
<tr>
<td>4</td>
<td>Yeka Hendriyani, S. Kom, M. Kom</td>
<td>Lecture FT-UNP</td>
<td>Media Design</td>
</tr>
<tr>
<td>5</td>
<td>Vivi Puspita, S.Pd., M.Pd</td>
<td>Lecture STKIP Adzkia Padang</td>
<td>Material</td>
</tr>
<tr>
<td>6</td>
<td>Yelmiati, S.Pd, M.Pd</td>
<td>Lecture STKIP Adzkia Padang</td>
<td>Material</td>
</tr>
</tbody>
</table>
b. Language Validation

Validation stage of the language format, validator validate and evaluate the format of learning media. Language Validators assess the language of the questionnaire, the suitability of the indicator with the validated aspect, the truth of the sequence of statements on the questionnaire and the use of language in the learning medium was easy to understand.

c. Media Design Validation

Media format validation stage, validator validate and evaluate the format of instructional media. Media validators assess media designs developed from aspects of navigation, convenience aspects, written and display aspects.

d. Material Validation

Validation of Material, validator perform validation and assessment of materials. Validation of material includes accuracy of material coverage, suitability between material and syllabus.

3.3 Dessiminate

Disseminate phase was done by giving this learning media problem solving of the elementary mathematics in class 17087 V section code in PGSD STKIP Adzkia Padang. Based on the explanation, it can be concluded that this instructional media is one of the learning media that is valid, practical, and effective for use in the process of learning subjects of Mathematics Problem Solving elementary.

3.4 Data Description

3.4.1 Data of Validity Test

The retrieval of learning media validity data is by using questionnaire.

3.4.2 Data of Media Design Validation Test

Assessment of validator about validity of instructional media Mathematics Problem Solving Elementary can be seen in Table 5 below.

Table 5. Validator Rating About Validity of Learning Media

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Validity</th>
<th>Number Grain Reserved</th>
<th>Max Score</th>
<th>Respon of Validator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V1</td>
</tr>
<tr>
<td>1</td>
<td>Navigation</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Convenience</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Teks</td>
<td>10</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Display</td>
<td>16</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Based on the results of data analysis obtained the index of agreement is 0.703. so that, the development of media support interactive multimedia-based learning in the category of “Valid”.

3.4.3 Data of Material Validation Test

Assessment of validator about the materials validity and materials of Mathematics Problem Solving Elementary can be seen in Table 6:
**Table 6. Validator Rating About Validity of Material Learning Media**

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Content Validity</th>
<th>Aspects that are assessed</th>
<th>Max. Score</th>
<th>Respon of Practitioner (Lecturers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Materials</td>
<td></td>
<td>5</td>
<td>V1 5 V2 5</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>5</td>
<td>V1 4 V2 4</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>5</td>
<td>V1 4 V2 4</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>5</td>
<td>V1 3 V2 3</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>5</td>
<td>V1 3 V2 3</td>
</tr>
</tbody>
</table>

3.4.4 Data of Practicality Test

Based on the results of data analysis obtained the index of agreement is 0.828. So that, it can be concluded that the material presented on the media support interactive multimedia-based learning developed for Mathematics Problem Solving learning Elementary "Very Valid".

**Table 7. Data of Response Lecturers About The Practicality of Learning Media Problem Solving Mathematics Elementary School.**

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Assessment</th>
<th>Percent of Assessment</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technical</td>
<td>82</td>
<td>Average</td>
</tr>
<tr>
<td>2</td>
<td>Content</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Design</td>
<td>84</td>
<td></td>
</tr>
</tbody>
</table>

Based on table 7, there are three aspects of media practicability of Interactive Multimedia-based learning based on the response of lecturers through the questionnaire. The Average of percentage is the assessment of both practitioners, among others: (1) the technical use of acquired 82.5% with very practical categories, (2) content of time obtained 84.5% with very practical categories, (3) design is 84% in very practical category and obtained an overall average that is 83.66% with very practical category. These results indicate that the supporting media learning developed "very practical" so as to facilitate lecturers in helping student learning and help students understand the concept of the learning material.

**Table 8. Data of Student’s Response About The Practicality of Learning Media Problem Solving Mathematics Elementary School.**

<table>
<thead>
<tr>
<th>No</th>
<th>Aspects of Assessment</th>
<th>Percent of Assessment</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Simplicity</td>
<td>89.20</td>
<td>Very Practical</td>
</tr>
<tr>
<td>2</td>
<td>Motivation</td>
<td>85.80</td>
<td>Very Practical</td>
</tr>
<tr>
<td>3</td>
<td>Interesting</td>
<td>90.50</td>
<td>Very Practical</td>
</tr>
<tr>
<td>4</td>
<td>Usefulness</td>
<td>85.75</td>
<td>Very Practical</td>
</tr>
</tbody>
</table>

The results obtained are shown in Table 8 below:
(Mathematics Problem of elementary Element according to student is 87.81, so it can be concluded that the media is included in the category of "Very Practical".

3.4.5 Data of Test Effectiveness

a. Test of Instruments question

Test to know the validity, reliability, difficulty level problem and distinguishing power.

1. Test of Item Validity

Testing the validity of instruments is done by testing the student test with Section Code 17087 V_b PGSD STKIP Adzkiya Padang, assuming that both are done on the problem solving problem (Problem Solving) of elementary mathematics, and in students with the same generation.

After tested the validity of the items of the 30 questions given there are 25 valid questions, that are questions no 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 16, 17, 18, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30 While the question no 9, 11, 13, 19, 21 fall into the category of invalid questions, meaning the matter is discarded.

2. Test of Realibility

Reliability results using microsoft Excel 2007 obtained value of 0.746. The result is compared with r table. The test is declared Reliable if r result of calculation> r table. According to r table, for N = 30 and a significant level of 5%, the value of r is 0.361. Then get r count> r table = 0.746> 0.361

From the results of analysis and based on the interpretation of the value of r then it can be seen that the test has a high test reliability is 0.746.

3. Test of The Toughness Index

The Toughness Indexis made to see if the problem has been made into difficult category, medium or easy. Of all the problems that have been tested then tried to analyze and obtained the result that 3 questions are classified as moderate criteria, 27 questions are relatively easy.

4. Test Of Different Power

From all the question that have been tested done the analysis of the problem and it was obtained that the 8 categories of good, 17 questions enough category, and 5 questions ugly category.

a. Learning Outcomes

Learning Outcome Problem solving (Problem Solving) SD Mathematics seen from posttest and pretest result of student. Data of learning result obtained from data of learning result before and after test of instructional media use test, where matter in the form of multiple choice as many as 25 problem. Here is the average table of student learning outcomes:

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>≥KKM</th>
<th>Percentage</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>12 persons</td>
<td>44.82%</td>
<td>69.13</td>
</tr>
<tr>
<td>After</td>
<td>26 persons</td>
<td>89.65%</td>
<td>86.75</td>
</tr>
</tbody>
</table>

Figure 8. Histogram Improving the Value of Student Learning Outcomes Before and After Learning

4. PRODUCT REVISION

The main purpose of product revision is for the perfection of instructional learning media that has been designed so as to have validity, practicality, and effectiveness when used according to their needs. Likewise this case has some of the following revisions.

4.1 Language

The revision of the questionnaire and learning media is based on the validator input that includes the correct and correct Indonesian sentences, use the same letter for each questionnaire and be consistent with the spaces used.

4.2 Learning materials

Learning materials that exist in this learning support media there is no significant improvement based on validator assessment.
4.3 Media Design

The revision of instructional media support design is based on validator input which includes the use of letters and text that are too small, and an enhanced color combination.

With this revision, the weaknesses or deficiencies contained in the media supporting the learning can be minimized, so valid is used as a medium of learning.

5. DISCUSSION

This research produces learning support media for problem solving problem (Problem Solving) of elementary mathematics. The development of this media is based on the initial observation of learning process of problem solving problem of elementary mathematics which aims to know the problems, obstacles, and any phenomenon encountered in the field related to learning, then needs analysis, such as curriculum analysis and identification of the required materials. Learning media Problem solving Problem (Problem Solving) SD Mathematics, this has been through the test phase of validity, practicality and effectiveness. In the validity test is done by seeking expert opinion through validation sheet. The validated aspect of this instructional media is the design of instructional media and material conformity with the curriculum. From the experiments conducted got the result that the whole aspect is very valid value.

Practical testing is done by asking opinion to lecturers and students through practicum questionnaire sheets. From the test of practicality is known that the learning media Problem solving Problem (Problem Solving) SD as a whole well. This is evident from the practicality of instructional media based on practicality assessment by teachers stated "very practical" and based on students' judgment also stated "very practical".

d. Effectiveness of instructional support media Problem Solving Mathematics of SD seen from student learning outcomes before (pretest) and after learning using learning support media (postest). Learning outcomes show an increase in the average value of students, so that this learning media is said to be effective

7. REFERENCES