Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.5, No.32, 2014

Development of Interactive Multimedia Learning in Learning Instructional Design

Sahat Siagian[1]* Mursid[1] Yasaratodo Wau[2]
1.Educational Technology Post Graduate, State University of Medan, Indonesia
2.Administration of Education Post Graduate, State University of Medan, Indonesia
*Email of the corresponding author:Sahat.sgn61@gmail.com

The Research is financed by Ministry of Education and Culture Directorate of Research and Public Service Contract No. 062 / UN33.8 / LL / 2014, aprl 01 2014 through funding BOPTN

Abstract
The presence of interactive learning media in teaching and learning have made a different atmosphere in the classroom, because the material that used to be taught by lectures and monotonous only be varied with the integration of display impressions in the form of text, sound, moving images and video. The purpose of this study is to develop an interactive multimedia learning effective and efficient. The research method used is the method development. Model Borg & Gall combined with models of learning development Dick & Carey model. This activity is planned for 3 years. The first year is done at the beginning of March 2013, the search results of the questionnaire are stocked to 4 professors and 80 students found that 86% of the lecturer of the course and has taught instructional design states require interactive learning media in the learning process so that the learning process run more effectively , and 98% of students stated need interactive learning media that it can use as a learning tool individually. In the second year starts in early March 2014 to July 2014 to test a product that has been made. The results of trials instructional media products developed through evaluation of four stages, namely: expert evaluation of materials and media expert, individual testing, small group testing, and field trials showed that the assessment materials and media expert and product trials in both categories.
Keywords: interactive multimedia, instructional design, development

1. Introduction

Advances in information technology and telecommunications are so rapid that offers a variety of new ease in learning are conducive enabling occurred -shift learning orientation from outside guided into self guided and of knowledge as possession into knowledge as construction. This technology plays an important role in updating the original conception of justification that focus on learning as merely a presentation of a variety of knowledge into learning as a guidance to be able to explore the rich socio-cultural knowledge.

Success in improving the quality of human resources through education, related to various aspects, one of which concerns the ability of faculty in designing a learning process. In this regard, Rooidjakkers (1993) states that teaching is an attempt to pass on the knowledge to others. Teaching is all efforts made by the lecturer in the form of deliberate to convey knowledge and views as well as providing the possibility for learners to enable the learning process according to the purpose. Furthermore, Gagné, et al (1992) says that learning is an activity that can make students learn and easy to know what was delivered. Mayer (2005) says that achievement learning with interactive multimedia more effective. Moreno (1998) with interactive multimedia research shows that study with interactive multimedia better than the other media. To achieve this, of course, cannot be separated from the use of instructional media is a tool to convey message. Hence concern for each lecturer is how a teacher is able to select and use the media as well as the characteristics of the material, the nature and characteristics of science as well as the characteristics of students Problems often arise regarding the use of instructional media and the availability of using media. Media bank are still less that the teachers use the media to a minimum. The second problem is the use of the media. Print media and media power point is the media most frequently used by teachers, because it is easy to develop and searched from various sources. However, most of the media used is highly dependent on verbal symbols (words) that are very abstract, so it requires a very high abstraction abilities of learners, it is this which can complicate the student. As participants in the use of this media, creativity and judgment required teacher. In fact, instructional mature than is often seen, many teachers use instructional media "roughing" without consideration learning (Instructional consideration). Interactive learning media include a variety of media are integrated into one. Each component of the media can stimulate one or more of the human senses. Ahmizar (2008) explains that "the more senses involved in the learning process, the learning process will be more effective". Explicitly, this theory suggests the use of more than one human's sense. Research by effendi (2013) about development instructional model base interactive multimedia for instructional Mekanika explained that learning achievement more effective than the other media. The same as Rini research (2011) explained that learning achievement with multimedia better than the other media. Therefore, the use of

multimedia in learning can be expected to improve learning outcomes.

The development of computer technology, especially in the field of software support in its application as a medium can be presented the learning. Computer media contains learning materials textual, audio and visual. One of the software that support in developing interactive learning media is Macromedia Flash Professional. Given this reality, the need for the development of multimedia interactive learning for learning design courses in Educational Technology Studies Program (TP) Graduate Program (PPS) State university of Medan. Students as the recipient of the course material, it will be easier to understand the material presented. This study is an attempt to develop a multimedia interactive learning course design for learning in courses State university of Medan TP PPs with Macro-media Flash professionally.

2. Research Methods

The research method used is the method used development. Model development is development model Borg,et al (1983) combined with models of learning development model Dick ,et al (2005). The procedure adopted for the development of interactive learning media products are divided into six stages, namely: (1) The first stage of a preliminary investigation, (2) the second phase of the design of software, (3) the third stage of collecting materials, (4) the fourth stage of making and producing interactive learning media, and (5) the fifth stage is a review or field tests in order formative evaluation and revision of the product. Formative evaluation continues throughout the development process starting from the stage of analysis, design, production and implementation of the results to be obtained in accordance with its intended purpose, (6) Test the effectiveness and efficiency of the product. Product Media Interactive multimedia learning instructional design, the procedure requires the development stages, including the analysis phase, design phase, development phase, implementation phase and assessment phase of the product.

This study will involve students actively, both in preliminary studies, product development, development of instructional materials, testing products to the design of the final product. In this research systematic diagram described as follows: This research was carried out three phases. In the first stage of the analysis performed in the first year of the interactive learning media used in the most appropriate learning instructional design, through a survey of preliminary studies, including identification of learning needs and determine the competency standard courses, perform analysis early development. Identifying characteristic and behavior of students, writing basic competence and indicator, write a reference benchmark test, develop learning strategies, develop learning materials. Then proceed with the design of software include: the creation of a script, storyboard creation, manufacture flowchart view.

The second stage is to collect materials, including: the creation and collection of images (image) and animation, audio recording and collection, develop and create interactive learning media. The next activity review the media, competencies, and learning materials that have been discovered in the first phase. Learning media, learning materials, competence will be tested on a small scale as well as large dn input for the revision of the initial stage. Thus in the early stages of the second trial will be limited, large-scale testing, revision, and the results so. In the second phase of the study, used a test method procedures (a) expert review, (b) one-on-one trials, (c) small group testing, and (d) a large group trial (the real class) for instructional media are operational. In the third stage of preparing guidelines (guidelines) implementation of the use of interactive learning media, evaluation, dissemination and development can be done in the form of experiments to see the effectiveness and efficiency of interactive learning media products which are developed.

3. Results And Discussion

This research the following step : developing stage product, product evaluation phase and revised preliminary product. Developing Stage Products included: 1) analysis, which includes: the selection of the type of application, the basic layout, color and font type, operating system, forms of distribution, and the minimum specifications that must be owned by the user, 2) make the initial design in the form of storyboards (storyline or scenario), prototype (preliminary design of a learning) and collecting the supporting materials such as sound files, movie images, animations and others that support the development of these products. Product Evaluation Phase are: Evaluation of Expert Judgment, Evaluation of Individual, Evaluation of Small Group, and Evaluation of Large Group. Revised Preliminary Productto look more attractive instructional design and nice impressed. And some entries are not too much and basically have a good, iInstructions menu on the home page menu animated images similar to menu preliminary, suggest improvements just like the menu layout he wrote the introduction, instructions menu animation image material field written instructional design courses that have not been clear, at any subject matter consists of a sub-sub subject matter, so that suggestions for improvements to the subject matter of each title should only be found in one or two slides, not all of the same title slides.

3.1. Presentation of Data Test Results
Interactive multimedia learning on instructional design courses in Educational Technology program Postgraduate of State university of Medan already has a valid status. This has been done validation product, a series of testing and revision process. The test is done 4 steps: (1) evaluation matter experts and media experts, (2) individual testing, (3) a small test group, and (4) field trials.

3.2. Data Stage I of Trial Results, Expert Evaluation of Materials and Media Expert
Evaluation of the product is intended to determine the material and expert opinion regarding the suitability of the design of expert media, aspects of learning and truth content, and media design:

3.2.1. Data Evaluation Results Matter Experts
Expert evaluation of materials for the development of interactive multimedia learning instructional design courses conducted by Julaga Situmorang. and Harun Sitompul, a professor of Graduate Education Technology of State University of Medan . The assessment was conducted to obtain information that will be used to improve the quality of learning instructional design courses specifically on instructional design course materials, Based on expert assessment of software quality material aspects of the quality of learning materials in the majority of the criteria of "good", there are two points that includes the criteria of "very good ", namely the typographical arrangement and illustration (item number 5 and number 6). In general, from the aspect of the quality of learning material, product is rated "good".

The results of the expert evaluation of a material assessment score of the components of the course learning instructional design instructional strategies on the quality of material show the assessment of quality aspects of learning strategies, assessment materials and student involvement in learning activities rated as "moderate". This assessment into consideration in the revision of the product before the test to the student. Quality Preliminary, quality feedback and presentation time is considered good. Overall quality of learning strategies assessed aspects of "being". The results of the evaluation scores matter experts also form an assessment of the components of Interactive Multimedia Instructional Design learning on learning delivery systems indicate that according to experts from the aspect of software quality material delivery system, learning the majority of the criteria of "good", there is one item that includes the criteria of "very good" the accuracy of the sequence of learning materials (item number 4). Overall aspects of learning delivery system, product is rated "good". The classification by two expert material on the quality of learning materials Interactive Multimedia Instructional Design as a whole show that is expressed very well by 50%, while 50% claimed good. While the assessment of the quality of learning strategies which can be seen in both states by 50% and 50% said it was

3.2.2 Test Results Data Media Expert Evaluation
Media expert evaluation conducted by three (3) members, namely Muhammad Badiran, Efendi Napitupulu,and Abdul Hamid . is Lecturer in Educational Technology Graduate University of Medan. Media experts provide product evaluations on aspects of media in between the presentation of design, interaction design, and information design. The results of the evaluation of a learning component assessment scores Instructional Design of Interactive Multimedia presentation on design aspects

Based on the assessment of media experts show presentation of the design aspects of the majority of the criteria for "good", there are two points that are "very good" the clarity of color and font type and size selection (item number 1 and item number 4). Overall presentation of the design aspects rated as "good". The results of the evaluation of a learning component assessment scores on aspects of interaction design can be seen in Table Based seen that according to media expert on information design aspects rated as "good". There are four items were rated as "very good" selection of topics, namely precision, explanation given instance, sequences with the use of the learning process (item numbers 1,6,10 and 11). Motivation (item number 3) is considered "moderate". Overall the design aspects of information was rated "good".

Score assessment of the results of the evaluation of the learning component of the experts on information design aspects rated as "good". There are four items were rated as "very good" statutes that topic selection, the explanation given instance, and sequential use in the learning process (item numbers 1, 6, 10, and 11). Motivation (item number 3) is rated "Medium". Overall the design aspects of information was rated "good". Assessment by media experts who were 3 people on the media aspects include: the design presentation, interaction design, and information design. Based on the media experts conducted by 3 people to design presentations Interactive Multimedia Instructional Design learning shows that 1 person (33.3%) expressed very well and 2 (66.7%) stated either. While the assessment of interaction design, 33.3% said very good, 33.3% said good, and 33.3% said it was. The results of the assessment carried out by the 3 media to information design

Interactive Multimedia Instructional Design, which states a very good one (33.3%) and expressed either two people (66.7%). Media expert evaluation results show there are still shortcomings, weaknesses in presentation design, interaction design, and information design.
The results of the evaluation are analyzed media expert developers and discussed again by media experts as the basis for the revisions improve the instructional design instructional design. Overall assessment, feedback, and advice from experts and media experts as the material basis for a decision to carry out the revision of the role of matter experts and media experts do not just stop at just this stage, the discussion on the revised continue until learning is complete Interactive multimedia instructional design and ready disseminated.

3.2.3. Data Stage II Trial Results Individual Trial
Individual trials conducted in two schools namely the Regular class A1 Educational Technology Post Graduate Program State University of Medan . Individual testing of each of the 3 students with less ability, moderate and intelligent. The purpose of this test is to identify individual deficiencies after learning products reviewed by experts. Assessment and feedback from this trial is about the presentation of learning products covering aspects of display and presentation aspects of the material contained in the instructional design of computer-assisted learning. The results of individual trials assessment of aspects of the appearance of the overall instructional design of learning for two classes B1 and B2 Educational Technology Graduate Studies Program of State University of Medan results are as follows:

The results of student responses made by three of the aspects of the display indicates that the students (33.3%) expressed very well and the two students expressed both (66.7%). Assessment of the aspects of the display appears on the student table shows that three students (100%) stated either. Student responses to individual test on the material aspects of the majority of the criteria for "good". There is one item which includes the criteria of "being", ie the clarity of feedback (item number 7). Overall the material aspects of the product learning Instructional Design Interactive Multimedia rated as "good". Student responses on individual trials shows that, the tests carried out on three aspects of students for the majority of the material included in the criteria for "good". The results of student responses were done by three people to material aspects to show that two students (66.7%) expressed both the student and the claim was (33.3%). Individual trial data collection is done by asking the students to follow the learning Instructional Design using on-line learning, noting the less understood and discussed weaknesses. In addition, students are also asked to fill out a questionnaire on the quality of learning Instructional Design Interactive Multimedia.

3.2.4. Data Results from Pilot Phase III Trial in Small Groups
The trial was also conducted in small groups of two schools, namely in Class B2 and B3. Small group trials conducted on each of 6 people with less ability, medium, and clever. Small group of test data is intended to identify some of the weaknesses or obstacles faced when learning Instructional Design products are used. This small group trials used as early experience before the product tested to the field. The results of the pilot assessment of small groups of aspects of the appearance of the overall learning Instructional Design for two classes B2 and B3. The results of both student responses respectively of two people (33.3%) expressed very well and four (66.7%) expressed both trials, each group of six students. Score assessment of the instructional design of learning components are also present in the material aspect. Based on responses from the student stating "good" aspects of the material on a small test group. As much as one grain shows the criteria of "very good" is the order of accuracy of the presentation. On the whole aspect of the material on a small test group is indicated by the criteria of "good".

The results show the majority of the student response criteria of "good" on a small test group. Criteria of "very good" indicated in point 1 and point 8 is on the suitability of materials and learning support program. Overall assessment on the material aspects of this in the criteria of "good". The results of assessment tests to small groups on the material aspects of the overall learning instructional design for class B2 and B3 indicate that two people (33.3%) expressed very well and four (66.7%) expressed either The results of student responses also on the material aspects of the trials showed that a small group of people (16.7%) expressed very well, four (66.7%) stated well, and one (16.7%) said it was.

3.2.5. Data Results from Pilot Phase IV Field Trial
The class were taken randomly from each class 20 students as field trials. Field trials generate data which will measure the feasibility of cultivated products, as well as to determine how the product benefits to the wearer. The results of the evaluation on the display aspect for field trials in the majority of the criteria of "good" except for the color composition included in the criteria very well. On the whole aspect of the display was rated "good". Based on the results of student responses at the aspects of the display for the majority of field trials in the criteria

of "good". There is only one item, namely the carrying capacity of the music included in the criteria of "being". The results of the field trial assessment of aspects of the appearance of the overall learning instructional design for the two schools to display the results stated that the aspects of Class B1 field trials showed that seven people (35%) expressed very well, eleven (55%) stated either, and two (10%) said it was. The results of student responses in class B1 field trials are also on aspects of the display indicates that fourteen people (66.6%) stated either, while the states are as many as six people (28.6%) and one (4.8%) expressed less good Responses of students from the aspect of software quality material overall criteria of "good" in both field trials Class B1 and Class B2. The results of the field trial assessment of aspects of the instructional design of learning materials on the overall result for the two schools, the responses of students in Class B1 by 20 people who expressed very well as six (30%), both as many as nine people (45%), and five people (25%) said it is for the material aspect is based on the results of the responses of students in Class B2 by 21 people to as many as a material aspect (4.8%) who stated very well, twelve (57.1%) stated either, and eight (38.1%) said it was.

3.3. Analysis of Data

3.3.1. Analysis I

3.3.1.1. Data Analysis Evaluation Results Matter Experts

The Matter experts assess learning instructional design of interactive multimedia learning design is based on three aspects: the quality of the subject matter, the quality of the learning strategies and learning delivery items showed an average score of 4.07, respectively; 3.4; and 3.8 include both categories, and well being, which means learning interactive multimedia instructional design can meet the demands of learning needs. The results of the assessment of learning design shows a small error when compared to the number of errors that may occur, meaning the proportion of instructional design learning the truth is very large or interpreted otherwise contain very small error. Errors such as typing errors with this small proportion, can be reduced through revision. instructional design of learning materials experts declared eligible by field trials with the wrong revision. Two experts mean score obtained empirical material on aspects of quality learning materials for 8.14 (36.1%), from the aspect of learning strategies by 6.80 (30.2%) of aspects of the learning delivery system at 7.60 (33.7 %)

3.3.1.2. Analysis of Data Media Expert Evaluation Results

Media expert assessment of the design aspects of the presentation showed an average score of 3.80, including good category, which means the physical appearance of functional learning instructional design to increase student motivation to learn. Media expert assessment of the design aspects of the interaction showed an average score of 3.3, including both categories, which means that the interaction of interactive multimedia learning instructional design can make it easier for students to obtain the desired information according to their own pace. Media expert assessment of aspects of information design shows an average score of 3.67, including good category which means setting the content of the learning sequences to consider aspects of learning so as to create a condition that is able to facilitate learning.

Three media expert mean scores obtained on the empirical aspects of information design at 11.55 (33.2%), from the design aspect Presentation 11.83 (34.0%) and of the interaction aspect of 11.40 (32.8%) Based response media expert, stated that learning instructional design feasible for field trials with appropriate revision suggestions, namely the navigation buttons and links. The comments are summarized media experts show interactive multimedia learning instructional design is acceptable and much needed.

3.3.1.3. Analysis II

Based on the above table of a small group trials in Class B1 of the aspects of the display with an average score of 3.90 and 3.67, respectively, and include both categories, while the material aspects of each with an average score of 3 , 63 and 3.71 include both categories. Individual trials as much as 3 students in Class B2 obtained empirical mean score of 11.71 on the display aspects (51.9%) and the material aspects of 10.88 (48.1%). From individual trials as much as 3 students in Class A1 obtained empirical mean score of 10.86 on the display aspects (50%) and the material aspects of 10.88 (50%).

3.3.1.4 Analysis III

From a small group trials in Class A1 and Class A2 to display aspects with an average score of 4.19 and 3.99, respectively, and include both categories, while the material aspects of each with an average score of 4, 06 and 3.91 trials categorized as either small groups of students in the class as much as 6 A2 obtained empirical mean score of 25.14 on the display aspects (50.8%) and the material aspects of 24.38 (49.2%) trials small group of students in Grade 6 were obtained A1 empirical mean score of 24.00 on the display aspects (50.4%) and the material aspects of 23.63 (49.6%)

4. Analysis IV
Based on field trials in Class B1 and Class B2 to display aspects with an average score of 3.99 and 3.51, respectively, and include both categories whereas on the material aspects of each with an average score of 3.90 and 3.58 includes both categories. Field trials in Class B1 of 20 students obtained a mean score of 79.71 empirical aspects of the display (50.9%) and the material aspects of 77 (49.1%) field trial in as many as 21 students of Class B1 obtained empirical mean score on display aspects of 73.71 (49.5%) and the material aspects of 75.13 (50.5%)

3.4 Revision Products
3.4. 1. First Revision
Based on data analysis and expert evaluation of materials instructional media expert researchers do some revision. The result of these revisions can be seen in the following explanation:
* There are some less obvious exposure to the use of words and sentences.
* Completing the picture is less complete
* It should be added that much more animated.
* It should be added the presence of apperception.
* It should be added to any problem-solving exercises in each.
* Placement should be equated to the same navigation purposes and placement of buttons to make it more consistent.
* It should be added to any operating instructions on CD learning.
* Bibliography should be added as a source of reference to be included in CD learning.

3.4.2. Second Revision
The third revision of the instructional design of interactive multimedia learning based on the results of trials conducted small groups and field trials carried out by replacing the supporting music in the menu and evaluation with musical material that is more dynamic and still pay attention to the balance of the workings of the right brain and the left brain that feels enjoy learning, fun and interesting for students. When viewed from various types of errors and suggestions, among others; revision of expert fields of study, materials experts, media experts, as well as the revision of students on individual testing, small groups and the field, it can be explained that, the program development of interactive multimedia learning instructional design feasibility aspects need improvement regarding the content, presentation, linguistic, and grafic. After the revision, the obtained product / CD learning. Repairs and improvements based on data analysis conducted to test the feasibility of product development produce a decent product if categorized feasibility aspects of content, presentation, linguistic, and grafic, can increase the interest and motivation to learn and effective for use as a medium of learning. In order to maximize product yield and fit for use even further, it would require a team of developers consists of expert curriculum developers, experts and field of study profesional material experts, media experts, financial support and time available, and the ability of adequate infrastructure .

3.5. Assessment of the Final Product
Learning materials are interactive multimedia instructional design which has been developed with consideration of learning and media as message design principles of learning. Product development of interactive multimedia learning instructional design for students in Second Half Technology Postgraduate Education University of Medan has made revisions and improvements based on the analysis of data validation of matter experts, media experts followed by individual testing, small group testing, and field trials.
Aspects revised and refined based on analysis of data and test materials and inputs from experts, media experts, and students as users of the learning program is an interactive multimedia instructional design, aims to explore some common aspects in the development process of a product. Learning variables have a good average value

3.6. Product limitations
* There is a complete load of material as the overall instructional design lessons, but only materials and important subject.
* Piracy / CD learning to multiply the product is difficult to avoid.
* The use of CD learning instructional design requires a computer that has the ability to quickly access and good, for example, a minimum of a Pentium 2 Processor and Memory at least 64.

This result research correlationship with Dale Theory (1969) says that result of learning achievement through eyes is 75%, hearing is 13% and the others is 12%. The other theory like munir (2008) says that result of learning achievement through eyes is 90%, hearing is 5 % and the others is 5%. Research about interactif multimedia by Efendi (2013) says that instructional with interactive multimedia more effective than the other

media. The research of Rini (2011) about multimedia says that learning result with multimedia more effective than the other media

4. Conclusions

Based on the stages of research and development that have been passed, conclusions in the report stage of the progress that has been implemented is as follows:

* Almost all the students gave positive responses regarding learning using multimedia instructional design of interactive multimedia learning, in the context can bring benefits, attractive, and can increase student motivation to learn, which is done in capturing data on needs analysis.
* Judging from the general aspects, software engineering, visual communication, and learning material substances, the interactive multimedia instructional design produced need to be continued for the validation and testing of products, with some of the criteria that have been defined in the planning and development of research methods
* The use of interactive multimedia instructional design is expected to provide convenience to faculty and students in absorbing
* In terms of learning the course instruksional multimedia design, ease of use and interactivity of multimedia, is expected by all students to own a laptop / computer, so that the learning process with an interactive learning media goes well and smoothly.
* stage of development and research is still not finished, so that the resulting product can provide convenience to the maximum in student learning. The next stage will be followed by an expert validation and testing with revision, to the effectiveness of the product learning by doing experiments to determine the quality of products and excellence of the products developed.

Acknowledgements

Thanks to the Ministyr of Education and Culture Directorate of Research and Community Service through BOPTN Fund which has provided financial assistance in the implementation of this research with contract number 062 / UN33.8 / LL / 2014, aprl 01 2014, hopefully the results of this study useful for the advancement of education

Reference

Ahmizar, F. (2008), *Mengoptimalkan Multimedia Sebagai Sarana Mencerdaskan Bangsa*. http://www. Fahmi.az@hotmail.cim. Diunduh tanggal 20 Oktober 2011.

Borg, W. and V Gall, M.D. (1983), *Educational Research. An Introduction* (4nded). New York & London, Longman.

Dale, E. (1969),. *Audiovisual Methods in Teaching*. (Third Edition) New York, The Dryden Press, Holt, Rinehart and Winston, Inc.

Dick, W. and Carey, L. (2005), *The Systematic Design of Instruction*. United States of America, Scott Foresman and Company.

Gagné, R.M.;Briggs, L.J , Wager, W.W. (1992), *Principles of Instruction Design*. New York, Saunders College Publishing.

Mayer. R.E. (2005), *The Cambridge Handbook of Multimedia Learning*. USA, Cambridge University Press.

Moreno, R., & Mayer, R.E. (1998), A Learner-Centered Approach To Multimedia Explanations: Deriving Instructional Design Principles From Cognitive Theory. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*.. (online). (http://imej.wfu.edu/articles/2000/2/05/ index.asp -).Diakses 16 Oktober 2011.

Munir. (2008), *Kurikulum Berbasis Teknologi Informasi dan Komunikasi*. Bandung, Alfabeta.

Napitupulu, Efendi. (2013), Pengembangan Model Pembelajaran Berbasis Multimedia Interaktif Pada Kompetensi Mekanika Teknik SMK Propinsi Sumatera Utara. *Laporan Penelitian Hibah Pasca*

Rini. (2011), Pengaruh Pembelajaran Bebasis Multimedia dan Gaya Kognitif Terhadap Kemampuan Pemecahan Masalah Matematika Siswa SMP Negeri Lubuk Pakam. *Laporan Hasil Penelitian Tesis*

Rooijakkers, Ad. (1993), Mengajar Dengan Sukses: *Petunjuk Untuk Merencanakan dan menyampaikan Pengajaran.* Jakarta, Gramedia.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar