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EFFECTIVENESS OF INSTRUCTIONAL MEDIA BASED GAME ON MATHEMATICS AT VOCATIONAL HIGH SCHOOL

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Abstract
Instructional Media was a tool or form of stimulus which serves to submitted a learning massage. Computer could be used as instructional media. Instructional media of computer could facilitate student to independent learning. Based on observation, researcher found that using of instructional media had not been maximal, just using whiteboard and power point only. This research aimed at developed instructional media based game on mathematics at Vocational High School. Model of this research was 4D (four-D) model that was developed by S. Thiagarajan et al. There were four steps in 4D (four-D) model, were follow: define (define phase), design (design phase), develop (development phase), disseminate (disseminate phase). Electivity test include in develop phase. Electivity test was done with using pretest and posttest that given to students. The effectiveness of instructional media based game was expressed effective for improving results of student learning because 82,1% of students have reached KKM

Introduction
The learning process is said to be effective if the learning process of the students can achieve the expected learning goals. Utilization of media instructional can facilitate students' understanding of the concepts and able to be apply these concepts in the form of job skills so that objectives learning can be achieved by students. Development of instructional media is very important in the education world, nothing else to overcome the shortcomings and limitations of existing media. Medium of learning is one of the important and major component in supporting the learning process, for it is necessary to improve the utilization and management so that the desired objectives can be achieved. media Learning can be a model / props, flowcharts, tables, and computer-based media. Media learning to use the computer as a learning medium plays an important role in the learning process.

According Wankat and Oreonovicz, as cited by Wena (2009: 203), of the one advantages of learning by using media machine learning is to stimulate students to do the exercise because of the availability (1) animated graphics, (2) color, and (3) music. Even notebook or laptop computer is not item luxury anymore, so a lot of people who already have a computer. Therefore, a computer learning media can facilitate students to learn independently. Students can learn to use computers both at school and at home.

Mathematics is one of the subjects in the schools from school elementary to high school in both the High School and School. Vocational High Difficulties in learning mathematics found in many schools at this time. Math learning method for this is still monotonous, which is only the delivery of material in the lecture, the result a little feedback from the students. The use of instructional media are still not up to the new form of use of the blackboard and power point slides only.

Based on observations conducted in SMK, it appears that the process of learning mathematics is not maximized, because the student's task is to note what the teacher explained to the class or registering at respective notebook their to what teachers have been listed on the board. This activity resulted in students being less active in the

learning process. Whereas the greater participation and involvement in the learning process, will be able to improve memory their of the materials studied, which in turn will impact on improving their understanding on these subjects. And students are afraid of mathematics. One of the factors that make students afraid of math is because of the complexity of the learning of mathematics in terms of finding the answer long as the use of the formula, the use of symbols and requires a high concentration, so the notion of students towards mathematics is a difficult subject.

Sadiman (2012: 7) media is derived from the Latin and it is form The plural of medium which literally means an intermediary or introduction. Media is an intermediary or an introductory message from the sender to the receiver. Meanwhile, according to Djamarah (2002: 137) is generally the media interpreted as any tools that can be used as a conduit messages to achieve a goal that both teaching purposes or other purposes.

Rusman (2011: 60) learning is a process of communication between students, teachers and teaching materials. Communication will not run without the help of means of a delivering a message or media. Media used in the learning called media, learning which has a function as an intermediary for the message, in this case is matter the subject to students. According to Sanjaya (2014: 61) is a media learning is everything as a tool, the environment and all forms activities of that are conditioned to increase knowledge, change attitudes or in culcateskills of each person who uses.

So, from some of the above opinion can be concluded that instructional media some things any tool or form that serves as an intermediary for the message to increase knowledge, change attitudes or embed benefits, the message is meant here is the subject matter presented to the students. Speaking about the media and the experiences built, we can be guided by the cone of experience or commonly called the Cone of Experience. The purpose of the Development Research is to produce a media game based learningare effective in learning mathematics, which can the support learning needs of students in improving learning outcomes.

Theory

Understanding Learning

Sugandi (2008: 9) learning is viewed from within the off ender is a set process that is individualized, which revamp stimuli from the environment persona into a number of information, which in turn can cause learning outcomes the in long-term memory. Teaching provided by teachers is one of example the learning that comes from outside actors. Learning is the process or work the done every individual to obtain a change in behavior in the form of knowledge, skills and positive attitudes and values as an experience to get some impression of the material that has been studied. The learning activities there are to do in school, at home, and in other places such as in a museum, in the laboratory, in the jungle and anywhere.

Learning Media

Rusman (2011: 60) instructional media is a tool or form of stimulus that serves to convey a message of learning. The forms of stimulus could be used as a medium of which is the relationship or interaction of human, reality, moving images or not, the writing and sound recorded. The fifth form of stimulus will assist participants in learning a foreign language.

According to Edgar Dale (1969: 108), the media have nested levels of influence, his theory of 'Cone of Experience'. Edgar Dale argues that if the image of the Cone of Experience can be interpreted properly, the Cone of Experience can assist teachers in learning concept. Visual analogy is the one of few devices that have been set up to show the development of direct experience, direct participation to the pictorial representation and to the abstract purely and symbolic expression.

The range of experience levels that are directly up to the experience through the symbols of communication, and of course provide specific implications for the selection of learning methods and materials, particularly in the development of Technology. Learning So it can be interpreted that the purpose of learning not only mastered material theoretically but demands and friends participants to be creative and use the knowledge gained to be a

competence that are useful in daily life. It can be obtained through practical activities that can produce a product. Therefore, it can be supported by the use of media-based learning this game.

Rusman (2011: 65) the function of the media is to clarify, simplify and make learning interesting message delivered by the teacher to the students so as to motivate learning and streamline the learning process.

Instructional Games

By James W. Brown et al (1973: 315) instructional games are activities structured with the rules set for the play in which two or more students interact to achieve instructional goals are clearly demonstrated. Competition and the opportunity is generally a factor in the interaction, and there is usually a winner.

James W. Brown et al also say that instructional media examples of games that could be developed one of them is in mathematics. According to James W. Brown et al (1973: 322) in mathematics, games are usually designed to make abstract concepts concrete, understandable, and enjoyable, many games make practice fun and motivating exercise on the skills basic that are important.

Rusman (2011: 313) instructional games is one of the methods in computer-based learning. The purpose of this model is to provide the experience of learning experiences that provide learning facilities to increase the ability of students through a game that educates, instuctional games can be able to have characters that provide a fun challenge for students. Overall game the the has basic components as motivational to bring way competed to achieve something that is expected, the learning objectives.

According to Ismail (2006: 119) education games (educational games) is an activity that is fun and can be a way or educational tools that are educational fun. So, from the above description can be concluded that education games (educational games) is a game that is used in the learning process and in the game contains elements of educational or values education.

The game as a form of computer-based learning developed on "fun learning" which provides the experience of experiences learning that provide learning facilities to increase the ability of students through educational form of the game.

Methods

This type of research is the development of research (research and development). According Sugiyono (2008: 297), "the study is the development of research that is used to produce a specific product and test the effectiveness of products". Thus, the purpose of this research is to develop and produce a media game based learning education by using can be used in mathematics class X.

Sugiyono (2012: 407) also explains that in order to produce products certain used research to test the effectiveness of these products in order can function in the wider community, the necessary research to test the effectiveness of product. The model chosen in this study is a model 4-D (four-D) as model a development that has a systematic procedure, according to the problem of background this study.

Procedure development of media-based learning games using this model of drill and practice development model 4-D (four-D). The process of development consists of four phases: (1) define (determination of material); design(design); (3) develop (development); (4) disseminate (spread) (Trianto2009: 189).

Results and Discussion

The products of this research is a game-based learning media which contains materials in accordance with the syllabus prepared by the school. Media-based learning game created named “Joint Adventure with The Clever Ben”. Game-based learning media created using Macromedia Flash 8. In media, this game based learning there are 4 material, wherein each material has a game, in this game based learning media also contained instructions for use, the standard of competence, basic competence, indicators and objectives learning. Evaluation presented in this learning media in the form of a game.

The effectiveness of media-based learning games on the study visits are used to help students understand the learning materials. The effectiveness of the development of game-based learning media can be seen in the subjects of Mathematics and Mathematical Logic in particular on the material that is done by pretest and posttest. The learning result obtained from the pretest and posttest were given to28 students Grade X of Multimedia at Vocational High School. The results of effectiveness test pretest and posttest game-based learning media can be seen in Table 1. From results tests given to students Grade X of Multimedia showed that mastery learning outcomes of students who reached the KKM is 82.1%.

Table 1. Results of Effectiveness Test Student Learning Grade X of Multimedia

No.	KKM	Total of Students	%
1.	< 75	5	17,9
2.	≥ 75	23	82,1
Total		28	100

Based on the table above were obtained ratings of cognitive learning outcomes of student tsfrom the pretest and posttes, explained that students who have not completed (KKM <75) is as much as five students (17.9%) and who have reached KKM as many as 23 students (82.1%) and completeness categorized as good, it can be concluded that the media game-based learning is effective learning media used in the subjects of Mathematics ,

Conclusion

This study has resulted Game-based learning media that can beused in learning Mathematics Grade X of Multimedia. This Instructional media based game has gone through phases of testing effectiveness through tests learning outcomes of student in the form of pretest and posttest. The test results states that the effectiveness ofmedia-based learning effective game in the category. This research can provideinput to education providers, as Media based learning Games developed can improve student learning outcomes. Teachers can develop media-based learning of game, so its use is not confined to mathematics, but can be used for any other study..

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