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Development of computer based learning media about Continuous Variable Transmission (CVT) on motorcycle subjects at Vocational High School (SMK)

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Abstract: *The purpose of this study was to identify computer-based learning media condition, development process, and proper assessment about CVT. The design of the study was Research and Development. Respondents of this study were eleventh-grade students of Automotive Skills Program at Vocational High School (SMK) in Cilacap Regency of Central Java. Field trials of the media were conducted three times at SMK Dr. Soetomo, at SMK Boedi Oetomo, and at SMK Negeri 2 Cilacap with 36 students of each school. The student's response toward the learning media appropriateness in the media aspect and in the material aspect was collected by closed-questionnaire. In the media aspect, indicators of feasibility consisted of: (1) visual interpretation, (2) visual design, (3) graphics as a visual media, and (4) procedure of media development. Indicators of feasibility in the material aspect were: (1) relevance between the material and the syllabus, and (2) self-learning. The collected data of the learning media appropriateness was analyzed by descriptive statistics in percentages. The result of this initial study showed that based on the media aspect, the media of CVT were in proper condition with a percentage of 86.96. Meanwhile, based on the material aspect, the media of CVT was not in proper condition with a percentage of 14.28. Viewed from the media aspect, the result of the data analysis was in proper condition with percentage of 87.05. Moreover, based on the material aspect, the learning media was in proper condition with a percentage of 58.33%.*

Keywords: *computer-based learning media, continuous variable transmission (CVT), learning media appropriateness, feasibility*

1. Introduction

Teaching-learning processes have always become interesting topics of discussion by experts in education. The teaching-learning process is a set activity of a teacher and students based on interactive-relationship in education (Asep Jihad, 2008: 12). Oemar Hamalik (2003: 54) stated that a teaching-learning process is a structured combination of humanity, facility, and

procedure that interact with one another to achieve learning objectives. Based on two statements above, interaction between teacher and students needs facilities to achieve the learning objective. One of the facilities in the teaching-learning process is the learning media.

Two important elements in the learning process are the learning method and media (Azhar Arsyad, 2008). There are some reasons that show how the learning media

can enhance student's learning process quality (Nana Sudjana, 2007). There are many kinds of learning media in the teaching learning activity. Each of the media has a special capability in the explanation of teaching materials and the effect of the media on student's understanding is different.

Based on an observation conducted at SMK Dr. Sutomo in Cilacap Regency, the teaching-learning material of CVT on Motorcycle subject in academic year 2009/2010 has been facilitated by some learning media. Learning media used in the teaching-learning activity were whiteboard, charts, and power points. There was no computer-based media of CVT's teaching-learning in the school. The problem is how to develop the learning media as a proper facility.

There are three research problem statements, namely: (1) How is the existing condition of CVT's learning media at SMK in Cilacap like?; (2) What is the way to develop the CVT's learning media at the school?; and (3) Is the developed learning media of CVT at the school in proper condition as a media? The purpose of the study is to identify a computer-based learning media condition, development process, and proper assessment about CVT.

Many education experts claimed that learning media are a mediator or medium, a communicator between information source and receiver (Azhar Arsyad, 2010). The media consist of all humans, materials, or events that build a condition to achieve students' knowledge, skills, and attitudes. Specifically, a learning media means graphics, photographs, or electronic equipment to receive, process, and arrange verbal information. Based on these experts' opinions, it can be concluded that learning media: (1) can explain messages more clearly and enhance the learning process and output, (2) can direct students' attention and create their motivation, (3) can improve space and time limitations, and (4) can give equal experiences to students.

A computer-based learning media is a way to explain learning material by using microprocessor-based sources. The main characteristics of computer-assisted technology are that it: (1) can be used in the random, sequential, and linear way, (2) can present ideas in the students' experience context, (3) can apply cognitive and constructivism principles in the teaching-learning, (4) can organize the teaching-learning into a cognitive scope in order to master the material, (5) can involve students' interactivity, and (6) can integrate words and visual from various sources. Macromedia Flash is a specially designed program by Adobe and by standard authorizing tool professional applications for making animation to develop interactive and dynamics website.

There are some studies supporting this present study. The first is a study by Dyah Ayu Prihatini (2010) about the development of Macromedia Flash-based interactive learning multimedia for all students of the Installation Program at SMK Negeri 1 Tanjungsari. This findings showed that learning output of students who used Macromedia Flash-based interactive learning multimedia reached 86 percent completeness.

The second is a study by Ria Agustina (2009) about the development of learning video of Cake Processing with Yellow Pumpkin substitution in the Cake and Bread subject at SMK Negeri 2 Godean. The learning output of students in this research reaches 86 percent completeness. From an examination of the media aspect, the feasibility of the media is in category of 85 percent, and 15 percent is in the category of very decent. Viewed from the learning material aspect, the media is 34.52 percent in the category of very decent, and 65.48 percent in the category of appropriate.

The third study has been conducted by Evi Dhian A. (2010) about the development

of computer-assisted learning media for Chemistry at SMK Ngadirojo Pacitan. It showed that learning media is in the good quality. This result indicates that the developed media software for the computer-assisted learning of Chemistry fits for use as learning media.

For the fourth study, Uli Johar Miasih S. and Agus Budi Santosa (2010) have developed an interactive-learning media by R & D method on Basic of Electricity Subject for the tenth-grade students at SMK N 3 Boyolangu, Tulungagung. The result of their study concluded that the developed interactive-learning media can be used as teaching media.

The last study has been conducted by Lusia Rakhmawati and Ihsan Nurhakim (2010) about development of computer-based interactive multimedia on Applied Electronic at SMK N 2 Surabaya by R & D approach. This study concluded that the developed media can be used as learning media.

A Continuous Variable Transmission (CVT) system is an automatic-transmission system that can produce a different torque and acceleration in each centrifugal energy created by the coupling with continuous speed and torque variable movement in an engine revolution (Subandrio, 2009). An automatic-transmission system is applied in a matic-motorcycle where energy from crankshaft is transmitted to rear wheels by V-belt of two pulleys. Advantages of the CVT system are: (1) easy in operation, (2) more convenient in use, (3) easy in care, and (4) smooth in acceleration. A disadvantage of this system is too much fuel consumption, because the speed of CVT is higher than manually- transmission systems.

There are two pulleys in the automatic transmission, namely drive pulley or primary pulley and driven pulley or secondary pulley. A drive pulley consists of six components, namely: (1) cooling fan and the pulley body, (2) movable drive face, (3) bushing, (4) roller, (5) backing plate, and (6) V-belt. A driven pulley consists of six components,

namely: (1) secondary outer-pulley wall, (2) return spring, (3) coupling lining and housing, (4) secondary inner-pulley wall, (5) torsion cam, and (6) reduction gear.

2. Method

This study was conducted by a Research and Development (R & D) method. Sugiyono (2008) states that the R & D method is used to produce a specific product and test the effectiveness of the product. This study focused on the CVT's learning media product with the program Macromedia Flash. The study was conducted at SMK Dr. Soetomo, SMK Budi Oetomo, and SMK Negeri 2 Cilacap. The study took place from July to December 2011.

The product was a computer-based learning media about CVT on Motorcycle subject at SMK. Using a procedure according to Borg and Gall (1989), the development of learning media CVT with Macromedia Flash uses of the procedure which consists of ten steps, namely: (1) research and information collecting, (2) planning, (3) developing preliminary form of product, (4) preliminary field testing, (5) main product revision, (6) main field testing, (7) operational product revision, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation.

Product development trials were conducted in two stages, namely: (1) small-group trial, and (2) field trial. The purpose of the trials in small group was to test the feasibility of the product to 15 students of Grade 11 of the Automotive Skills Program at SMK Dr. Soetomo Cilacap, and to test validation by media experts, material experts, and by teachers. Small group testing was carried out to get appraisal before the field trials. Field trials were implemented 3 times to 36 students of Grade 11 of the Automotive Skills Program from each of three schools. The first trial was held in SMK Dr. Soetomo, the second trial was executed at SMK Dr. Soetomo and at SMK Budi Oetomo, and the

third field trial was conducted at SMK Dr. Soetomo, at SMK Budi Oetomo, and SMK N 2 Cilacap.

Subjects selected for validation of the product were three lecturers from Automotive Technical Education Study Program of UNY, two of them were as learning material experts and another was as a media expert. Subjects in the small-group were students of Grade 12 of Automotive Skills Program at SMK Dr. Soetomo, and subjects in the field trial were eleventh-grade students of Automotive Skills Program at SMK Dr. Soetomo, at SMK Budi Oetomo, and at SMK N 2 Cilacap agency.

The students' responses towards the learning media appropriateness in the media aspect and in the material aspect were collected by closed-questionnaire. In the media aspect, the responses consisted of: (1) visual interpretation, (2) visual design, (3) graphics as a visual media, and (4) procedure of media development. In the material aspect, those responses were: (1) relevance between material and syllabus, and (2) self-learning.

3. Findings and Discussion

Based on description of results, data showed that the condition of the existing learning media for CVT at SMK Dr. Soetomo Cilacap was in feasible condition with a percentage of 86,96 as reviewed by the media expert. The weakness of the media is that the text was not in the appropriate size. In contrast, the learning media is in unfit condition with a percentage of 14,28 in terms of the learning material aspect as reviewed by the material expert and teachers. The media is considered less appropriate for use in the learning process because there is material that does not comply with the basic competences in the syllabus. The material is still too short and not yet able to provide detailed information about CVT. Therefore, development of computer-based learning media must be done in order to obtain the

appropriate learning media for CVT on the Motorcycle lesson.

The process for developing computer-based learning media about CVT on Motorcycle subject uses the procedural development model referred to by Borg and Gall (1989). Development the media is done by Macromedia Flash in the stage of design and stage of program development.

Testing of the validity of computer-based learning media was done by two media experts, one learning material expert, and teachers. Experts in the media aspect suggest to revise the developing media in background and color writing. The learning material expert advices: (1) to correct component functions, and display menus, icons, and background on the main page, (2) to repair video that shows the workings of CVT, and to add the workings of torque-cam, and (3) to change the display menu icons into one language. Meanwhile, teachers suggested that component functions must be corrected, and the material part is to be colored.

The condition of the computer-based learning media in the media aspect from the trial data on the small group was in feasible category with percentage of 73,33. Meanwhile, in the material aspect from the trial data on the small group, the media was in feasible category with percentage of 66.66.

The feasibility of computer-based learning media in the media aspect from the first-field trials was in feasible condition with percentage of 91.66. The feasibility of the learning media in the material aspect from the first-field trials was in feasible condition with percentage of 69.44. In the second-field trials, the feasibility of the computer-based learning media in the media aspect was in the decent category with percentage of 72.22. In the material aspect, the feasibility of the learning media was in the feasible category with percentage of 66,11. In the third-field trials, the feasibility of the computer-based learning media in the media aspect was feasible with percentage of 80.55, and in the

material aspect, the condition of the media was feasible with percentage of 75.92.

The development of this CVT's computer-based learning media on Motorcycle subject at SMK in Cilacap Regency supports the results of the study conducted by Dyah Ayu Prihatini (2010), by Ria Agustina (2009), by Evi Dhian A (2010), by Lusia Rakhmawati and Ihsan Nurkhakim (2010), and by Uli Johar Miasih S and Agus Budi Santosa (2010) that stated that learning outcomes of students who use Macromedia Flash-based interactive learning multimedia reached 86 percent completeness. These results indicate that the media software for computer-assisted learning developed is fit for use as a media of learning.

4. Conclusion

Viewed from the media aspect, CVT learning media that exists at SMK Dr. Soetomo Cilacap is in the adequate category and can be used in the learning process. However, judging from the material aspect, the media is considered less appropriate for use in the learning process, because there is material that does not comply with the basic competences in the syllabus.

The process of developing computer-based learning media about CVT on Motorcycle subject at SMK Automotive Skills Program uses the procedural development model referred to in Borg and Gall (1989). Development of the media is implemented by Macromedia Flash 8.

Validity of developed computer-based learning media was held by media experts, learning material expert, and teachers. Experts in the media aspect suggest to revise the media in background and color writing. The expert of learning material aspect gives four suggestions, namely: (1) to correct component functions, and display menu, icons, and background on the main page, (2) to revise the video that showed the workings of CVT, (3) to add the working of the torque-

cam, and (4) to change the display menu icons into one language. The teachers suggested that the component function was to be corrected, and the material part was to be colored.

The condition of the computer-based learning media viewed from the media aspect from the trial data on the small group was in the feasible category, and the condition of the media in the material aspect from the trial data on the small group was in the feasible category too.

The feasibility of the computer-based learning media from the first-field trials viewed from the media and the material aspect was in the feasible category. In the second-field trials, the feasibility of the computer-based learning media reviewed from the media and in the material aspect was in the decent category. Viewed from the media and the learning material aspect, the feasibility of the computer-based learning media from third field trials was in the feasibility category.

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