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## Learning media of vehicle power Train systems

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### Abstract

This study aims to develop a valid, practical and effective learning media for power train systems for vehicles. This learning media is developed consisting of a clutch, transmission, propeller shaft, differential and wheel shaft. All of these systems are made with parts (cutting) so that the movements of the parts appear. The results of media validation by media experts stated that the media developed was valid. The results of user evaluations stated that the media developed was declared practical. The quasi-experimental results of the control group with the experimental group gave different results of 17.7% better than the control group in the experimental group. This indicates that the learning media of the vehicle power train system developed was effectively used for learning in the subject of the power train system in the Department of Automotive Engineering Education, Faculty of Engineering, Makassar State University.

**Keywords: power train, power transfer, learning media**

### 1. Introduction

According to the chairman of the Student Association assessment of Automotive Engineering Education at the time of carrying out social in Bulukumba 23-26 March 2017, said that students majoring in automotive engineering education less inclined to improve power transfer system on a motorcycles and car, forcing student teaching assistant who must deal with if there are problems related to the automotive power transfer system. This is an indication that the Automotive Engineering Education students need to improve the competence in the field of power transfer systems, especially on cars and motorcycles.

The learning process associated with faculties in the Department of Automotive Engineering Education in theory is generally given first, followed by practice. This is done with the hope that by the time practice, theories that support has been learned can be exploited so as to facilitate the practical activities. This learning model effective instructional media at the time when learning theories using instructional media in accordance with what is actually (media models intact). According to Prosser that vocational education will be effective and efficient if the environment in which learners (students) are trained or taught by using media that is a replica of the environment in which he will be working [1].

One of the weaknesses in the education department of automotive engineering, especially in the process of learning the theory of power transfer system that is the



medium used by lecturers are learning media in the form of pictures and animations. While the components are studied in the energy transfer system is the component that must always be related to the work. This causes a slow student in understanding the process of work going on, so that when they come back to practice again examine the working principle. This is what causes the time used by the student to complete the job for too long practice. In the case when the students are expected to learn the practice is no longer working principle but must exercise diagnose the damage and disassembly only.

Starting from this phenomenon, researchers intend to develop instructional media power transfer (power train) systems for vehicles made of genuine power transfer system components is then split, exposing the work processes that occur in the power transfer system. This can help students to learn the process of power transfer system works before practice disassembly, so that the time used to shorter practical.

Learning includes activities proceed and a very fundamental element in any organization of the type and level of education. This means that the success or failure of education goals that are very dependent on the learning process experienced by students, both when he was in school and in the home environment or his own family. Therefore, a correct understanding of the sense of learning in all aspects, forms and manifestations is absolutely necessary for educators, especially teachers. Errors of perception of the learning process and matters related to it may result in less quality learning outcomes achieved by students.

Learning is to gain knowledge, understanding or mastery of through experience or study. Kimble defines learning as a relatively permanent change in the potential behavior that occur as a result of reinforced practice. Learning is based on the theory behavioristic is a change in behavior as a result of the interaction between stimulus and response [2]. In other words, learning is a form of change experienced by students in terms of its ability to behave in a new way as a result of interaction of stimulus and response. A person is considered to have learned something if he can show changes in behavior. According to this theory the most important is the input in the form of stimulus and output the form of the response. This theory assumes that what happened between stimulus and response is not important to note because it can not be observed and can not be measured. Only the stimulus and response can be observed. Therefore, whatever the teacher (stimulus) and what is produced students (response), it must be observed and measured. This theory prioritizes measurement, because the measurement is an important thing to see happen whether or not a change in behavior.

Other factors that are considered important by a factor strengthening the flow behavioristik (*reinforcement*), reinforcement is anything that can strengthen the onset of the response. When the reinforcement is added (positive reinforcement) then the response will be stronger, so also when gains are reduced (negative reinforcement) respon will still be strengthened [3].

According to Winkel study is a mental activity, which takes place in an active interaction with the environment that resulted in a number of changes in the knowledge, understanding, skills and value the manner in which the changes are relatively constant and permanent learning outcomes is the level of success one attains goals set in a learning program [4]. Success in learning can be seen from the results of learning obtained. Learning outcomes according to Snelbecker in is a change in behavior that has the characteristics of (a) a new behavior in the form of real-time capabilities, (b) apply the new capabilities in a relatively long time, and (c) the new capabilities acquired through a business [5][6].

Bloom found students' learning outcomes are earned after participating in a learning process that covers three areas, namely the ability of cognitive, affective and

psychomotor. Within the meaning of learning to learning outcomes as has been noted, it can be concluded that the learning outcomes are the level of success in getting the knowledge, understanding or mastery of through experience or study [7]. Gagne and Briggs suggested learning outcomes as the capacity or ability obtained from the learning process that includes five categories of learning outcomes, namely: (1) intellectual skills, (2) verbal information, (3) cognitive strategies, (4) cognitive skills and (5) attitudes or values [8].

Stages capabilities in the area of cognitive expressed Bloom, later revised by Anderson and Krathwohl which divides the cognitive aspects into two dimensions, namely (1) the dimensions of knowledge consisting of factual knowledge, knowledge concepts, procedural knowledge, and knowledge of metacognitive, while (2) the dimensions of the cognitive process contains six levels include remembering, understanding, applying, analyzing, evaluating and creating[9].

Gagne defines a taxonomy of learning outcomes in the five components as an ability to: (1) verbal information, the ability to recall all the information obtained from the learning process, (2) intellectual abilities, that skills acquired someone through a learning process that can used and functioned well in the community or society, (3) motoric skills, in mastering various motoric skills, (4) attitude, the ability of affecting the will of action to be taken in dealing with various matters, and (5) strategy cognitive, namely the ability governing how students manage their learning in acquiring knowledge. So, the three domains in Bloom's taxonomy included all here [8].

Based on some of the definitions and descriptions of learning outcomes that have been described, it can be concluded that the learning outcomes are changes in a person's behavior or learners in the form of the acquisition of the ability or skill both in terms of cognitive, affective and psychomotor as the accumulation of the whole process of learning that has been done or lived. Media literally means "intermediary" or introduction. Based on Association for Education and Communication Technologi (AECT), media include any form of programmed to process information distribution [10]. Learning media is a tool that is used as an intermediary to convey the message in the learning process. While learning is a process of communication between teachers, students, and teaching materials. Communication will not run without the help of conveying a message or media. So, as a tool, the media's function pave the way towards the achievement of learning goals.

The activities of learners (students) with the help of the media will produce a learning process and results were better than without the help of the media. Through the media is expected to occur interaction between lecturers and students to the maximum so as to achieve the learning outcomes are consistent with the objectives. No provision when a medium should be used, but it is highly recommended for teachers to select and use the appropriate media. The use of improper learning media will cause learners misunderstood the basic teaching materials provided and prevent them from achieving the learning outcomes as desired. This is in accordance opinions Afolabi, et all which states that the use of the media is very important to improve the learning poses social sciences in secondary schools [11]. Guarantee better student achievement through the effective use of learning media. Media elections trainer (the actual media/model intact) is able to represent the shape of a medium of learning for a learner (student/student) to gain direct experience that can involve the senses of seeing, feeling, hearing, smell and touch [12]. This is consistent with the philosophy of vocational education of Charless Prosser that vocational education will be effective and efficient if the environment in which learners (students) are trained, is a replica of the environment in which he will be working [1].

Based on theory dual coding expressed Paivio that the person receives information processed through one of the two channel, that is channel verbal such as text and voice, and channel visual such as diagrams, pictures, and animations [13]. Second channel, this can work well independently, in parallel, or also be integrated together. Second channel, the information has different characteristics. Channel verbal processes the information sequentially while channel nonverbal processes the information simultaneously (synchronous) or parallel.

Can not be denied that the very decisive result of learning media educational process, then humans are continually improving learning media. From the simplest to the most sophisticated (advanced). Among the wide range of media that can be used in the learning process, then the media that it is possible to further improve student learning outcomes, particularly those studying the mechanism of action moves like the automotive is medium in accordance with the original object (model intact). Media completed models can produce media that can be seen, heard, and done. In connection with this media, a cone introduced by Edgar Dale [14].

Anderson describes the experience of Edgar Dale Cone, according to Dale study, the method at least in the experience, is located at the top of the read text (Just read). The most effective method is basically involves direct experience, full of meaning, the real things. Based on the picture above, if the teacher teaches with a lot of lectures, students will be given only 20% for students just listen. Conversely, if the teacher asks the students to do something and report it, they will remember 90%.

## 2. Research methods

This study was classified as research and development of education or Education Research & Development (E, R & D) that is the approach used to produce products that are useful in the world of education. This study refers to the model of development of Borg and Gall Learning Media Power Transfer (Power Train) System for developed media refers to completed models of split (section/cutting), this means that the media is exactly the same as what happened to the power transfer system in light vehicles, only shows the movement of the parts that work while on the actual vehicle components workings can not be seen [15].

Stages of this study broadly mapped into three sections: (1) the preliminary study stage (needs analysis), (2) development and (3) testing and evaluation phase. Used preliminary study stage interview guidance instruments to collect data needed for the development of the media. While at this stage of development is used questionnaires in the form of checklist to assess the validity of the media. Media validity rated by expert judgment. Neither practicality media rated by the user by using checklist.

## 3. Results and Discussion

Products produced in this development study is the instructional media Power Transfer System for Vehicle models are cleaved intact (section/cutting) consists of a system of clutch, transmission, propeller shaft, differential and axles. According to the assessment results validator (expert judgment). Learning media of power transfer (power train) system developed are valid with an average score of all system rated is 4.5. Neither the assessment results, the media is also stated practical with an average score of all systems is 4.45. This is stated that according to the results of learning media.



Figure 1. Power Transfer System Learning Media Shopping

Media practices developed power transfer system and meets the requirements of validity, and effective practical, effective media transport system of light vehicle power this gives an indication that the power transfer system of instructional media that has been cleaved suitable for learning theory and practice of power transfer system of light vehicle or car for students majoring in Automotive Engineering, because it gives the students experience the exact same happened to the power transfer system on the car and the students can see firsthand how the workings of the components. This is helping students to improve power transfer system on the car when facing cases of damage that occurs in the transfer transfer (power train) system. When compared to other models like the model that is not cleaved whole student is still difficult to understand the working principle of each component as it is located at the place closed so students only rely on the ability to think abstractly.

The results of this research to improve student results was 17.7% according to the results of research Kristianto who found that the students' learning activities Mechanical Engineering Study Program (D3) after using a media trainer Unesa increased by 14%. Similarly Parenrengi, Syria, Yahya and Najamuddin in his research suggests that learning media intact model of effective electricity used in the learning process[12][16][17].

The importance of learning media hemisphere models (cutting) for use as a media exercise that students do not feel awkward when will diagnose and repair damage to the light vehicle power transfer system. This is in accordance with filosofi vocational education that should be what learners are trained to the same pesrsis what will be done later on when working in business and industry. The results of this study are in accordance with the hope that the media developed have validity criteria, the practicalities and effectiveness, so that it can be used as a learning medium power transfer system in the majors or courses of study automotive engineering.

#### 4. Conclusion

Based on the research can be concluded; 1) developing/ learning media power transfer system parts by means of a model, 2) create a learning medium power transfer system in exactly the same with the actual power transfer system, only split cover moving parts so it can be seen how the workings of the component.

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