The effect of Delphi-based on learning media at student learning outcomes in basic electricity and electronics subjects viewed from the level of student learning autonomy

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Abstract. This research is motivated by the mastery of matter electrical learning lessons subjects from the majority of Vocational High School students, still very lacking, mainly due to inadequate learning media. This study aims to determine: the influence of Delphi-based learning media on student learning autonomy and student learning outcomes in the subjects electrical learning lessons. The method used in this study is a literature study of research results, and journals about Delphi-based learning media, its effect on student learning autonomy, and its effect on student learning outcomes. Research found that: the use of Delphi-based learning media can increase student learning autonomy student learning outcomes in in the subjects electrical learning lessons.

1. Introduction

Education is a shared responsibility, both community and government. One of the efforts made by the government to improve education in Indonesia is to make the 2013 Education Curriculum an improvement of the 2006 Curriculum or the Education Unit Level Curriculum (KTSP). In Permendikbud Number 70 of 2013 it was stated that the aim of the 2013 Curriculum (K13) was to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative, and effective and able to contribute to the life of the community, nation, state, and world civilization [1]. In the development of the 2013 curriculum requires students to learn more independently, discipline in managing time, and carry out more directed and intensive learning activities so that the objectives of the implementation of the 2013 Curriculum can be achieved well.

In learning activities, autonomy is very important because autonomy is a personal attitude that is needed by every individual. According to Utari Sumarmo with autonomy, students tend to learn better, be able to monitor, evaluate, and manage their learning effectively, save time efficiently, will be able to direct and control themselves in thinking and acting, and not feeling dependent on others emotionally. Students who have learning autonomy are able to analyze complex problems, are able to work individually or work with groups, and dare to express ideas. Learning where students just sit quietly and listen to information from the teacher seems to have become entrenched since a long time ago, so that to make changes towards active, creative, and fun learning is rather difficult [2].

So that we need a concept of self-learning from students to improve student autonomy. According to Dhesiana the concept of independent learning actually stems from the concept of adult education. Self-study is also suitable for all ages. In other words, independent learning is suitable for all levels of school for both secondary and elementary schools in order to improve student achievement and abilities [3].
Independent learning can be interpreted as active learning activities, which are driven by intentions or motives to master a competency in order to overcome a problem and be built up with the knowledge or competence that has been possessed [4].

In Audio Video Engineering (TAV) Expertise Competencies in Vocational Schools in Surabaya there are competencies that must be mastered by students, one of which is Basic Electricity and Electronics competencies. Mastery of Basic Electricity and Electronics material is needed, because the material is a basic material that will be very useful for further learning materials such as Digital Electronics learning material and Microcontroller learning material.

Power Point learning media (PPT) has based on several article sources obtained data that some of the Vocational Schools in Indonesia, learning in Basic Electrical and Electronics subjects in class X TAV Expertise Competence (Audio Video Engineering) obtained less on learning outcomes. This is because during learning some students do not pay attention to the teacher's explanation, students also do not read textbooks and do not work on worksheets if not asked or ordered by the teacher and when the teacher gives homework students do not do it at home. Such conditions indicate a lack of autonomy of students in learning Basic Electricity and Electronics subjects.

The condition that shows the lack of autonomy of students in Basic Electricity and Electronic subject learning in several Indonesian Vocational Schools is caused by the use several weaknesses. The weakness of Power Point learning media (PPT), namely: the lack of clarity of the material presented using Power Point learning media (PPT), monotonous and less attractive display design, and limited space (Power Point learning media) so that students become uninterested and bored during the learning activities.

Therefore, to overcome the problem of lack of autonomy of students in the learning of Basic Electricity and Electronics above, we need a learning method and learning media that are appropriate to use during the learning process that can improve student learning outcomes. One learning model that can improve student autonomy is a self-regulated learning (SRL) model.

Self-regulated learning is a learning model that provides flexibility to students to effectively manage their own learners in various ways so as to achieve optimal learning outcomes. Pintrich [explains self-regulated learning as an active process, directs learning objectives, controls the learning process, fosters self-motivation (self-motivation) and self-confidence (self-efficacy), and selects or regulates environmental aspects to support learning. The learning environment governed by students in learning includes the physical and non-physical environments [5]. This is consistent with research conducted by Erdost and Yastibas, who concluded that: self-learning (self-regulated learning) is intended to make students active in the learning process by helping them be responsible for their own learning so that they can prepare themselves behaviorally, metacognitive, and motivation to improve student learning outcomes [6]. Self-regulated learning is not only important for formal education, but also in professional career life when someone needs to renew and improve professionalism and academic competence.

Meanwhile, to help deliver material to students, interesting and interactive learning media are needed. One of the appropriate learning media for the delivery of Basic Electricity and Electronics learning materials is learning media that use animation and simulation media. One software that can be used to create learning media is the Delphi software. Delphi is a programming language used to create VCL application programs (Virtual Component Library), Web-based applications (Web Application and Web Service with ASP.NET), database applications (Database Application with ADO.NET, and Windows applications (Windows Application with Windows Form) and audio-visual based. Delphi software is a computer software application that can be used to help simulate basic electrical and electronic material. This is because the Delphi software is able to function as a medium of information in the form of text, graphics, animation, and feedback. directly so that the teaching and learning process is more quality and meaningful.

This research is different from previous studies. In this study, the research focused on the influence of Delphi-based learning media using the self-regulated learning model. Delphi-based learning media used have been programmed in Basic Electric and Electronics learning materials which are equipped with several sample questions and several calculation simulations.
The use of Delphi-based learning media in Basic Electric and Electronics learning subjects is expected: (1) can help students' imagination of the actual image of objects; (2) as a method of activating students' views and skills in an activity; (3) students will be more interested in paying attention to the material being taught; (4) students will better understand the material delivered by the teacher; and (5) can assist students in practicing several measurement procedures in Basic Electrical and Electronics subjects.

1.1. Formulation of problem
- What are the characteristics of Delphi-based on learning media?
- What is the influence of Delphi-based on learning media on student learning autonomy?
- How is the influence of Delphi-based on learning media on student learning outcomes in the subject of Electricity and Electronics?

1.2. Objective of the problem
- To find out the characteristics of Delphi-based on learning media
- To determine the effect of Delphi-based on learning media on student learning autonomy
- To determine the effect of Delphi-based on learning media on student learning outcomes in the subjects of Basic Electricity and Electronics

2. Research methods
The method used in this study is a literature study. This literature review aims to build and construct a stronger concept based on empirical research that has been carried out. In this study researchers examined based on the results of research and journals about media learning based on Delphi, the effect on students' autonomy for learning, and its effect on student learning outcomes.

This review is intended to show the correlation between variables by controlling the variations of many article sources. If control can be done perfectly, the distribution of correlation studies can be used directly to estimate the actual correlation distribution. By observing the correlation between several observation variables in various studies, researchers can integrate these results and construct the theory [7]. This review is based on the meta analysis technique which is one effort to summarize the various research results quantitatively [8]. Meta-analysis can also be seen as a technique for re-analyzing research results that are processed statistically based on the results of primary studies. In the meta-analysis study, the data analyzed is primary data. The important thing related to the meta-analysis study is to help researchers to construct the theory by collecting many studies and summarizing the results of the study, after which researchers can better identify the relationships between variables and present aggregate data from the various primary studies.

3. Result and discussion
3.1. Characteristics of Delphi based learning media
Media comes from Latin which is the plural form of the word "medium" which literally means an intermediary or introduction. Media is a messenger that originates from a message source (which can be a person or object) to the recipient of the message. According to Sanjaya stated that media is not only an intermediary tool such as: TV, radio, slides, and printed materials, but includes someone as a conditioned learning resource to gain knowledge and insight, change one's attitude and increase skills [9]. In the opinion of Sardiman media is a communication component that functions as an intermediary / messenger from the sender to the recipient. Learning media is everything that can be used to channel messages (learning materials), so that they can attract the attention, interests, thoughts and feelings of students in learning activities to achieve certain learning goals [10].

From several definitions of learning media above, it can be concluded that learning media are all components in the student learning environment that are used by the instructor so that learning takes
place more effectively. So that the delivery of messages or information in the form of knowledge, skills (skills), ideas, experiences, and so on when the process of delivering information from teachers to students can run smoothly. The use of interesting media in the learning process must involve the participation of students, as "add-ons" in the learning process.

According to Husni Delphi, software made by Borland is very popular. Unlike Windows software in general, Delphi is not application software, such as MS Office or games [11]. Delphi is a programming language, which is an application for creating other applications. Delphi is used to build Windows applications, graphics applications, visual applications, even network applications. Borland Delphi is a Windows-based programming language. Delphi can help to create various applications that run on Windows operating systems, starting from a simple program to a client / server or network based program.

Delphi includes applications that can be used to process text, graphics, numbers, databases, and web applications. To facilitate programmers in creating application programs, Delphi provides very complete programming facilities. The programming facilities are divided into two groups, namely object and programming language.

In summary the object is a component that has a physical form and can usually be seen (visually). Objects are usually used to perform certain tasks and have certain limitations. Furthermore, programming languages can be briefly referred to as a set of texts that have certain meanings and are arranged with certain rules and to carry out certain tasks. This combination of objects and programming languages is often referred to as Object Oriented Programming (OOP). Borland Delphi is an option for some programmers to create applications. Here are the advantages of Borland Delphi.

- Based on Object Oriented Programming (OOP). Each part of the program is seen as an object that has properties that can be changed and regulated.

![Figure 1. Borland Delphi interface.](image-url)
The final result is a file * .exe. After the program is designed in the Delphi IDE (Integrated Development Environment), Delphi will compile it into a single executable file. Programs created can be directly distributed and run on other computers without the need to include DLL files from outside. This is a significant advantage.

- Borland Delphi 7 comes with Borland Kylix 3 based on Linux, allowing the programmer to create multiplatform applications.
- This program is accompanied by images, animations and simulations that make the appearance more attractive, interactive, attractive and practical.
- Delphi based application program that can be used to solve electronic calculation problems along with steps to get the solution.
- Delphi install results can be used without having to install the Delphi software first.

While the lack of Delphi software is: (1) to make learning media applications based on Delphi, absolute programmers must have the basic capabilities of Delphi programming and are quite complicated in the manufacturing process; (2) the process of making this learning media application takes quite a long time; (3) difficult editing in Delphi-based application programs; and (4) to use the program in the classroom requires a laptop or PC (Personal Computer).

Based on the definition above, Delphi-based learning media has interesting and interactive properties with the presence of these features. This will stimulate students to learn.

3.2. The influence of Delphi based on learning media on student learning autonomy

Cronbach argues that "Learning is shown by a change in behavior as a result of experience". Which means learning is shown by behavior change as a result of experience. With a quality learning process, it will produce the desired learning outcomes [12]. According to Hamalik, learning aids or media are included in the elements in the learning process that have dynamic properties which can change at any time, sometimes strengthening sometimes weakening which can affect the learning process related to the implementation of learning to achieve graduate competencies with desired learning outcomes. When viewed from the side of learning theory, the explanation of the element is close to understanding the learning theory of information processing [13].

Where the theory of information processing according to Yudhawati and Haryanto explained that in information processing there is an interaction between internal conditions and external conditions in each individual. The state of affairs of a person who wants to achieve high learning outcomes is what is called internal conditions. While stimuli that affect someone from their environment in the learning process are external conditions [14]. In addition, the explanation above also according to Rusman relates to the implications of the principles of learning for students that cannot be ignored during the learning process, such as the first principle, namely attention and motivation, where in the learning process students are required to pay attention to each stimulus given in the learning process [15].

From the explanation above, regarding the elements of learning, learning theory, and the principle of learning, conclusions can be drawn that student learning outcomes are influenced from outside (external) and from within (internal) students themselves. One that affects learning outcomes from outside students is the media. In the learning process which is a process of communication between teachers and students, according to Gagne and Briggs "media represent one component of delivery systems" which means that media is one component of the delivery system [16]. Submission here is the delivery of messages from teachers to students in the form of information or knowledge in the learning process. In addition to learning media, the element of learning also mentions the elements of the subject matter of learning, where the conditions of the subject of learning also determine the activities and success of learning. An example of the condition of learning subjects originating from within students is learning autonomy.

The importance of learning autonomy is stated by Litschenberg in Martono in the phrase "When you have been obliged to discover by yourself, which means" If you learn by finding it yourself, it will be left behind the aisle in your mind that can be entered again when it needs to rise [17]. The opinion explains
that by learning independently you will get an understanding of the concept of knowledge that will last so that it affects the achievement of student learning outcomes.

Suryaningsih conducted a study on "The Effect of Learning Media and Autonomy of Learning on Science Process Skills Ability", this study concluded that: there is an influence of interaction between learning media and learning autonomy on the ability of science process skills [18]. Meanwhile Syaharuddin, Mandailina, and Anwar conducted a study entitled "Development of Solutive Based Junior High School / MTs Software Using Borland Delphi", the study concluded that: the final product results were developed in the form of media learning for junior high school / MTs in the algebra field. Field trials obtained student responses of 56.94% which meant "quite practical" [19]. Based on the definition above, the use of Delphi Based Learning Media can increase students' autonomy for learning.

3.3. The effect of Delphi based on learning media on student learning outcomes

The position of the media in learning is very important, therefore the teacher needs to use it in learning. Teachers who are good at using media are teachers who can manipulate media as a source of learning and channel information from material delivered to students in the teaching and learning process. Indeed learning media are a means of communication and information resources in the teaching and learning process, a means that can improve the quality of learning.

The function of the media in learning activities is no longer just as a teaching aid for teachers but as a carrier of learning information needed by students. In general, the media or props have the following functions: (1) Clarify the presentation of the message so as not to be verbalistis (in the form of written words or impressions); (2) Overcoming limitations of space, time and senses such as: the use of images, films, video, diagrams and so on; and (3) By using the media appropriately and varied, it can overcome the passivity of the students, causing excitement in learning [20].

The media used in this study are video media and image media incorporated in a single unit of Delphi learning media. Video is one type of audio-visual media that is capable of displaying images and sounds at the same time. According to Smaldino, Lowther, and Russell, they are available for almost all types of topics and for all types of learning fields, such as cognitive domains that help students observe dramatic revisions of historical events and actual recordings of later events because they help print books by showing processes, relationships, and techniques [21].

While the media image which is an original reproduction in two dimensions, in the form of photos or paintings is one type of graphic media included in the category of visual based media according to Arsyad plays an important role in the learning process because it can facilitate understanding and strengthen memory [22]. Scrawling, Crudde, and Robinson mention four ways visual appearance influences learning to help students namely help students focus on important information, reduce the amount of information and organize it in ways that reveal the most important relationships and complex processes between concepts, instantiating external information into mental models internals that improve understanding of important information, and reduce foreign cognitive load associated with learning large amounts of complex information [23].

Umar and Aziz conducted a study entitled "The Effects of Multimedia with Different Modes of Presentation on Recognition Among Students with Different Self-Regulated Learning Levels", concluded that: multimedia with voice recognition systems had a positive impact on students' reading skills, where audio files resulting from voice recording allows students to evaluate their own reading results with the help of their friends, where students who have high self-regulated learning, coursework can improve their learning, students' receptive and productive skills, and student reading skills [24]. Likewise, Jiang et al. conducted a study entitled "Development and Evaluation of a New Curriculum Based on the Delphi Method for the Master of Nursing Programs in China", this study concluded that: the final results learning media made using the Delphi software had an authority coefficient of 0.88 and the Kendall coordination coefficient was statistically significant (c2 test, P <0.01) [25]. In addition, Mandailina et al. conducted a study entitled "Combination of Delphi and Geogebra Media in Three Dimensional Learning", the study concluded that: the final product results were developed in the form
of application programs that combined Delphi and Geogebra software, which were tested the average field try gives a response of 86.09% which means "very good" [26].

Based on the definition above, the use of Delphi Based on Learning Media can improve student learning outcomes in Basic Electricity and Electronics subjects.

4. Conclusion
This study concludes: (1) delphi-based on learning media, are interesting, and interactive, so as to stimulate students to learn; (2) the use of delphi-based on learning media can increase students' autonomy to learn; and (3) the use of delphi-based on learning media can improve student learning outcomes in Basic Electrical and Electronic subjects.

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