The Development of Connected Learning Modules in Computer Systems and Microprocessor Electronics Subjects at 10th Grade in Vocational High School

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ABSTRACT

Learning modules are one of the important things in the continuity of learning. The learning modules are arranged systematically and cover all the content of the learning material that will be delivered by including an evaluation at the end of the module section to determine students' ability to understand learning. This study aims to determine the effective development of connected learning modules in 10th grade at VHS (Vocational High School). The data collected is in the form of the feasibility of developing learning modules. This research is field research with the descriptive qualitative method. MAXQDA is used to explain the mapping of the research results obtained. The research subject involved the teacher as MGMP Team (Subject Teacher Conference) in this VHS, which provides an assessment through a validation sheet regarding the feasibility of the module to be used in the learning process. The results of this study indicate that the module that will be used already has a good and proper category as a support for the Connected Learning model to be applied learning process in the classroom. The conclusion based on the study results shows that the Connected Learning model can be used as an alternative learning model that only focuses on conventional learning models. This study's results imply that the Connected Learning model can make it easier for teachers to be effective in the learning process.

***Keywords**: Connected Learning, Field Research, Learning Model, Learning Effectiveness, Qualitative Method*

INTRODUCTION

The learning model is a step that is often or commonly done in the learning process to achieve the learning objectives set before the start of learning (Octavia, 2020). Learning models have a role in improving the quality of learning because, in addition to educators who are required to deliver learning materials through the modules used, students are also expected to take an active role and understand the material presented through the learning modules presented. However, it takes work to determine a learning model. Many educators (teachers) are still trying to find a suitable learning model to be applied to be effective and create an atmosphere that is not boring for students when teaching and learning activities take place (Mirra, 2019).

Many students experience a drastic decrease in learning motivation(Laakso et al., 2021) due to various things, especially those who do not properly collaborate between digital media and conventional media in the learning process. The development of learning modules is increasingly leading to transformative learning that involves a lot of social interaction and n open attitude to opinions and practices from learning between educators and students (Bali & Caines, 2018).

Connected Learning is one of the many models applied in the learning process, where the implementation of the conne learning focuses on the parts that are inte (Connected Learning) focuses education's attention on the relationship between various areas of learning, and student's interest in one subject (Seftstudent's et al., 2013). In addition, students are actively involved as one of their needs in the learning process to create a learning experience. The linkages between one discipline and not utilising the model can help students develop their understanding in a better direction regarding the concept of discipline and transfer knowledge from one context to learning material (Dasgupta et al., 2019).

The supporting factor in the form of the use of digital technology in the application of the Connected Learning Model proves that several programs mediated by digital technology can support student development in the learning process (Mädamürk et al., 2021). In addition, supporting factors in the form of motivation generated by each student, including creative thought communication between students and educators, are important in the scope of Connected Learning (Toh & Kirschner, 2020).

In its application, the development of the Connected Learning module for SMK students includes students' interest in subjects with this Connected Learning model, involving teachers as the MGMP Team (Subject Teacher Consultation) in SMK, which provides an assessment through a validation sheet regarding the feasibility of the module to be used as a support learning process.

METHOD

The method used in this study is a type of field research with descriptive qualitative methods. Researchers directly go to the field to obtain data, which will later be collected in the form of words or writing and pictures or documentation of research results so that the data obtained in this qualitative research does not emphasise numbers (Azwar, 2001). This study aims to determine the feasibility of developing the Connected Learning module to be applied as a support in the learning process.

Participants in the study involved the MGMP team in VHS on Computer Systems, where the MGMP team would assess the learning modules made.

Qualitative data analysis is carried out interactively and continuously until the research demands are carried out, thus producing saturated data (Milles, 1986). So, the analysis of this research data goes through the data reduction stage by basing itself on field research, so when doing data analysis, an analyst must first examine in depth what things will be analysed (Moleong, 2017); Presentation of data in the

form of learning modules that have been made, and verification through data instruments to prove that the learning modules made are suitable for use.

The MGMP Team consisting of Computer Systems and Microprocessor Electronics subject teachers at VHS became subject experts who gave an assessment on the validation sheet for the feasibility of developing learning modules that would be applied to support the connected learning model. See Table 1.

Table 1. Connected Learning modul validation instrument (Zunaidah & Amin, 2016).

Expert	Validation Component	Indikator validasi
Expert 1	Study materials Computer Systems and Microprocessor Electronics	a. Typo b. Punctuation Wrong c. uppercase, lowercase in writing d. language use
Expert 2	Serving Method	a. Systematic Presentation
	Worth Serving	a. The title on the cover looks b. easy to understand module content
	Decent View	a. Use of Margin b. Cover Design c. Place writing on the Cover and inside module d. Font size e. Complete module content
Expert 3	conformity with basic material	a. Complete material b. Broad Material c. Material discussed in detail
	Material accuracy	a. Learning objectives b. Biner and Decimal conversion c. Arduino IDE Codding for Temperature sensor d. Temperature sensor LM35 e. Task Accuracy with material
	learning support	a. According to the curriculum b. Number conversion connected with microcontroller programming

The validation instrument is in Table 1. The instrument testing is divided into three parts where there are experts 1,2, and 3, with each of these experts assessing aspects of different validation components, including learning materials; Presentation technique, Presentation Feasibility, Module display feasibility, the suitability of the material with basic competencies, material accuracy, and learning support materials. The results of this validity test will be discussed in table 2. In the results and discussion section.

RESULT AND DISCUSSION

The value that has been given by the MGMP Team, which consists of teachers of Computer Systems and Microprocessor Electronics subjects at Vocational High School,

will be the final result of the module being developed, whether or not it is appropriate to use it as supporting teaching materials in the connected learning model. See table 2.

Table 2. Expert validation result

No	Expert	Validation result
1	Expert 1	It is better when doing a learning module to include basic competencies & indicators of achievement of competence (GPA) to discuss more the theoretical basis so that when they step into the demonstration process, students understand well, in theory, the basic things that each student must master. And based on the assessment carried out, the module that has been made is declared "Appropriate for use for learning after revision".
2	Expert 2	Retool the material for learning modules at the next meeting so that it already has a good depth of material when learning takes place. And based on the assessment carried out, the module that has been made is declared "Appropriate to use for learning without revision".
3	Expert 3	Further development of the modules made by completing various assessment sheets is needed. And based on the assessment carried out, the module that has been made is declared "Appropriate for use for learning after revision".

The results of the validation assessment are in Table 2. Several varied assessments were made of the modules made for the connected learning model, and then the analysis results from the validation will be processed on MAXQDA. See Figure 1.
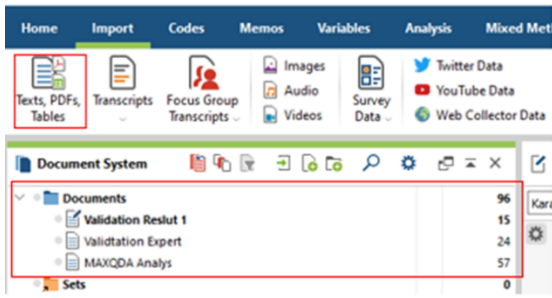
4

Figure 1. The Process of Importing Data Validation Results on MAXQDA.

Figure 1. shows the validation results that have been imported in the form of documents into the MAXQDA application. These results will be mapped with the system code seen in Figure 2.

(a)

(b)

Figure 2. (a) Code System Process on MAXDQA, (b) Code System Result on MAXDQA.

Fugre 2 (a) is a process code system and (b) is the result of a code that serves as an initial

stage before the data is mapped. Every important sentence in the validation results is selected to be the initials/code in the "new code" menu, as shown in Figure 2. (a) after each important sentence in the document has been entered in the code, it will generate a code or initials according to the Figure 2. (b), then the data will be used in mapping the validation results in Figure 3.
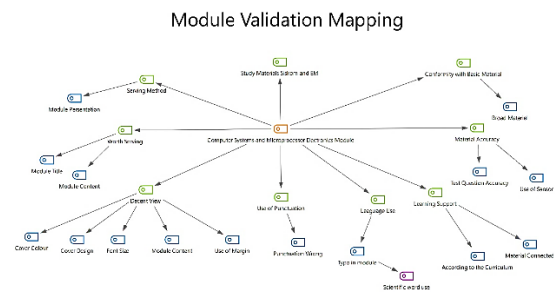

Figure 3. validation result module analysis

The results are that the modules created have categories that are feasible to be used as supports in the application of the connected learning model, with several revisions according to the suggestions and inputs submitted by the MGMP team.

Quality learning modules pay attention to the components of the feasibility aspects of content, language, images and presentation (Harta & Lismayanti, 2014). The module's results created and validated are appropriate (review table 2) by several experts. The validation results show that the modules made are suitable for use with improvements in teaching materials that should include basic competencies, achievement indicators, and theory. The basics that must be discussed in depth and the aspect of the accuracy of the material must be added back to the varied

assessment sheets so that teachers can freely give assessments to students.

The mapping of the validation results used with MAXQDA, where the software's purpose is to make it easier to read the data results by describing each keyword generated from the validation test (review table 2).

Conclusion and Recommendation
Conclusion

This research resulted in the development of a learning module that was feasible to use because it had been validated by several experts who were members of the MGMP team. Validated points include learning materials; presentation techniques, presentation feasibility, module display feasibility; the suitability of the material with the basic competence; the accuracy of the material. The results of the validation are mapped through MAXQDA software so that they are easy to read and understand. The results of this developed learning module can support the application of the connected learning model, provided that it has been revised according to the suggestions and inputs given by experts. In addition, the application of this connected learning model can activate the delivery of learning materials and can be used as an alternative learning model that has only focused on conventional learning models.

Recommendation

Further research can be taken with more subjects to have diverse data and the limitations of the data processing system so that it can be improved and updated in future research to have novelty in research related to the development of learning modules with this connected learning model.

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