Demolition Works Topic: An Interactive e-Module Development for VAK Learning Style

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ABSTRACT

The purpose of this study is to design and develop a teaching and learning e-module for the topic of Demolition Works based on the VAK learning styles for the Construction Technology 3 (BBB30503) course at the Faculty of Technical and Vocational Education (FPTV), UTHM. This study also evaluates the developed teaching and learning e-module in terms of design, content, and functionality. The three phases involved are the analysis phase, the design phase, and the development phase. The instrument used to evaluate the e- module in terms of design, content, and functionality was an expert evaluation questionnaire, considering VAK Learning Styles. The developed e-module was assessed by three experts, consisting of lecturers from UTHM. These experts included one lecturer from the field of multimedia and two lecturers from the field of building construction. The results of the study analysis found that design, content, and functionality received a high level of agreement. Overall, the researcher found that the developed e-module is a suitable teaching aid for use during the teaching and learning process for the Construction Technology 3 course at FPTV, UTHM.

Keywords
e-Module, Demolition Works, VAK Learning Style

Introduction

Education is defined as be a vital and indispensable element in the society and the nation therefore, the necessity of creating a sound and quality education system cannot be overemphasized (Jamaluddin, 2011). One of the subsystems of this system is, therefore, the teaching-learning processes that, if well-deployed, can enhance the nurturing of workforce and boost the nation's economy (Padzil et al., 2011). Quality education also helps in development and bring up of a society with qualified human resource (Abdullah, 2017). Therefore, organised teaching aids such as modules are essential in the provision of education. Teaching and learning modules are not only effective in presenting content but the designed and presented offers a content, method and assessment package that can foster self-education. e-Modules has such benefits in comparison with printed materials, instructiveness, possibility to develop notes, audio, and video inputs, instant feedback in form of quizzes and exams.

Sugihartini and Jayanta (2017) also suggested that for e-modules to be more effective they should incorporate VAK learning styles (Visual, Auditory, Kinetic). These are learning techniques that are aligned to the preferred learning modalities of the learners. VAK learning style strategies used in class aim at accommodating a few students' sense to enhance their ability to learn with ease (Rukmana & Hardjono, 2018). According to Kiong (2021), technical subjects pose challenges to students because most of them face challenges in relating and, in extension, arranging the concepts. Hence it shows that systematic and well-designed e-modules can help the students in understanding as well as memorizing of information. Finally, technology has been of much importance in enhancing learning in the 21st century because it has allowed learning through online facilities. Such methods prevalent on the Internet have their advantages, such as improved knowledge and more versatility (Kaviza et al., 2021).

The use of Information and Communication Technology (ICT) has been embraced in developed countries such as those in Europe and America and Malaysia is not left behind in embracing the technologies in learning institution (Sihes & Sani, 2010). The use of ICT-based teaching aids has been found to enhance the efficiency of the teaching and learning process (Sallehin & Ab Halim, 2018). ICT can help in capturing students' attention and keeping them engaged, an important factor that enables them to grasp what the teachers are conveying (Isa & Ma'rof, 2018). e-modules are a crucial component of Information and Communication Technology (ICT) in education. e-modules significantly enhance the efficiency and effectiveness of the educational process, making learning more interactive, accessible, and personalized. e-Modules also help students by providing numerous benefits, including directly interacting with the content, which creates a better experience for the students (Azman & Ab Rahman, 2022). Additionally, e-modules are packages organized into specific units and designed for the benefit of student learning. A module package typically includes components such as student usage guides, student activity sheets, student worksheets, and test sheets.

In technical courses like Construction Technology 3, being knowledgeable of each content is very important in the preparation of the students towards the working world (Zamrin, 2022). A preliminary study at UTHM indicated that students involve a lot of difficulty when studying the topic of Demolition Works. It was named as a challenging area by both students and lecturers and therefore doubts relating to the sufficiency of the existing approaches could be raised. The study also expounded the fact that traditional teacher directed teaching methods are dominant which led to receptiveness and poor learners' attention (Hamdan & Mohd Yasin, 2010). It is hoped that knowledge, skills and values that are taught should be more dynamic to engage the students in problem solving activities (Azman et al., 2014). Also, paying attention to a single learning style is disadvantageous in meaning that students would not be able to comprehend or grasp some concepts. These challenges can be met through the application of VAK learning style to e-modules since it accommodates the different sides of learning preference and has elements such as notes, demonstration videos and also student's activity.

Problem Statement

The Construction Technology 3 course is a compulsory course for all students in the Building Construction Programme. According to a preliminary study, most students identified Demolition Works as a particularly difficult topic to master, a view supported by the lecturer involved in the study. The Demolition Works topic encompasses demolition activities. The preliminary study revealed that disorganized, unsystematic, and incomplete note content is the main reason students struggle with this topic. Additionally, the lack of reference materials aligned with the syllabus and the scarcity of material- and student-centred teaching activities also contribute to the difficulty in mastering this topic.

Therefore, it is crucial to develop an e-module to help students master the Demolition Works topic. The development of this e-module is also important because it will produce a more organized, systematic, and syllabus-based teaching and learning module. This will make it easier for students to master the topic. Furthermore, if this issue is not addressed, student performance will deteriorate. This is supported by the preliminary study, which found that most students agreed that their performance would improve if they had good teaching aids. Additionally, this study is necessary to prevent students from copying their peers' work when they do not understand the lesson. In this study, the researcher will design and develop an interactive e-module that includes various multimedia elements such as text, images, videos, and activities using VAK learning style. Technical courses often involve complex processes and practical skills that can be effectively taught through interactive and multimedia-rich content for the Demolition Works topic.

Literature Review

The VAK learning style refers to a learning style that involves three senses, which are visual, auditory, and kinesthetics (Siregar, 2018). Based on this, visual learning refers to the perceive learning hence students learn with their eyes for instance via pictures or videos and reading. After that, there is audio learning that deals with sound the students learn through their ears for instance through lectures or audio Montgomery (2010). Regarding kinesthetics learning, students are more likely to learn through the course of active mode that can be describe as touching and moving.

Teaching strategies that would involve the VAK learning style are also among the most popular and regularly implemented teaching approaches (Banas, 2018). In this way, using the VAK-based teaching and learning process, it can promote the critical thinking skills of students effectively (Rini et al, 2020). What is more, the level of cognitive

development of a student helped also when using the VAK (Baharom et al., 2022). Finally, it is appropriate to apply teaching and learning activities using VAK learning style because a fact that among the students there are various learning styles is known to everybody (Azman & Ab Rahman, 2022).

Minggu and Mohamed (2021) did a study to conclude that the VAK learning style is perfect for technical courses while the VARK learning style is appropriate for non-technical courses. They also provided their thoughts saying that the application of learning with the help of teaching aids according to the above distinguished learning style may activate students' sensory input, particularly in technical subjects, where students are to imagine a lot. They also discovered from their research that teaching aids developed from VAK gained a high percentage of agreement from the experts. In this respect, selection of the right learning style to be used in the teaching aids is very important in the enhancement of the students' performance.

Nadzar (2022) also pointed out that the VAK learning style is the widely known and the most often used when planning the instructional resources. The presentation of teaching aids that features Visual, Auditory, and Kinesthetics learning dominates the teaching and learning process and assists learners grasp what is taught easily. This is because, unlike any other learning style that is usually bound to one of the three elements of senses, all the three student's senses are occupied. Choosing the right teaching aids will help teachers get through the necessary, accurate and complete information to the students. Therefore, researcher created the teaching and learning e-module for the topic of Demolition Works adopting at VAK learning style since the VAK learning style is supportive to teaching- learning processes.

Methodology

In this study, the researcher chose three phases to be involved, namely the analysis phase, the design phase, and the development phase. In the analysis phase, the researcher conducted interviews with three lecturers who teach the Building Construction Program to determine the user needs for the design and development phases of this study. The researcher also identifies the problem that needs to be resolved. Therefore, before the teaching and learning e-module for the topic of Demolition Works based on the VAK learning style at FPTV is developed, the researcher also conducted an initial study through a questionnaire to identify problems during teaching and learning process in the Construction Technology 3 course. The researcher distributed questionnaires to 32 students who had taken the Construction Technology 3 course (BBB30503) and obtained their responses. The researcher also distributed a questionnaire to three lecturers who had taught the Construction Technology 3 course to identify problems and give good suggestions to develop e-module using VAK learning style. Questionnaire is conducted to evaluate design, content and functionality on e-module for the topic of Demolition Works based on the VAK learning style. In addition, Guttman Scale shall be used by the researcher in case of evaluation of the questionnaire developed with the assistance of the experts. The Guttman Scale offers easy to understand results as the result can only be "Yes" or "No" or any other response that is in conformity to the question that was posed, and this scale is mostly used in definite opinions. The research participants, who are experts in the field of study, are being conducted to ensure that what is being measured by the evaluator accurately represents the field (Zamrin, 2022). Therefore, the researcher selected three experts in their respective fields to evaluate the teaching and learning e-module for the topic of Demolition Works based on the VAK learning style at FPTV, which has been developed. These experts consist of lecturers from the Faculty of Technical and Vocational Education (FPTV) who are in Building Construction, multimedia and pedagogy field.

The design phase is critical for facilitating the development of this teaching and learning e- module. In this phase, the researcher uses the Google Sites web platform as the platform for developing the e-module and employs the VAK learning style as the basis for this e-module. The researcher designs the e-module based on the needs analysis conducted, as well as readings and discussions with an expert. The development phase is where the teaching and learning e-module for the topic of Demolition Works based on the VAK learning style at FPTV is created within the actual system, involving appropriate media elements such as text, graphic, video and audio. The researcher develops this e-module to ensure that the study's objectives are achieved based on advice from experts from pedagogy aspect. The content of this e-module includes the topic of Demolition Work and covers all the subtopics within it, such as i) Identify demolition works site investigation requirements, ii) Understand the demolition process, iii) Plan the demolition methods and techniques, iv) Check authorities' rules and v) Carry out structural demolition works. The researcher also places significant emphasis on easy language use, VAK learning style elements, and the design of the e-module to ensure it aligns with the target audience. Incorporating visual elements, the strategies include instructional

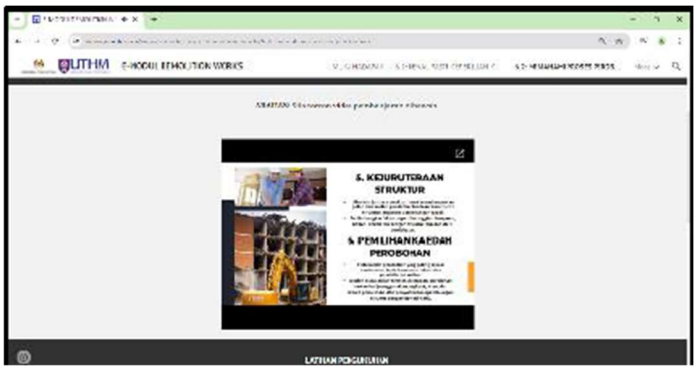
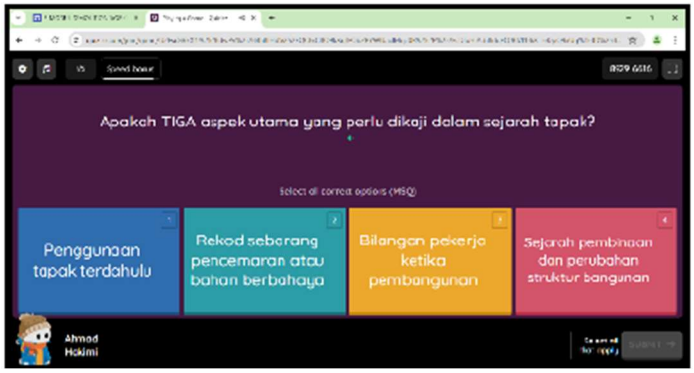
video and use different color of graphic to highlight key points of information. For auditory elements, e-module provide audio explanations and narrations for content. Lastly, in terms of kinesthetic, researcher create activities for assignment and lab practical that involve hand-on to engage physically.

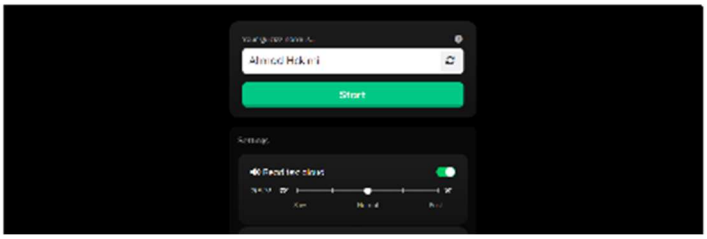
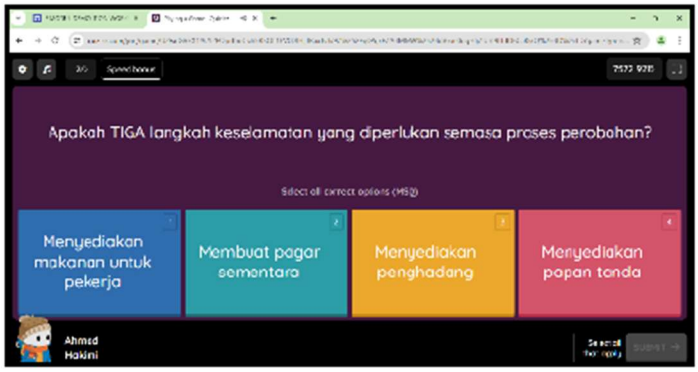
Data Analysis

The researcher use Microsoft Excel software to analyze the data obtained in this study because it is easier and more suitable for obtaining accurate percentages and frequencies. According to Zamrin (2022), the data obtained from the questionnaires must undergo an analysis process to derive useful input. This is to prevent the data obtained from remaining unprocessed and becoming raw data, thus not providing any useful input. Therefore, the data obtained from the questionnaires in this study will be analyzed to provide valuable information to the researcher. This data will be carefully analysed by the researcher to avoid any errors or mistakes. After the percentage value is calculated using a formula, the obtained percentage value will be categorized into three levels: high (71%-100%), medium (41%-70%), and low (0-40%). In this study, the researcher will determine the levels based on the obtained percentage values.

Results

Design

Element	Method
Visual	To increase interest in the content, the researcher developed instructional videos that include the use of several bright colours.  To reinforce the content, the researcher administered questions in exercises designed using the Quizizz software which provides options of aesthetically appealing colour themes for the exercise. 

Auditory	The researcher incorporated auditory elements into the learning materials by designing instructional videos that include teaching audio.  Additionally, the researcher applied auditory elements to the reinforcement exercise questions by designing these exercises using the Quizizz software, which features a "Read Text Aloud" function, where AI reads the question text out loud. 
Kinesthetics	The researcher incorporated kinesthetics elements into the reinforcement exercises by designing questions that require users to answer by clicking on options, typing responses, and recording audio and video answers.  Additionally, the researcher applied kinesthetics elements to the final assessment by instructing users to conduct a case study.

As for the interface design of the e-module, all the experts unanimously noted that it was comprehensible. Next, regarding the item mentioning that the e-module allows an organised design, the degree of consensus was moderate. The one who also opposed was from the building construction area and stated that the front-page layout of the e-module could be optimised even more. The idea of an e-module design was acknowledged as appetizing by all the experts; moreover, all the participants noted that all the font, as well as the language used in the e-module, is comprehensible. But two experts opined that the e-module offers a learning material design level of the student, easy access to the reinforcement activities and interesting reinforcement activities. The expert that dissented was from the field of building construction. He stated that the reinforcement exercises in the Quizizz software were not easily accessible or areal and did not make the students feel enthusiastic. e-Module also include an assignment instruction sheet available for quick reference on the final assessed page and the specific advantage of the e-module in offering a simple to understand assignment instruction sheet on the final assessed page.

Content

All the experts opined that the syllabus of the content of the e- module is in consonance with the learning syllabus and that there is a systematic presentation of the contents in line with learning objectives. However, only one expert believed the content of the e-module contains all the three VAK learning style that encompasses visual, auditory and feeling or touch. The first expert from the field of building construction who dissented believed the content for the element named kinesthetics was relatively poor in comparison to the visual and the auditory elements whereas the second expert from the similar background opined that the e-module was less of an interactive model. The responses received from all the experts were unambiguous; the reinforcement exercises occur within the learning syllabi and are compliant with the learning objectives. The level of agreement is moderate, However the content of e-module reinforcement exercises corresponds to the above three element of VAK learning style. The dissenter was a specialist in the construction of buildings, who opined that the kinesthetics element in the reinforcement exercises could be optimised. All the specialists assessed the number of reinforcement exercises completed and the number of final assessments as sufficient. All in all, the content of the e-module could be further discussed as being rather suitable, with most of the offered items being described as highly essential by the respondents.

Functionality

All the experts believed buttons or icons worked fine. However, one professional from the field of building construction believed the shifting from one screen to another was seamless. Unfortunately, the expert did not give explanations as to why they hold this view to the points made in the opposing argument section. All the experts opined that each of the screens had interaction buttons/icons pointing to the subsequent screen. Furthermore, in the opinion of all the distinguished scholars, the Google Drive links of the subtopic 6. 1, 6. 2, 6. 3, 6. 4, and 6. 5 pages, the link to the website at the end of the Final Assessment page, the link to the video on the page Subtopic 6. 3 pages, and the Quizizz links on the subtopic 6. 1, 6. 2, 6. 3, 6. 4, and 6. All five pages work well in order, whether it was to jump from one page to another or move back and forward from one position and the other. The assignment instruction sheet which was on the last page of the final assessment was well served as all the experts agreed. In general, most of the items were answered with high level of agreement, consequently the functions developed in the e-module are beneficial.

Discussions

The evaluation of the research result shows that all the experts agree that the design of e-learning module for demolition works, which is based on VAK learning style at FPTV is appropriate. The designing of the module is also convenient, attractive and clear and the format of the text also makes it easy to interact with. Readability is underlined, with no desire to overload a user and cause disruptions, easily readable fonts and a clear structure of an interface are named as critical values (Krug, 2014). Further, by virtue of the module's design, presentation is crucial in the stimulation of students' thinking abilities (Zamrin, 2022). Both qualitative and quantitative studies also show that language comprehensible in the module also meets the experts' approval. This is very important particularly for minimising confusion that students could latch onto and for improving the general quality of the e-module (Laili et al., 2019). Furthermore, the final assessment guidelines of the module are described in detail. Accordingly, the students will be guided on expectations and thus may enhance their performance (Lang, 2021).

However, the response to the overall design of the learning module is positive, but the front page of the module and the structure of the material lacks work that would improve the consensus among the specialists. A specialist in construction of buildings was asked about the ideas that could be applied to make the layout less confusing and more structured at the same time, all the ideas were suggested to be implemented in the front page of the newspaper. Thus, Supri (2021) pointed out that gamification is useful when reaching specific learning outcomes. Also mentioned as weaknesses were the matching of content to the students' progression and the accommodations for the revision tasks. These materials should be at the level of the students to trigger as much development as possible of their abilities (Azman et., al 2014), accessible practice exercises are essential in engaging student (Urquiza et., al 2020). All in all, the e-module layout is reasonable, although more specific adjustments should be made to improve specific aspects of the e-module and user satisfaction.

From the following research finding analysis, it is evident that all the experts concur that the e-learning for demolition works at FPTV based on the VAK learning style is adequate for the content of the works. The topics in the module correspond to the characteristic of the syllabus, learning outcomes, and are provided systematically with the course materials. All these components are strategic because they influence the process of teaching and learning. An effective e-module is integrated since it has all the elements provided in a comprehensible way. In addition, Azman and Ab Rahman (2022) point out that for an e-module, its content should be well formulated and systematic for the content to produce optimal results. Therefore, these aspects have been given priority by the researcher while designing the e-module. In addition, everyone agrees on the fact that all the reinforcement exercises correspond to the syllabus and the learning outcomes. The students also concur with some of the management decisions that include the number of reinforcement exercises and final assessments. In any learning module, reinforcement exercises and final assessments are exercises that should not be overlooked. Zamrin (2022) points out that reinforcement exercises are important in ensuring that students can grasp more about a topic. Hence, it is suggested that assessment of reinforcement exercises and final assessment should be done in a manner that guarantees quality and adequacy to facilitate effectiveness of the e-module.

However, the content of the e-module on VAK learning styles Visual, Auditory, Kinesthetic received low level of agreement. A sounding specialist in the building construction field pointed out that going by the ''elements of art,'' the kinesthetic factor is the least incorporated when compared to the visual and auditory aspects. The kinesthetic element is the one that requires some boost, as it is one of the significant aspects of student interaction using hand on and physically respond. The use of kinesthetic activity in educational context has been proved to be helpful in the terms of enhancing students' interest and achievement (Matere et al., 2017). Thus, one must advance the kinesthetic element further to enhance the e-module makeover effectively. Moreover, another expert in the same field, who has offered some feedback concerning the application of the e-module, should be more interactive. High interactivity in an e-module is even critical in assessing the efficacy of an e-module in learning among students (Rahmadhani et al., 2021). Hence, there is a requirement for increasing interactivity, this is among the areas that must be developed if the quality of the e-module is to be improved.

Also, the content of the reinforcement exercises that attempted to respond to the three VAK modes of learning did receive moderate agreement as well. The findings of this paper reveal that the kinesthetic component in reinforcement activities is unique in student learning, particularly in the technical aspect of learning (Hidayah et al., 2021). As much as this e-module is for a technical course, from the above statements it can be deduced that there is not much emphasis placed on the Kinesthetic aspect in the reinforcement exercises to improve the said e-module. In conclusion, all the

experts admitted that the content of the e-module developed by them was proper, but they collectively agreed that there is the need for further enhancement or optimization, with a view to improving the effectiveness of the kit and bringing it to a better standard. From the analysis of the findings, it emerges that all the experts concur to the effect that the e-learning module for the topic of demolition that is learned at FPTV that applies the VAK learning style is highly functional. According to Supri (2021), the effective use of buttons and icons in the e-module, along with navigation elements on each page, significantly enhances student autonomy, a key characteristic of quality e-modules. Furthermore, the use of the web links part of the module, such as Google Sites that is linked on each subtopic page and on the final assessment, Google Drive on each subtopic page and final assessment and a YouTube page on subtopic page 6.3, and Quizizz on each subtopic page, work well. These links include social media, e-learning, and other instructional tools necessary for teaching-learning activities in a class. It is crucial since a failure in these links can interfere with the teaching and learning processes. This aspect of the module is crucial to achieve the best results in terms of student flow.

By now the final assessment page has divided the overall task into smaller comprehensible tasks with the help of the task instruction sheets and these are quite useful. The proper functioning of these learning materials is important because good teaching aids facilitate understanding by students of the contents being taught. According to Anas (2013), effective teaching aids increase the ease with which the facts in education are grasped in a big way. But the shift between screens was viewed somewhat less approving, in terms of the level of agreement being moderate among the experts. In summary, it forms the consensus of all contributors of this study that the e-learning module preferred by the researcher works well. The operational buttons, icons, and web links in the module and the learning notes, videos, and the task instructions are part of the functions. Although there is confusion as to the way screens transition from one to another, the use of the module is sufficiently satisfactory and relevant to the processes that take place while learning.

Conclusion

This study is, therefore, designed and developed to propose a teaching and learning e-module on the topic of Demolition Works based on VAK learning styles to be implemented for the course Construction Technology 3 at FPTV, UTHM. This study has successfully attained its objectives and accounted for all the research questions. The e-module was designed by the researcher to be visual, auditory, and kinaesthetic to satisfy the students with different learning styles. This holistic approach not only helps in a better understanding of the subject matter but also enhances the student's interest and retention capability. The fact that the researcher presents very high percentages of agreement in all three aspects-content, design, and usability-underlines the effectiveness of the e-module.

The consensus among the experts involved in this study identifies the VAK learning style in e-module as a clear pedagogical tool. The experts acknowledged its potential to add enormous values into learning by capitalizing on VAK learning styles and integrating technological and innovative advancement into education. This much alignment also duly applies to modern educational practices within Malaysia's evolving educational landscape.

It also developed several identified issues and challenges found in the traditional teaching methods of the topic Demolition Works. Therefore, it is an efficient solution for quality enhancement in Construction Technology 3 by providing a structured, interactive, and student-centre learning tool. These lead to the conclusion that the study has not only achieved what it had aimed for but also proved a point on how VAK principles are to be integrated into designing e-modules. Positive feedback from students and experts alike affirms this approach as effective, hence, it sets a precedent for future educational innovations. This e-module will be of great use as its concepts can be adapted to and expanded on other topics and courses, hence furthering the development of educational technology in Malaysia.

Limitations and Future Studies

For future studies, the researcher suggests that the e-module for teaching and learning on the topic of Demolition Works, based on the VAK learning style at FPTV, be utilized as a teaching aid in the actual teaching and learning process. This developed e-module can be applied by students taking the Construction Technology 3 (BBB30503) course at FPTV, UTHM, to aid in better understanding the Demolition Works topic. Future studies could also compare the effectiveness of using the e-module with conventional methods using a quasi-experimental study design.

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