# The Relationship Between Motivation and Academic Achievement on the Effectiveness of E-Module Prediction Questions Among Vocational College Students

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***Abstract* – E-module is essential to improve conventional teaching methods and increase the motivation of students' learning experiences in the era of the rapidly evolving technological revolution. This study aims to develop the e-module predictive question and the relationship level of motivation and effectiveness among students in vocational colleges. The e-module is carefully developed based on the ADDIE model, ARCS model and constructivism theories using the Canva platforms to assist the understanding and application of subject technology electronic and used method is quantitative quasi-experimental design of non-equivalent control group type study. This study uses pre-test and post-test methods which consists of 49 students and questionnaire. The result shows that the development e-module improve student motivation and performance and these findings also show that the e-module increase performance of the student during the process of learning compared to using conventional methods. The evidence from this study reinforces that when students can easily interact with and navigate the e-module, they are more likely to be motivated, attentive, and proactive in their learning process. Future studies should consider expanding the current model and exploring additional variables that may affect e-module effectiveness. In the conclusion, this study contributes to the growing body of knowledge on the effectiveness of e-modules in vocational education, emphasizing the dual importance of motivation and academic achievement as essential components of successful digital learning.**

***Keywords* – Motivation, Academic Achievement, E-Module Effectiveness, Vocational Colleges, Digital Learning**

## I. INTRODUCTION

By 2025, Malaysia needs to increase student enrolment in Technical and Vocational Education and Training (TVET) by 2.5 times through the Economic Transformation Programmed (ETP) and there are 10 leaps that have been identified in the Malaysian Education Blueprint (MPB) 2013-2025 (Ministry of Education Malaysia (MOE), 2013). The 4th leap which aims to strengthen student enrolment in TVET and through this transformation, MOE through Community Colleges (CCs), Vocational Colleges (VCs) and Polytechnics will be able to provide TVET higher education which is key in improving students' skills and career advancement (MOE, 2013). Therefore, today's education must be in line with the country's technological advancement. According to Razak et al. (2022), this is called Education Technology (EdTech) which refers to the application of technology to improve teaching and learning methods including the use of online platforms, software and digital tools.

This shows the importance of digital learning specially to improve educational standards and create flexible learning options. This includes developing students' ability to understand various types of data, procedures, collaborate and communicate actively and initiate additional innovations (Ismail & Hassan, 2019). Therefore, the production of this e-module is seen as the best platform to assist college vocational lecturers in their teaching and learning to achieve learning objectives. In addition, the e-module developed is equipped with interesting features that can increase student interest in this course as well as help students in providing a clear picture of a topic through appropriate animation or multimedia.

## II. PROBLEM STATEMENT

The use of e-modules in teaching and learning is currently seen as an alternative medium to further strengthen education in this country. Before the introduction of e-modules, there were several problems that had been identified in conventional teaching and learning for electronic technology modules. Among them is the use of a lot of paper to print notes and reinforcement exercises as student copies. Notes for each chapter will be given to students at the beginning of each semester and students need to print the notes. Printed notes look boring and do not interest students, which causes them to be unable to concentrate fully, fail to get high marks in exams, show less interest in certain subjects and subsequently give up (Sulaiman, 2023).

The different aspects of learning styles among students should be given focus because this aspect can lead to studies that lead to the exploration of learning styles that are suitable for the student's learning process (Tar & Mahmud, 2021). Some students have dominant learning patterns in themselves. There are also students who use a variety or combination of several learning styles in their learning process and some students face problems in applying strategic learning styles that are suitable for the learning process (Sudadi et al., 2024).

As a result, students obtain unsatisfactory results in academic achievement due to the application of ineffective learning styles absorbed and used in their learning process (Arifin, N., Jinan, M., & Ali, B., 2023). This study also found that significant achievements in learning will occur when the matching of learning styles with learning attitudes is carried out. The study also found that students

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will have a high level of motivation and have obtained more excellent results after being introduced to appropriate learning styles and teaching methods.

Furthermore, in vocational colleges students need to pass both theory and practical exam to further their study to be eligible to continue studying to the diploma level. Therefore, the production of this e-module is seen as the best platform to assist vocational colleges lecturers in their teaching to achieve learning objectives. Apart from that, the e-module developed is equipped with interesting features that can increase student interest and motivation towards this course, as well as help vocational colleges students in providing a clear picture of a topic through appropriate animation or multimedia.

## III. LITERATURE REVIEW

### *E-module Prediction Question*

The teaching process traditionally only takes place in the classroom using only books. However, now, with the convenience of information technology and the internet, the teaching process can take place anywhere without being limited by time and place (Jaafar & Tharbe, 2022). Rahim et al. (2021), stated that learning activities are said to exist when they can be adapted to the content of the subject. According to Ehsan, Vida and Mehdi (2019), an effective learning method is a teaching method that emphasizes the attitude or behaviour of students to work together and help each other in a group.

The e-module predictive question is to enhance the learning experience and achievement of students in electronic technology modules. This concept allows for interaction between students and what they explore and increases their engagement in the learning session. As such, this technology can increase student engagement and achievement.

This e-module allows learning to take place outside the classroom and provides wider access for students. E-modules can also facilitate collaborative learning, where students can work in teams or share their learning experiences through interactive features integrated with the e-module (Wulandari et al., 2021). Furthermore, students and lecturers can benefit from this e-module. For example, by using the e-module, students can review lessons and answer questions at any time and can refer to notes and answers included in the e-module.

This is because e-modules provide a unique learning experience and have a good impact by attracting students' attention and interest in learning (Wahyu et al., 2020). Indirectly, this e-module will provide many benefits and advantages to students. Lecturers can also provide students with a more effective learning environment and provide them with predictive questions and supporting notes for each question to better practice technology using the latest technological capabilities.

### *Theory and Model in E-Module Development Design*

For the module development model process, it must be guided by the existing teaching design model. The presence of this teaching design model will certainly produce a quality learning module. This is because before the teaching design model is developed, aspects of the constructivism learning theory are applied. Constructivism theory includes concepts that are based on a person's cognitive structure that will develop and change when they gain new knowledge and experience (Zajda, 2021).

Constructivism is one of the trends derived from cognitive learning theory. The purpose of using the constructivism approach in learning is to help improve student understanding. Constructivism is closely related to learning methods, discovery and meaningful learning. Both of these learning methods are in the context of cognitive learning theory. Constructivism is learning that provides development for students to learn to develop their own knowledge about the learning model plan made by the lecturer (Buhari & Hussain, 2023).

In constructivism learning, presentations can be used in the form of simulations of problems that occur in the environment (Shah, 2019). According to Makewa (2019), defining the constructivism approach is learning that emphasizes the active role of students in developing, understanding and giving meaning to the information or events experienced.

Another opinion was also presented by Rahmawaty et al. (2021), who explained that the constructivism approach is a method of teaching learning that aims to maximize student understanding and make learning more effective if students are directly in contact with the object being studied, namely in the surrounding environment. Apart from that, the use of equipment based on current technology with or without a network and diverse learning resources can also increase the effectiveness and efficiency of student understanding (Harun et al., 2021).

Next, the module design model is continued with a process for building teaching materials such as printed modules, teaching videos, computer software, and so on. At the same time, this process will include the development of the design process. According to the statement of Spatioti, Kazanidis, and Pange (2022), instructional design is defined as the science of creating detailed teaching practices for the development, evaluation, and maintenance of learning situations that facilitate the learning of a unit of study.

Therefore, the module design model for the development process is the ADDIE Model. ADDIE is an acronym for Analyze, Design, Develop, Implementation and Evaluation. The ADDIE model is often used in student-centered learning processes. The ADDIE model is often used to produce effective teaching aids, especially with the help of technology. This is because this model provides a systematic framework guide to adapt to a variety of learning environment situations. Using the ADDIE Model in teaching strategies helps lecturers improve their teaching efficiency (Almelhi, 2021; Ebru, 2020). Therefore, the ADDIE model is widely used by lecturers to provide a learning environment that allows

students to build their own knowledge and skills (Ebru, 2020). Figure 3.1 shows the ADDIE Model.

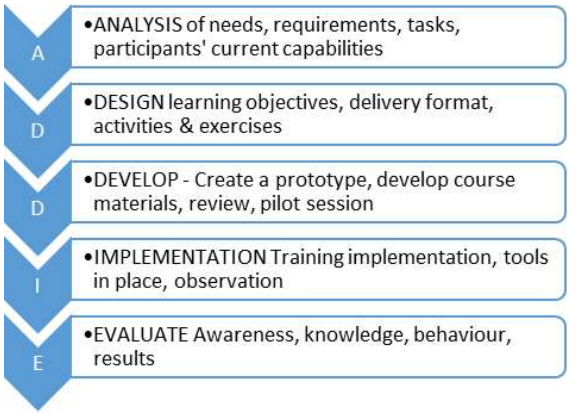


**Figure 1. ADDIE Model**

Another model in this study is the ARCS Model, a motivational approach developed by John Keller in 1987, aimed at increasing student motivation in the learning process. ARCS is an acronym for four main elements that influence motivation in learning as Attention, Relevance, Confidence and Satisfaction. The definition of the four elements related to the application used into four categories, namely learning attention, learning interest, learning behaviour and learning satisfaction based on this Keller's ARCS motivational theory. Overall, the ARCS model assists teachers in identifying their students' learning motivation and in developing interesting and productive lesson plans that will attract students' attention throughout the class (Chang, 2021).

## IV. METHOD

### *Quasi-experimental Design of Non-Equivalent Control Group Type Method*

This study used a quasi-experimental design of non-equivalent control group type to evaluate the effectiveness of using Sijil Vokasional Malaysia (SVM) e-module prediction question on the achievement of students in the electronic technology course at vocational colleges. This design involved two groups of students who differed according to their year of study. The first group consisted of students in the year 2024 who followed the course without using e-modules, while the second group consisted of students in the year 2025 who used e-modules during the learning process.

The examination results for the group of students in the year 2024 were used as pre-data (control group), while the examination results for the group of students in the year 2025 were used as post-data (experimental group) shows in Table I. Both groups used the same tests and syllabus, to ensure equivalence in terms of assessment content. This design allowed comparisons to be made between two groups of students exposed to different teaching methods to identify the extent to which the use of e-modules affected the academic achievement of students.

TABLE I: QUASI-EXPERIMENTAL DESIGN OF NON-EQUIVALENT CONTROL GROUP TYPE

| | | |
|---|---|---|
| Control group | Year 2024 | Pre-test (Without e-module) |
| Experimental group | Year 2025 | Post-test (E-module) |

The experimental group was exposed to e-module teaching learning. While the control group was not given treatment. The teaching learning methods of the control group were implemented according to conventional learning methods. The period of time that the researcher will implement for the post-tests is only two months (Ngasiman, 2013).

### *Sampling Study*

The teaching process sample selection is very important in a study because it will have a positive impact on the researcher. According to Ghafar and Najib (2003), the population is a group of people who have similar characteristics. The researcher has set the necessary criteria to conduct this study. Although this design does not involve the same students for both groups, it is still appropriate to use in the context of a real educational study due to ethical and logistical factors. However, the researchers are aware that there are possible differences in individual characteristics between the 2024 and 2025 cohorts that could influence the results of the study. Therefore, emphasis is placed on the equivalence of the instruments and learning content to minimize the effects of these extraneous variables.

## V. FINDINGS

A total of 49 students were involved in the pre-test and post-test. 21 students were in the control group and another 28 students were in the experimental group. The analysis of pre and post results based on data collected shows in Table II.

**TABLE II: THE ANALYSIS OF PRE AND POST RESULTS BASED ON DATA COLLECTED**

| Year | Type of Test | Number of Students | A- (89-80) | B+ (79-70) |
|---|---|---|---|---|
| 2024 | Pre-test (Without e-module) | 21 | 16(76.2%) | 4(19.0%) |
| 2025 | Post-test (e-module) | 28 | 25(89.3% | 3(10.7%) |

The study findings show an increase in student achievement after the use of the SVM e-module prediction question. In 2024, before the use of the e-module, 76.2% of students obtained an A- grade while 19.0% obtained a B+ grade. After the use of the e-module in 2025, the percentage of students who obtained an A- grade increased to 89.3%, and the percentage of students with a B+ grade decreased to 10.7%. This finding shows that the e-module has the potential to increase student mastery of Electronic Technology courses at Vocational Colleges.

**TABLE III: THE SUMMARY MODEL**

| Model | R | *R Square* | *Adjusted R Square* | Estimated Standard Error |
|---|---|---|---|---|
| 1 | 0.831 | 0.691 | 0.640 | 0.196 |

*a Predictors: (Constant), Functionality, Content, Design*
*b Dependent variable: Motivation*

Table III above shows the results of regression analysis involving three variables, namely the design, content and functionality of the SVM prediction question e-module for students of the Electronic Technology course as a teaching aid. Overall, the predictor variables (variants) contributed 69.1 percent (R2 = 0.691) to the variance in student achievement at Vocational Colleges based on motivation level.

**TABLE IV: ANOVA**

| | Model | Square Number | df | Square Mean | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1.554 | 3 | 0.518 | 13.439 | < 0.001 |
| | Residual | 0.694 | 18 | 0.039 | | |
| | Total | 2.248 | 21 | | | |

*a. Dependent variable: Motivation*
*b. Predictors: (Constant), Functionality, Content, Design*

As for questionnaire, regression was conducted to predict student achievement at vocational colleges based on the level of motivation (dependent variable) from the design, content and functionality of the e-module predictive question (predictors). The variables used in this study were significant in predicting the level of student motivation towards the use of the e-module predictive question for students of the electronic technology course at vocational colleges. This was evidenced by the value of F (3,18) = 13.439 with a significant value of $p < 0.001$, which indicates that at least one of the predictor variables (design, content and functionality) made an effective contribution to student motivation as shows in Table IV.

**TABLE V: COEFFICIENT MODEL**

| Model | Variable | B | Std Error | Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 1 | (constant) | 0.715 | 0.494 | | 1.449 | 0.165 |
| | Design | 0.295 | 0.267 | 0.26 | 1.106 | 0.283 |
| | Content | -0.056 | 0.22 | -0.057 | -0.253 | 0.803 |
| | Functionality | 0.543 | 0.161 | 0.668 | 3.379 | 0.003 |

Based on Table V, the design variable was found to have no significant relationship with student motivation, (B = 0.295, RP = 0.267, t = 1.106, p = 0.283). This shows that changes in design do not have a significant effect on the e-module prediction question on student achievement in vocational colleges based on the level of motivation.

Next, the content variable also shows a non-significant relationship on student motivation, (B = -0.056, SE = 0.220, t = -0.253, p = 0.803). This result shows that the content does not have an effect on the effectiveness of the e-module prediction question on student achievement in vocational colleges. Therefore, it shows that these two factors are not the main determinants of the effectiveness of the e-module prediction question on student motivation in the context of this study.

On the other hand, the usability variable was found to have a positive and significant relationship with student motivation, (B = 0.543, SE = 0.161, t = 3.379, p = 0.003). This indicates that the better the usability of a platform or system, the higher the level of motivation of students at vocational colleges to use it. Therefore, for every one unit increase in the usability score, the level of user motivation will increase by 0.543 units.

## VI. DISCUSSION

The findings of this study indicate that the use of the e-module predictive question significantly improved students' academic achievement in the electronic technology course at the vocational colleges. The analysis revealed that students who used the e-module demonstrated a much greater improvement in their test scores compared to those who did not. This difference clearly demonstrates that the implementation of the e-module contributed to enhancing students' learning performance. The improvement may be attributed to the interactive features of the e-module, which allowed students to engage in self-directed learning, repeated practice, and instant feedback features that are often limited in traditional classroom instruction.

The regression analysis further supports these findings by identifying the key factors that influenced student motivation in using the e-module. The results of the regression test showed that the predictors design, content, and functionality collectively made a significant contribution to predicting student motivation, as evidenced by F (3,18) = 13.439, $p < 0.001$. However, when each variable was examined individually, only functionality demonstrated a significant and positive relationship with student motivation (B = 0.543, t = 3.379, p = 0.003).

The evidence from this study reinforces that when students can easily interact with and navigate the e-module, they are more likely to be motivated, attentive, and proactive in their learning process. Therefore, it can be concluded that the effectiveness of the e-module predictive question depends largely on its usability rather than solely on its design or content. Overall, the integration of a well-functioning and user-friendly e-module has proven to be an effective strategy in promoting both academic achievement and learning motivation among students in the vocational education context.

## VII. CONCLUSION (OR LIMITATION OR SUGGESTION FOR FURTHER STUDIES)

Future studies should consider expanding the current model and exploring additional variables that may affect e-module effectiveness. In the conclusion, this study contributes to the growing body of knowledge on the effectiveness of e-modules in vocational education, emphasizing the dual importance of motivation and academic achievement as essential components of

successful digital learning. By integrating motivational theories and achievement-driven pedagogical designs, e-learning systems can better support vocational students' engagement, performance, and lifelong learning potential.

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