Impact of e-Book Operating Systems on Motivation and Academic Performance Among Different Cognitive Styles in Department of Information Technology at Politeknik Seberang Perai

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Abstract

The research seeks to evaluate the efficacy of using the e-Book Operating System in terms of motivation, performance on achievement tests, and cognitive load experienced by students. The purpose of this study was to examine variations in motivation levels among students with varying levels of knowledge, establish the correlation between motivation and achievement test scores, and ascertain whether cognitive burden acts as a mediator between student motivation and test performance. The assessment was carried out by administering before and post tests using the Instructional Materials Motivational Scale (IMMS) survey questionnaire and the NASA Task Load Index cognitive load test (NASA-TLX). The research uses experimental quasi-methods to collect data, which is then subjected to quantitative analysis utilising pairs-t tests and PLS-SEM. Seberang Perai Polytechnic has a cohort of 80 students enrolled in the subject Operating Systems for the first semester. There are notable disparities in the accomplishment test scores, motivation levels, and cognitive load of pupils before and after using the e-book Operating System. The pair-t test findings indicated substantial disparities in achievement test performance across children, with t-values of -11.515 (p=0.000) and -12.729 (p=0.000). Prior to and following the utilisation of the E-Book Operating System, there was a substantial disparity in motivation levels among students. This was evident both before (t=-158.650, p=0.000) and after (t=-158.796, p=0.000) the implementation of e-books. Furthermore, motivation exhibited a significant correlation with students' academic progress (t=5.597, p=0.00). The analysis reveals that cognitive strain serves as a substantial mediator between motivation and student achievement test performance (β:0.106, t:4.904, p=0.00). To summarise, the e-Book Operating System serves as a viable option for enhancing teaching materials. It may be used as a comprehensive resource for the study of operating systems, while also stimulating student engagement and academic performance. Essentially, this strategy may be used as a tool for teaching and assisting instructional material creators in selecting suitable applications and adapting to various kinds of learning, particularly those based on e-books.

Keywords: Cognitive Level; Motivation; Operating System E-Book; Student Performance.

1.0 Introduction

Education is vital to the nation's long-term progress. Sirat (2012) claims that educational institutions are vital to achieving the national goal of top-tier education. Technical and vocational education (TVET) is also responding to the increasing rise of IT in education. Technical and vocational education teaches theory and practice. It targets students who want to learn more about this subject and develop new abilities. In engineering and vocational

education, teaching and learning emphasis on theoretical knowledge rather than practical application, like general education. Technical and vocational schools adopt examination-focused teaching methods, even as pupils struggle to learn new material. Salam and Ariffin (2020) states that each topic must be taught in a precise style to ensure student learning. For effective adaptation to changing times, adopt appropriate educational strategies and approaches. Technology may solve these issues. Teachers must master many teaching approaches to accommodate students' different learning styles, such as problem-based learning. They should also improve students' problem-solving, group collaboration, communication, responsibility, and active learning, increasing self-sufficiency.

Learning style is how a student perceives, engages, and navigates an educational environment. Students have auditory, visual, tactile, and kinaesthetic cognitive styles. Each kind needs materials that match their cognitive style. The cognitive talents of a learner affect how they interact with their surroundings. Personality traits like cognitive styles affect perspectives, values, and social interactions (Yahaya et al., 2018). Setiawan et.al. (2020) described style as a person's thinking, remembering, and problem-solving manner.

Teaching that is only teacher-centred and conventional is rude and does not meet the needs of today's learning (Mortensen & Nicholson, 2019). Most teachers use static methods of enlightenment and learning activities, i.e. using the same activity at each learning session and excluding the diversity of learning capabilities. The use of teacher-centric learning methods makes students passive and the type of interaction more of a day-to-day interaction. On the other hand, if a student-centred teaching approach is used, then the learning process will become more active because the student is fully engaged in learning activities, while the teacher acts as a facilitator and guide to the implementation of learning activities so that learning results can be achieved effectively.

According to Subari et al. (2021) to this day most professors have not been able to present their teaching effectively, so many students in higher education institutions are not interested in studying. One of the main reasons for the decline in academic achievement of students is that they fail to adjust to the way of teaching and learning in addition to not having the right learning style (Awang, 2020). The method of chalk and talk used by educators using blackboards is boring and less effective in giving understanding to students. The problem arises when the student's learning style cannot be adapted to the activities and teaching style of the teacher.

Failure of this traditional method will burden students with self-learning activities outside of class time to understand what they have failed to gain in class. Because the reference material for these subjects is also in the form of static media and the content of the lesson is beyond the limits of existing knowledge, the cognitive burden of the student will increase throughout the process of self-learning. Excessive loads in working memory will result in

information leakage and information that is difficult to record in long-term memory throughout the activity. As a result, students get bored and don't concentrate; they fail to score high on the exam, lose interest in a particular subject and then give up.

2.0 Methodology

A pre- test experiment group was formed as part of the research project, which was carried out utilizing quasi-experimental methods for the design of the experiment (Chua, 2016). The experimental quasi-method was selected since it involved selecting sample criteria that had essentially identical features without making use of processes that involve random distribution. In order for this strategy to be successful, the polytechnics have separated the students into groups that correspond to their respective class groupings. The researchers decided to utilize this particular design for their study because samples were taken from classes that were already in existence, and there was no change made to the sequence in which students were enrolled in those programs.

According to Creswell (2016), the quasi-experimental approach to execute the pre and post-test design approaches, divide current student groups into treatment groups, administer pre-examinations, perform experiments, and then administer post-test. There are two objectives in this study which are:

i. Identify the relationship between motivation and student achievement test performance after learning using the e-book operating system.
ii. Identify whether the cognitive burden is a mediator of the relationship between motivation and student achievement test performance after learning using the e-book operating system.

3.0 Result & Discussion

In Table 1, H[1] has significantly predicted cognitive load to be a mediator of the relationship between student motivation and test performance (Figure 1).

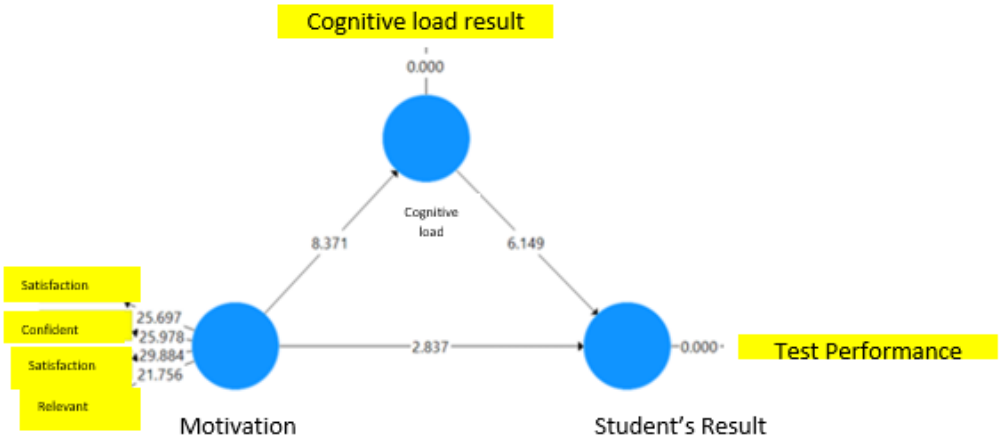

Figure 1: Analysis of cognitive load as a mediator

The results of the analysis showed (Table 1) that cognitive overload is a mediator between the relationship of motivation and student performance at significant values (β:0.106 *t*:4.904, *p*=0.00). This is because, according to

conditions from Hair et al. (2021) and Ramayah et al. (2020), the t-value should be above 1.96 and the p-value should be less than 0.05. The findings of this study indicate that motivated students need other factors such as cognitive burden to help improve their score achievement. Therefore, hypothesis H^1 for the fourth study question is accepted.

Table 1: The results of the cognitive overload hypothesis are a mediator to student achievement

H^1	Beta	Standard Deviation	t-value	p-value	Result
H^1: Motivation → Cognitive Burden → Student Achivement	0.106	0.022	4.904	0.000	Accepted

Once the measurement model is valid and reliable, then the next step is to evaluate the structural model analysis (Figure 2). Structural models are elements that have a frame that are combined with each other. The relationship between these frameworks is determined on the basis of previous theories that have explained the relationship. However, the formation of the structural model of this study is based on the consolidation of coupling theory and previous study models that have not been proven. Therefore, the evaluation of this structural model should be carried out to obtain information about the relationship between the constructs, namely the path coefficient (t-value and p-value)

Figure 2: Structured Model for student motivation and achievement

Path coefficient (β) used to describe the relationship between constructs. To test the significance of the path coefficient, this research has applied the standard bootstrapping procedure with 5,000 samples (Hair et al., 2020; Ramayah et al., 2020). The p-value also needs to be below 0.05 in order for it to be proven to be significant. In this research, the t-value used is based on a confidence level of 95% and a t-value equal to 1.96.

Table 2: Hypothetical results of student motivation and achievement

H^2	Beta	Standard Deviation	t-value	p-value	Result
H^2:Motivation→Student Achivement	0.247	0.044	5.597	0.000	Accepted
H^2:Motivation→Student Achivement	0.247	0.044	5.597	0.000	Accepted

Based on the results of the analysis of studies that have been conducted (Table 2), it was found that the motivation construct has a significant

relationship with the student achievement construct with the value of t = 5.597 and p = 0.00. This is because according to the terms of Hair et al. (2021) and Ramayah et al. (2020), the t-value needs to be above 1.96 and the p-value needs to be less than 0.05. This means that motivation can help in the improvement of student achievement tests. Therefore, the H^2 hypothesis in this third study question is accepted.

4.0 Conclusion

This study investigates the efficacy of using e-books to enhance motivation, cognitive load, and academic performance among students enrolled in an operating system course. Diversifying and adapting teaching and learning methodologies is essential to mitigate student boredom during classroom instruction. There is no universally superior teaching and learning strategy that can be applied to every setting in a classroom. The disparity in the classroom environment necessitates the expertise of the instructors to effectively manage the class. This issue pertains to the students' capacity to comprehend the teacher's intended message throughout the process of instruction and learning.

Hence, it is important to thoroughly explore and effectively address this issue to avoid students from experiencing a lack of information and direction. Comprehensive information, comprehension, and collaboration from all stakeholders are crucial for the successful implementation of optimal learning and teaching practices at the polytechnic level. The study of research investigating the correlation between motivation and student accomplishment test performance, after learning using an e-book operating system, revealed that motivation may enhance student achievement test performance. Consequently, motivation has a significant impact on student accomplishment.

In the upcoming research, cognitive load serves as a mediator in the connection between motivation and student accomplishment test performance, after the utilisation of a learning system that operates via e-books. The study's findings indicate that cognitive overload acts as a mediator in the link between motivation and student performance, with a considerable impact. The results of this research suggest that motivated students need additional elements, such as cognitive strain, to enhance their academic performance.

Furthermore, the results also provide a unique contribution to the advancement of instructional materials, learning via simulation, and the exploration of novel information. The following section of subtopics provides a detailed description of each of these individual contributions. The results also inform students that they possess the capacity to enhance their critical thinking skills in relation to real-world contexts. By using electronic operating system e-books, students may effectively use critical thinking skills in practical scenarios, as shown in this study (Berge, 2020). This assistance aims to enhance students' academic performance, therefore providing them with additional incentive with the use of entertainment-based learning support.

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Author Contributions
N.I. Omar: Conceptualization, Abstract, Introduction, Discussion, Conclusion, Data collection, Methodology, Result and Editing; **M.N. Ibrahim**: Result, Discussion and Writing-Reviewing.

Conflicts of Interest
The manuscript has not been published anywhere else and is not being considered by any other journals. All authors have authorized the review, agree with the submission, and state that they have no conflicts of interest in the work.

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