

Teachers Perception on Implementing a Problem-Based Learning E-Module in Mathematics

Vimala Devi Subramaniam., Murugan Rajoo

Department of mathematics, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris,
35900 Tanjong Malim, Perak, Malaysia

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ABSTRACT

COVID-19 was officially recognized as a pandemic in mid-March 2019. It has impacted on the social and economic activities of the nation, especially in the education system. To curb the spread of the coronavirus, many countries enforced restrictive measures aimed at limiting social gatherings and promoting social distancing among individuals. Schools, as well as higher education institutions, were shut down and shifted from conventional learning to electronic learning methods. It can be noted that globally, there is an increase in E-learning modules as the COVID-19 pandemic impacts. Hence, this research focuses on the perception of primary school mathematics teachers on implementing a Problem-Based Learning (PBL) E-module in mathematics classrooms. This research utilized an online questionnaire (google form) involving 52 respondents of primary school mathematics teachers from the state of Negeri Sembilan. The current research also found that the PBL approach allows students to create new insights into real-world mathematical problems. It was concluded that the E-modules were able to minimize students' dependencies on teachers in the classroom while engaging students in electronic-based learning methods during any unpredicted situations.

Keywords: E-Learning, COVID-19, E-Module, Problem-Based Learning, Mathematics.

INTRODUCTION

The COVID-19 pandemic impacted all sectors with regard to the economy as well as social activities worldwide, affecting developing countries nations worldwide [1]-[4]. Prior to this unpredictable condition, all the schools and higher education institutions were shut down and moved to technology-based learning. Technology is vital during the pandemic, given the advancement of technology and the widespread use of the Internet, transforming communication methods and brought significant changes across various fields [5]. Concerning the education sector, electronic-based learning methods have proven to be an essential tool for conducting online teaching and learning (TnL) during the pandemic. This approach was adopted regarding the social distancing guidelines, which were strongly recommended by the World Health Organization (WHO) to reduce the spread of the coronavirus [6]. In Malaysia, the government implemented a Movement Control Order (MCO) to restrict the spread with regard to COVID-19. However, despite the challenges posed by the pandemic, the TnL process continued to take place [7]. Thus, the E-learning system took over the traditional TnL process.

E-learning has firmly established itself, particularly within the framework of the modern education system. The E-learning method is found beneficial for the new generation, which has advanced knowledge of ICT and aims to fulfill their modern way of thinking [8]. E-learning has been steadily expanding each year, offering numerous benefits such as flexibility, easy access to the Internet as well as cost efficiency [9]. Following the onset of the COVID-19 pandemic, educational institutions worldwide transitioned from traditional learning methods to technology-driven education [10]. These benefits have the potential to turn education into a continuous lifelong learning experience.

The COVID-19 pandemic further highlighted how digital networks and technologies are enabling diverse communities all around the world to become more connected. One of the main priorities of UNESCO's

education sector initiatives has been to promote a feeling of shared humanity and community [11]. The pandemic served as a reminder that we may no longer take for granted the assumption that education will be constant in the future and that learning will always be ongoing. The planned, structured curriculum needs to be modified to accommodate the new reality of uncertainty [12].

Problem-Based Learning and Mathematics

Problem-Based Learning (PBL) refers to an instructional approach where the learning process is driven by problems. In this approach, learning starts with a problem that needs to be solved, and students must acquire new knowledge to address the problem effectively. Instead, it focuses on students interpreting the problem, finding a single correct answer, collecting necessary information, exploring possible solutions, assessing these solutions, as well as drawing conclusions. Advocates with regard to mathematical problem-solving argue that students can become proficient problem solvers by mastering mathematical concepts. Furthermore, when students successfully manage their own learning, it enhances their ability to solve mathematical problems effectively [13], [14], [15]. This is supported by a study by Ojaleye [16], which stated that students' accomplishment was improved when the PBL strategy was used in the mathematics classroom [16].

Many studies suggest that the PBL strategy should be integrated into the TnL process across various subjects, which include Mathematics. Note that Mathematics is a compulsory subject at all educational levels, from primary school to university, yet many students struggle with it due to its abstract nature [17]. Moreover, past research has discovered that students find it challenging to understand the concept of mathematics. They memorize formulas without understanding the concepts of the topics, and they lack accuracy in assessing questions presented in narrative form [18]. Students should possess logical, systematic, as well as structural thinking abilities and a strong imagination. Provided that PBL is implemented in the TnL process, it is projected to enhance the student's mathematics competence [17]. Moreover, implementing PBL into online learning can motivate students to learn mathematics and improve their numerical skills [19].

METHOD

This research was carried out using a survey method, where an online questionnaire was distributed via Google Forms for data collection. The study's primary objective is to identify the perception of primary school mathematics teachers on implementing a PBL E-module in mathematics classrooms.

The population for this study consists of primary school mathematics teachers in Negeri Sembilan, Malaysia. For this study, a random sampling method was applied by distributing an online survey questionnaire to the national primary school teachers in Negeri Sembilan state. There were 52 teachers who responded to this survey. The primary aim with regard to this survey is to identify the teachers' perception of implementing a PBL E-module in mathematics classrooms.

An online questionnaire was created with Google Forms in order to allow the teachers to respond to the survey at their own pace. The primary goal of this research is to signify the teacher's perception of implementing a PBL E-module in mathematics classrooms. Moreover, when compared with typical paper surveys, this online method had a number of benefits, such as being paperless, eco-friendly, time- and money-efficient, and accurate in compiling respondents' responses and having practical ramifications.

Validity and reliability studies have been conducted throughout this study. It is essential for researchers to ensure the reliability as well as validity of the instrument before its use to guarantee the authenticity of the data. For this study, the instrument was validated by a group of experts, including specialists in elementary education, mathematics education, and language, to assess both its content and language.

A pilot study was performed to examine the instrument's reliability as well as improve the study items. The pilot study involved 32 primary school teachers and aimed to evaluate the reliability of the close-ended questionnaire using a 5-point Likert Scale. The reliability coefficient, represented by Cronbach's Alpha value, was 0.825 for all elements, indicating that the questionnaire has high reliability.

RESULTS AND DISCUSSION

There were 52 respondents answered the survey. Note that 21% of them were male teachers, and 79% of them were female teachers. The data collection was analyzed descriptively to drive the percentage values, mean values as well as Standard Deviations (SDs). Table 1 represents the mean values interpretations, adapted from [20].

Table 1 Interpretation of the Mean Value

Mean Value	Interpretation
1.00-2.33	Low
2.34-3.67	Medium
3.68-5.00	High

Table 2 presents that the teacher's perspective on implementing a PBL E-module in mathematics classrooms indicates a high level of agreement having an average value of 3.85 and an SD of 0.906, which signifies a strong consensus.

Table 2 Teachers' Perception on Implementing a Problem-Based Learning E-Module in Mathematics Classroom.

No	Items	Disagree (%)	Agree (%)	Mean	Standard Deviation
1	PBL, when used in learning mathematics, can enhance problem-solving skills among students.	9.6	90.4	3.73	0.940
2	Students can generate new knowledge of real-world problems in mathematics classrooms through the PBL approach.	9.6	90.4	3.73	1.005
3	The PBL approach enables students to apply their knowledge of data handling better.	9.6	90.4	3.73	0.931
4	Students can visualize mathematical problems and be efficient logical-thinker in the PBL classroom.	9.6	90.4	3.71	0.936
5	The PBL approach motivates students to learn mathematics.	9.6	90.4	3.71	0.936
6	Lack of interactive materials with integrated PBL.	3.8	96.2	3.83	0.944
7	E-Modules enable students to explore learning through an interactive method.	0	100	3.98	0.828
8	E-Modules are able to minimize students' dependencies on teachers.	0	100	3.96	0.839
9	E-Modules provides an alternative method of learning for students with an absenteeism problem	0	100	4.06	0.850
10	Using E-Modules in mathematics could improve learners' learning outcomes.	0	100	4.06	0.850
	Average	5.18	94.82	3.85	0.906

Note: the term “disagree” combines “strongly disagree” and “disagree”, while “agree” consists of “Moderately agree”, “agree”, and ‘Strongly agree’

CONCLUSION

It can be concluded that the primary school teachers in the study have a positive perception of implementing a PBL E-module in mathematics classrooms. Teachers also agreed that E-modules are able to minimize students' dependencies on teachers and can improve the learning outcomes of the students.

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