

Development and Assessment of The Think Module in Teaching and Learning Health Education Based on The Stem Approach For Year 5 Students

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Abstract

In the field of Science, Technology, Engineering, and Mathematics (STEM), there has been a significant focus in the world of education because it is seen as capable of meeting the educational needs of the present while bringing about new changes in the education landscape. The Ministry of Education Malaysia has placed primary emphasis on Science, Technology, Engineering, and Mathematics (STEM) in its efforts to prepare the younger generation for the requirements of the 21st century and to ensure an adequate workforce for the future. The Ministry of Education Malaysia (2018) has outlined that the STEM field plays a crucial role in cultivating 21st-century skills (KA-21) integration of STEM into the Health Education subject and is developed based on the Curriculum and Assessment Standard Document (DSKP) for Physical and Health Education (PJK) Year 5 revision in 2019 (Bahagian Pembangunan Kurikulum, 2019). This THINK module will be used by PJK teachers during formal classroom teaching to help them prepare lessons that align with the requirements of 21st-century learning and HOTS. The THINK module can serve as a guide and reference for educators to implement intervention activities for students at various achievement levels. Thus, the THINK module can be considered a reference that meets the criteria of being valid, trustworthy, and of high quality.

Keywords: Teaching Module, STEM, Health Education, Higher-Order Thinking Skills, 21st Century Learning.

Study Background

The National Curriculum aims to produce a balanced generation for the future of Malaysia, equipped with 21st-century skills. Students who master 21st-century skills, including critical, creative, and innovative thinking, are capable of competing on a global scale. These skills align with the six student aspirations outlined in the Malaysia Education Development Plan (PPPM). Therefore, the Ministry of Education Malaysia (KPM) has placed significant emphasis on the

elements of critical thinking skills within the framework of 21st-century skills in its efforts to prepare the younger generation for the demands of the 21st century, especially in the fields of Science, Technology, Engineering, and Mathematics (STEM). Kementerian Pendidikan Malaysia (2018) has outlined that the STEM field plays a vital role in cultivating 21st-century skills and Higher-Order Thinking Skills (HOTS) among students, and it has a direct relationship with these three elements.

One of the key initiatives contained within the Malaysia Education Blueprint (PPPM) includes strengthening the quality of STEM education and promoting Higher-Order Thinking Skills in 21st-century learning (Kementerian Pendidikan Malaysia, 2018). After examining student achievements in the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA), the Ministry of Education Malaysia justifies the need for Malaysia's education system to be aligned with efforts to ensure the effective implementation of Higher-Order Thinking Skills across all subjects in schools (Bahagian Perancangan dan Penyelidikan Dasar Pendidikan, 2020). Therefore, the introduction of STEM education supports the PPPM agenda, which suggests that teachers should use approaches that encourage student inquiry in teaching and learning.

Health Education is one of the components within the Physical and Health Education (PJPK) subject and the core subject package offered at the primary school level. The DSKP for PJPK has integrated the six pillars of the Standard Primary School Curriculum (KSSR) framework, combining knowledge, skills, and values while explicitly incorporating 21st Century Skills and Higher-Order Thinking Skills. Science and technology are key components within the KSSR framework, outlining the mastery of STEM concepts. One of the goals of the PJPK KSSR is to enhance the understanding of PJPK concepts through meaningful learning experiences and the development of skills, including 21st Century Skills and Higher-Order Thinking Skills (Bahagian Pembangunan Kurikulum, 2019). The primary objective of the PJPK subject is to produce knowledgeable, skilled, and value-oriented students with a positive attitude to maintain physical fitness and health (Jemaah Nazir, 2019). Therefore, the researcher has developed a STEM-based project (PBP) teaching module called the THINK Module to investigate the effects of using the THINK Module on the achievement and improvement of higher-order thinking skills among students from three types of primary schools: Malay- medium schools (SK), Chinese- medium schools (SJKC), and Tamil- medium schools (SJKT). The THINK Module will be translated into the medium of instruction used in the selected schools.

Description of the Study

The developed THINK module can contribute to and benefit various parties, including:

- i. The integration of STEM into the delivery of Health Education teaching and learning can engage students' interest in the learning process.
- ii. Expanding the collection of learning modules for the limited subject of Health Education.
- iii. Serving as a guide and reference for educators to carry out intervention activities for students.
- iv. Serving as a reference for other researchers interested in conducting studies in either the same field or different areas.

This study involves the development and assessment of the THINK module for the Year 5 Health Education subject, with the following research objectives:

- i. Identifying the need to develop the THINK module through the STEM approach for the Year 5 Health Education subject among Health Education teachers.
- ii. Assessing the suitability of integrating STEM into the topics of the Year 5 Health Education subject.
- iii. Determining the validity of the THINK teaching module based on the STEM approach for the Year 5 Health Education subject.
- iv. Establishing the reliability of the THINK teaching module based on the STEM approach for the Year 5 Health Education subject.
- v. Identifying the mastery level of Higher-Order Thinking Skills and 21st Century Skills using the THINK Module for the Year 5 Health Education subject based on school categories.
- vi. Comparing the mastery level of Higher-Order Thinking Skills and 21st Century Skills using the THINK Module for the Year 5 Health Education subject based on school categories.
- vii. Identifying the relationship between Higher-Order Thinking Skills and 21st-Century Skills.

Several research questions have been listed, including:

- i. What is the need for developing the THINK module through the STEM approach for the Year 5 Health Education subject among Physical and Health Education teachers?
- ii. How suitable is the integration of STEM into the topics of the Year 5 Health Education subject?
- iii. Does the THINK teaching module based on the STEM approach for the Year 5 Health Education subject have good validity?
- iv. Does the THINK teaching module based on the STEM approach for the Year 5 Health Education subject have good reliability?
- v. To what extent do students master and achieve Higher-Order Thinking Skills and 21st Century Skills using the THINK Module for the Year 5 Health Education subject, based on school categories?
- vi. Are there differences in students' mastery levels between Higher-Order Thinking Skills and 21st Century Skills using the THINK Module for the Year 5 Health Education subject, based on school categories?
- vii. Is there a relationship between students' achievement in Higher-Order Thinking Skills and 21st Century Skills using the THINK Module?

This study employs the Design and Development Research (PRP) approach, which is a modification of the Research and Development (DDR) model (Saedah Siraj, Muhammad Ridhuan Tony Lim Abdullah & Rozainee Muhamad Rozkee, 2020). The effectiveness of the module is assessed in terms of enhancing Higher-Order Thinking Skills (KBAT) and 21st Century Skills. The DDR research is divided into three phases: needs analysis, design and development, and usability evaluation. This methodology aligns with research conducted by Siti Rohana (2021) and Gandi, Mohd Ridzwan Che Rus, and Suriani Mohamed (2021), in which the researcher applies a design and development approach as follows:

Needs Analysis Phase: The researcher adapted the Discrepancy Model (Mckillip, 1987) during the needs analysis phase to assess the development requirements for the STEM-based THINK Module. Sample selection in the needs analysis phase began with the selection of four experts

to obtain content validity for the questionnaire as suggested by Lynn (1986). Subsequently, the researcher purposively selected 30 expert teachers to conduct a pilot study to assess the reliability of the needs analysis questionnaire. In the next stage, the researcher conducted a needs assessment survey involving 79 expert teachers.

Design and Development Phase: The researcher designed and developed the THINK module using the Sidek Module Development Model (Sidek and Jamaludin, 2005). This phase involved the development of the THINK module as well as other research instruments, including the Higher-Order Thinking Skills Test Paper and the M-21CSI questionnaire to assess KBAT and 21st Century Skills mastery. All of these instruments underwent a content validity assessment with expert consensus. A pilot study was conducted during this phase to assess the reliability of these instruments before administering them to the actual study sample.

Evaluation Phase: In this phase, evaluation is conducted to determine whether the learning activities can help students master Higher-Order Thinking Skills and 21st Century Skills. The research design used in this study is a pre-experimental method, specifically a one-shot case study, involving three groups representing three different school categories. Each group receives treatment, and dependent variables are measured to assess the treatment effects and the usability of the THINK Module.

Population and Sample

The sampling for this pre-experimental one-shot case study involves Year 5 students and PJK teachers. The study's sample includes Year 5 students and PJK teachers who meet the study's criteria in all three school categories Malay- medium schools (SK), Chinese- medium schools (SJKC), and Tamil- medium schools (SJKT) in the Central Seberang Perai District (SPT), Penang. Accordingly, one school from each category was selected through simple random sampling, and the study sample was chosen through cluster sampling. The researcher selected 3 teachers and 93 students for all three categories. The selection of students intact (meaning the teacher selects all students in their class who are taking the Year 5 Health Education subject) formed the basis for selecting student samples.

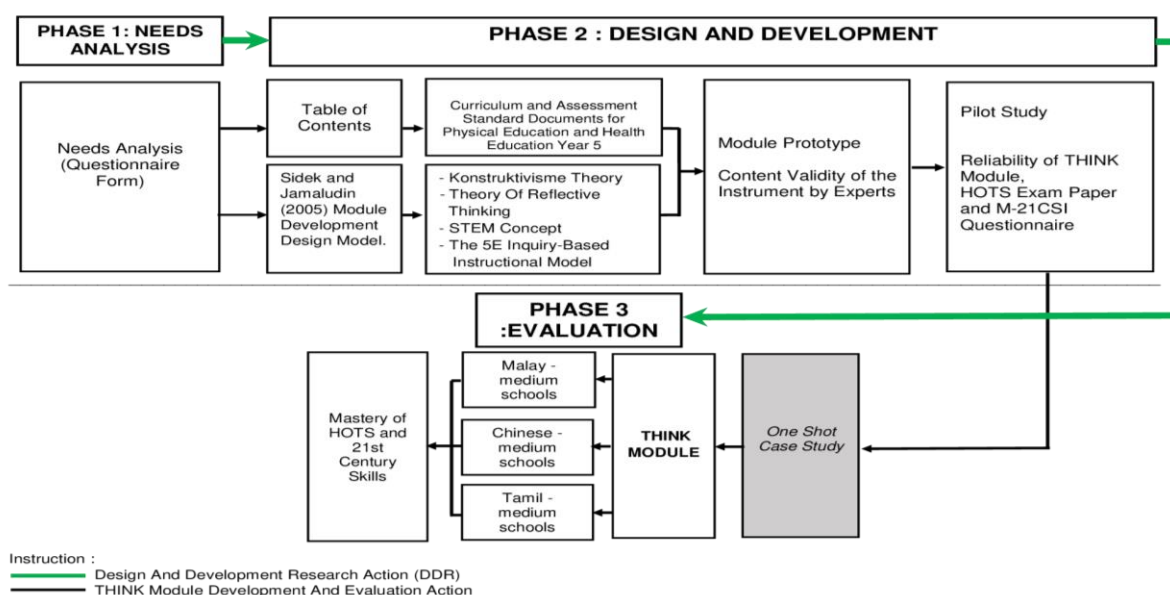


Figure 1: Conceptual framework of the study**Study Requirements**

The construction of this module took 10 months, including the needs analysis phase and the design phase, which required expert consensus for module construction. The effectiveness study, on the other hand, spanned 10 weeks, which is equivalent to 10 face-to-face hours and 9 sessions of video-sharing for teaching and learning all topics of Year 5 Health Education.

Conclusion

Before incorporating student-centered teaching and learning into their teaching methods, educators can employ a support tool known as modular teaching to make thorough preparations. These preparations involve ensuring readiness to utilize the latest teaching aids in alignment with 21st-century and HOTS pedagogical advancements. Encouraging a healthy lifestyle is also emphasized to nurture well-rounded individuals capable of global competitiveness. The establishment of a healthy lifestyle necessitates a deep understanding of health, fitness levels, and balanced dietary habits. Students who have studied health-related topics tend to possess more knowledge about health compared to those who haven't. Furthermore, the development of this module can bring about various advantages for multiple stakeholders. It can disseminate knowledge about healthy lifestyle practices within the community and furnish valuable insights to the Malaysian Ministry of Education for strengthening primary school curricular activities. Teachers can utilize this module as a resource and guide to implement interventions aimed at fostering student interest and expertise in maintaining a healthy lifestyle. Additionally, it can serve as a reference for other scholars pursuing research in similar or different fields.

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