

An Evaluation of the Implementation of a Science Project with the Application of the Engineering Design Process (EDP)

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This case study describes the evaluation of the implementation science project based on the curriculum standard of KSSM Form Two Science by applying integrated STEM education as a learning approach. The objectives of this study were to compare the actual and intended learning process and identify the strengths and weaknesses during the implementation process. Data were collected mainly from classroom observation and document review. This study revealed that the actual process did not fully match the intended process. Due to the second round of COVID-19 Movement Control Order (MCO), the school had to be closed and returned to online learning. Many of the students need to be assisted through online communication. The actual implementation process did not match the intended process. There was the initial excitement of students in the design challenge, and students presented their creative ideas. However, only 57.8% of the students persisted and completed, while the rest seemed to lack the motivation to persist through the task. The lack of resources, tools and material and the class setting may also contribute to the students' motivation. This evaluation helps identify the strengths and problems for further improvement by the teachers and school administrators. Several recommendations were given to improve further the implementation of a similar science project in the future.

Keywords: STEM education, Science project, Engineering Design Process (EDP), Implementation

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Designing a Computer Programming Curriculum for Beginners Using the Voting Theory and Mathematical Puzzles

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Computer programming education is a widely discussed topic. Mostly, people agree that it is very important; however, they have divided opinions on how the curriculum must be implemented and taught in a classroom. Scholars disagree on the age at which programming education should begin for students. This situation is very different from that of mathematics education, which has a long history; the implementation of the curriculum and teaching methods in mathematics education have changed negligibly over the last few decades. On the one hand, the mathematics education curriculum is similar in most countries; on the other hand, the programming education curriculum is significantly different. The authors believe that the status quo presents opportunities for teachers to experiment with various methods of teaching programming. One of the challenges of programming education at the beginner's level is that it is often boring to learn to use programming language commands. Twenty years ago, a simple calculation on the computer fascinated students; however, in today's world of sophisticated computer games, simple calculations or a display saying "Hello, World!" does not impress them. The authors propose a computer programming curriculum for students at the beginner's level that could be adapted for the advanced levels as well. This curriculum involves the use of mathematical puzzles and problems related to the voting theory in programming education. By using these problems at the beginner's level, students can solve mathematical puzzles easier than with pen and paper. Students can also understand the voting theory more clearly than they would when they learn from a textbook. These concepts could make programming fun and interesting. The authors are high school teachers and students. The students began to study computer programming using Python (an open-source programming language) and Mathematica (a software system that is free to use online) in April 2021.

Keywords Mathematical Puzzle, Voting Theory, Python, Mathematica