

STEM PROJECT-BASED LEARNING

by:

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The relevance of Science, Technology, Engineering and Mathematics (STEM) is recognized by educational institutions due to its great potential in supporting innovation and driving economic growth. The K-12 basic education program provides senior high school students in the academic track with an option to pursue STEM-related fields. This is key to increasing the number of enrollees and graduates of STEM-related courses at the tertiary level. Significant activities, interventions, and approaches are underway to boost student engagement in these subjects to improve teacher quality. STEM in basic education also aims to increase scientific literacy among students.

Project-based learning (PBL) is not new and it was introduced in the Philippines several years ago. John Dewey pioneered the introduction of PBL. It was also extended to problem-based learning (Merritt, Lee, Rillero, & Kinach, 2017). Over time, educators innovate and modified PBL through different interpretations and versions with students at the focus of instruction. PBL promotes authentic learning experiences that develop powerful and meaningful science, technology, engineering, and mathematics skills.

Project-based learning is often supported by research in the fields of arts, language, science, social science. PBL encourages teachers to design activities and simulations that will enable students to solve real-world or practical problems or mimic real-life situations. PBL allows students to use or integrate knowledge and skills from other subjects to solve problems. With proper design and implementation, PBL is deemed to be rigorous and flexible. One advantage that teachers can take is that it does not require a rigid lesson plan (Euefueno, 2019).

The project often starts with the selection of topics or problems. This can be assigned by the teachers or selected by the students. Solutions to problems can be found through observations or experimentations. Since PBL is flexible, projects can be assigned into groups or to individuals. It is advised to use grouping to maximize the social aspect of the approach. After topic selection, students move to crafting of the project plan which provides the details of investigation or steps that will guide them in solving the problem. Eventually, students conduct experiments, observations, collection of data, analysis of data and interpretations (Kızıkcapan & Bektaş, 2017).

STEM project-based learning is basically the integration of engineering design principles in the science basic education curriculum. This is not only limited to the usual science investigatory project. The integration of engineering design principles is very important because it makes learning instruction more practical. STEM PBL helps students in preparing for the tertiary level as it develops relevant skills and good study habits. Integration is a key aspect of STEM PBL since it uses connectivity among different subject areas. It also allows students to be challenged and motivated at the same time. Generally, STEM PBL promotes the use and development of higher ordered thinking skills (Euefueno, 2019).

With teacher innovation, STEM PBL can make learning more fun and exciting. The multi-disciplinary and social nature of PBL helps in the holistic development of a student. There is a strong need for educators and stakeholders to develop and implement STEM PBL instructional materials not only for the senior high school level but also in other levels of basic education.

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