PROJECT-BASED LEARNING (PBL): ENGAGING STUDENTS THROUGH REAL-WORLD CHALLENGES

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Abstract. The article is about Project-Based Learning (PBL) which is a teaching strategy that engages students in solving real-world problems, fostering critical thinking, problem-solving, and teamwork skills. Key components of PBL include driving questions, clear learning objectives, collaboration, and the use of technology. Projects culminate in tangible artifacts demonstrating students' learning. The article explains how PBL enhances academic performance and soft skills, particularly in STEM education, but presents challenges like time management and alignment with curriculum standards.

Keywords: Project-Based Learning, Critical Thinking, Problem-Solving, Collaboration, Educational Technology

One progressive teaching strategy called project-based learning (PBL) is intended to fully engage pupils in solving problems from the real world. Along with improving their comprehension, this approach sharpens critical thinking, problem-solving, and teamwork abilities (Thomas, 2000). The primary objective of PBL is to provide an environment in which students may use their knowledge and abilities in real-world situations, therefore preparing them for success in both their academic and professional lives (Musa et al., 2012).

Through projects emphasizing critical thinking, problem-solving, and teamwork—essential abilities in contemporary education—PBL engages students (Thomas, 2000). By giving students real-world assignments, PBL fosters deep learning and builds the soft skills required for success in school and the workforce (Musa et al., 2012).

PBL is distinguished from conventional teaching techniques by a number of fundamental components. Among them include the development of artifacts,

scientific methods, cooperation, driving questions, and explicit learning objectives. A key component of PBL, driving questions direct the learning process and concentrate student projects. They are designed to be difficult, open-ended, and relevant to topics in real world that students find important (Markula & Aksela, 2021). A leading inquiry in a science class would be, "How can we develop a sustainable water filtration system for our community?" Students are encouraged to investigate scientific concepts and put what they have learned into practice (Hasni et al., 2016). Because driving questions provide students a clear goal and ground the project in practical situations, they are crucial. Deeper research and ongoing investigation are encouraged by them. A leading inquiry in a history lesson would be, "What were the primary elements that contributed to the fall of the Roman Empire, and how can knowing these aspects help avoid similar collapses in current civilizations?" To develop thorough answers to these concerns, a great deal of study, critical thought, and group debate are required (Blumenfeld et al., 1991).

In PBL, learning objectives need to be clearly stated and in line with the curriculum to guarantee that students acquire both necessary skills and subject matter. Many times, these objectives involve knowledge particular to the topic and more general skills like cooperation and critical thinking (Thomas, 2000). One PBL course on renewable energy, for instance, may educate students about various energy sources and promote collaboration. Projects are kept focused and educationally relevant by learning objectives, which also help students remain on track and accomplish the intended results (Markula & Aksela, 201).

PBL in STEM education stresses including students in scientific procedures like questioning, investigating, and reporting findings. Students who do these exercises learn scientific ideas and procedures more thoroughly (Pedaste et al., 2015). In a biology project, for example, one may organize experiments to see how various fertilizers affect plant development, therefore promoting scientific investigation and useful problem-solving abilities (Novak & Krajcik, 2020). Because projects often need cooperation, communication skills, conflict resolution,

and the capacity to use other viewpoints are all fostered by collaboration in PBL (Blumenfeld et al., 1991). For example, a history project would have students collaborate on a multimedia presentation on a historical event, which would need task division, resource sharing, and cooperative synthesis of the results (Bestelmeyer et al., 2015).

Because technology offers means for research, teamwork, and presentation, it is essential to PBL. Computers, software, and internet resources all improve and increase the interaction of the learning process (Krajcik & Shin, 2014). Students may, for instance, utilize Google Classroom to exchange papers, work together on a project, and get instant feedback (Iftakhar, 2016).

Production of concrete artifacts that show students' learning and comprehension is the pinnacle of PBL. These artifacts might be models, presentations, reports, or digital goods (Blumenfeld et al., 1991). A chemistry project may, for example, provide a thorough report on the environmental effects of plastic waste along with a model of a suggested recycling method (Sahin, 2013).

According to research, PBL improves critical thinking, presenting questions, and teamwork abilities and results in higher academic performance than conventional education (Sasson et al., 2018). Furthermore improving interpersonal and intrapersonal skills is Kaldi et al. (2011). In tests of critical thinking and problem-solving, for instance, primary pupils in PBL environments do better than their counterparts in regular classrooms (Kaldi et al., 2011). PBL courses with a STEM emphasis help high school students become much better at planning and carrying out scientific experiments (Pedaste et al., 2015).

Implementing PBL, nevertheless, may be difficult. Project organization, time management, and enough support provision may be difficult for teachers (Tamim & Grant, 2013). PBL lessons may be designed and implemented by instructors with the aid of professional development and resources (Han et al., 2015). Furthermore improving the quality of PBL is teacher cooperation as well as that with outside partners (Aksela & Haatainen, 2019). For example, PBL was

designed and facilitated more successfully by Finnish teachers who took part in professional development programs (Aksela & Haatainen, 2019).

Another difficulty is to make sure PBL complies with curricular standards and standardized testing. Time for project-based activities may be difficult to allot since teachers may feel under pressure to cover a lot of material fast (Han et al., 2015). This may be addressed by creating PBL lessons that include necessary material and are in line with curricular requirements (Tamim & Grant, 2013). In order to teach important ideas and engage students in practical applications, a math teacher can, for example, create a PBL unit on geometry that entails creating and constructing a model playground. All things considered, PBL gives students chances to interact extensively with the material, hone critical soft skills, and use what they have learned in real-world situations. Through the integration of practical problems, technology, and teamwork, PBL equips students for the complexity of contemporary learning and work settings.

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