



USE OF PROBLEM EDUCATIONAL METHODS IN TEACHING TECHNICAL SCIENCES

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Abstract:

The article is about the importance and effectiveness of using problem-based learning methods in teaching technical sciences.

Keywords: Teacher, student, problem situation, method, problem education, trust, respect, education, independent.

When the educational process is organized on the basis of modern pedagogical technologies, there are a number of interrelated stages of knowledge acquisition. Situations such as giving a speech and expressing an idea in writing represent the levels of knowledge and understanding. At these levels, a creative approach is not required from the learner. At the next levels of mastering, students are required to apply their knowledge in practice, to obtain certain results, to complete, to enrich, to change, to have their own independent point of view. A problem-based approach is important for these mastery levels. The origin of problematic education.

Problem-based learning is a learning method introduced in 1969 at McMaster University in Canada. Later, this method was widely used in various disciplines such as management, engineering, agriculture and law. Howard Barrows was one of the academics who pioneered this method. Barrows et al. (1980) stated that this method focuses on learning activities that are useful in solving everyday life problems. It focuses on real problems and helps students understand real-life situations (Allen et al., 2011). This method also serves as a student-centered model lesson. The concept of the problem-based learning method is Kolb's theory, which emphasizes experiential learning, Piaget's theory, Vgotsky, Lave and Wenger, which focuses on constructivism and social learning, and other education, such as Sean's theory, which focuses on the reflective process. Is the result of theories. (Sadlo, 2007). The combination of these three theories constitutes the problem-based learning model. This method is also known as a form of education that allows students to think and do independent learning. Kitsantas (2013) states that this method helps students solve problems or problems presented using a variety of learning resources. In an educational context, teachers play a supportive role by providing students with guidance and relevant problems to solve. This means that students must actively search for and consider





other alternative solutions that are important in solving problems given by the teacher (Hmelo-Silver, Duncan, & Chinn, 2007). Teachers are required to properly plan lessons and set clear learning objectives. This is to ensure that the problem or problems are solved by the students. As Grant (2011) pointed out, this method is also able to increase students' motivation to study. This is because the approach focuses on teamwork, good communication between group members, problem solving and information seeking to solve problems or issues. In addition, students are responsible for their own learning and they must share responsibility among group members to solve this problem. At the same time, problem-based learning helps students to manage their learning time wisely because they have to complete the task given based on a certain time recommended by Grant (2011). Thus, Piaget (1983) suggested some key elements in using this method in the classroom, which are:

- 1) Students are given responsibility for planning their own education.
 - 2) The problem is the main key in this method.
 - 3) Teachers act as facilitators.
 - 4) Readers must reflect.
 - 5) Students should learn something in the process of solving the problem.
- Additionally, Graff and Kolmos (2003) listed nine key principles in this method:

- 1) The problem is the main element.
- 2) Student-oriented education.
- 3) Teachers play a role in creating real-life problems for students.
- 4) The problem should be related to everyday life situations.
- 5) Students show interest in the process of problem solving.
- 6) The basis of this method is educational activity.
- 7) The percentage of students' understanding of the topic is higher.
- 8) Cooperation between group members.
- 9) Active and reflective form of education.

In discussing the origins of problem-based learning, Boud and Feletti (1997) stated: Problem-based learning, as it is known today, was introduced 40 years ago in North America through innovative health science curricula. . Medical education, with an intensive pattern of basic science lectures and an equally comprehensive clinical training program, is inefficient and inefficient in the preparation of students, given the brilliance of medical information and new technology and the rapidly changing demands of future practice. Turned into an inhuman way. The medical school at McMaster University in Canada is not only a unique teaching method (Barrows & Tamblyn, 1980), but a whole school that promotes student-centered, multidisciplinary learning, and lifelong learning. Introduced as a central part of his





philosophy to create the curriculum. In summary, the concept of problem-based learning is a student-centered form of teaching that is based on real-life problems or issues. The problems or issues presented must be real, difficult, complex, and unexpected. In this method, the implementation of activities and approaches should be broad, but the evaluation should be based on specific criteria that assess the level of students' ability to apply high-level knowledge (Hmelo-Silver et al., 2007) . On the other hand, the implementation of this method can change the traditional educational paradigm to 21st century education. Thus, the quality of the education system increases together with other developed countries. Problem-based learning has been widely used in a variety of fields and educational contexts to promote critical thinking and problem-solving in authentic learning situations. His close association with workplace collaboration and interdisciplinary learning has helped him to reach beyond the traditional scope of clinical education to cover applied disciplines such as engineering, technical research, and engineering. With the growth and popularity of problem-based learning practices in various educational and organizational settings, the quality of student learning and its development of self-management habits, problem-solving skills, and in-depth disciplinary knowledge there is a growing number of studies examining the degree to which the outcome is achieved. Much of the previous research on problem-based learning has examined the curricular impact of this approach, and more recent research is needed to further explore how processes within problem-based learning lead to positive learning outcomes. This article reviews a number of studies on the effectiveness and impact of problem-based learning and how students learn in the process. In summary, Problem-Based Learning is a pedagogical approach that allows students to learn by actively engaging with meaningful problems. Students are given opportunities to develop independent learning habits through collaborative problem solving, building mental models for learning, and practice and reflection. Hence, the premise of problem-based learning is that learning can be considered a 'Constructive, self-directed, collaborative and contextual' activity. The principle of constructivism positions learners as active knowledge seekers and co-creators who use prior knowledge to organize new relevant experiences into personal mental representations or schemas. This is further reinforced by social theories of learning that promote the benefits of social interaction in cognitive development.





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