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### The Content and Pedagogical Potential of Project-Based Learning in the Training of Special Education Teachers

#### Abstract

*Introduction.* The study aims to analyze the content and pedagogical potential of project-based learning in the training of specialists in the field of special education. Project-based learning is recognized as an effective method that fosters the development of professional competencies in future teachers: Methodology and Methods. The research employed both qualitative and quantitative methods, including analysis of scientific publications, surveys among students and teachers, and observation of the educational process. The study was conducted at South Kazakhstan State Pedagogical University. *Results.* The findings revealed that project-based learning enhances students' deep understanding of the material, promotes critical thinking, and strengthens teamwork skills. It also positively influences learning motivation and readiness for professional practice, allowing for the integration of theoretical knowledge and practical skills. *Scientific novelty.* The research substantiates the role of project-based learning as an innovative teaching method with significant potential in special education teacher training, emphasizing its contribution to professional competency formation. *Practical significance.* The results can be applied in developing new curricula and teaching strategies aimed at improving the quality of teacher training for working with children with special educational needs.

*Keywords:* project-based learning, special pedagogy, professional competence, inclusive education, practical skills.

**Introduction.** In the current educational process, special attention is being paid to the preparation of specialists capable of working effectively with children with special educational needs. Special pedagogy, as a field of knowledge and practice, requires future professionals to possess not only deep theoretical knowledge but also practical skills. These skills can be developed through innovative teaching methods. One such method is project-based learning, which is increasingly being implemented in teacher training systems. Since this approach is based on students' active involvement in the project creation process, it fosters the development of critical thinking, creativity, and collaboration skills - qualities that are especially important for working in the field of special education (Petrovsky et al., 2018).

Project-based learning is a method in which students work on real-life problems and tasks, based on which they develop their own projects. This approach contributes to a deeper understanding of the subject, as students not only acquire theoretical knowledge but also apply it in practice. In the context of training special education teachers, project-based learning opens up new opportunities for future professionals to develop the skills necessary to work with children with special educational needs (Granado-Alcón et al., 2020). Moreover, recent longitudinal research with 143 preservice science teachers in Thailand showed that an 18-week project-based learning intervention led to statistically significant gains in all four dimensions of metacognitive skills (planning, monitoring, control, and reflection). Regression

analysis further indicated that exposure to project-based learning was a strong predictor of metacognitive development, even after controlling for academic level (Payoungkiattikun et al., 2025). Moreover, recent expert-based research in the field of inclusive digital education identifies project - and problem-based learning, as well as cooperative and service learning, as key pedagogical approaches that foster active participation, self-regulation, and collaboration among learners with special educational needs. The authors emphasize that integrating real-world projects with digital tools helps reduce barriers to participation and enables the effective implementation of differentiated instruction (D'Elia et al., 2025). A recent conceptual framework developed by international researchers emphasizes that the effectiveness of project-based learning depends on the intentional design of real-world tasks, continuous feedback, and structured collaboration, which together help optimize learning outcomes in diverse educational settings (Sánchez-García & Reyes-de-Cózar, 2025). A systematic review of 2015–2022 studies concludes that project-based learning consistently enhances students' problem-solving, creativity, and collaborative skills across different educational levels, confirming its relevance for modern teacher preparation programs (Yusri et al., 2024).

Likewise, research on initial teacher education across three universities in Portugal showed that the systematic use of project-based learning helped student teachers develop higher-order professional competences, including gathering and analysing data, making pedagogical decisions, working collaboratively, and demonstrating initiative and creativity. The authors conclude that project-based learning should not be treated as an isolated assignment but as a continuous element of teacher preparation (Tempera & Tinoca, 2023).

Current studies show that project-based learning significantly increases students' motivation and interest in the learning process. Unlike traditional methods, this approach prioritizes the development of student activity and independent thinking over memorization

and reproduction of information (Brown & Thomas, 2019). This is particularly relevant for preparing future teachers to respond effectively to various situations in their professional practice. Furthermore, PBL is increasingly regarded as a universal pedagogical approach that supports both neuropsychological development and students' social-emotional growth. Recent empirical work in project-based settings also demonstrates how learners co-construct and regulate metacognitive processes at the group level, highlighting the crucial role of socially shared metacognition in such environments (Lobczowski et al., 2021).

During project-based learning, students can work both individually and in groups, which helps them develop teamwork and communication skills. These skills are essential for successful work in the field of special education, where collaboration with colleagues, parents, and other professionals plays a crucial role. Furthermore, project-based learning supports the development of students' research and analytical abilities, which are necessary for designing effective educational programs and strategies for children with special needs. One of the key aspects of project-based learning is its focus on results. Students do not merely learn theory but create tangible products that can be applied in practice. These may include developing educational materials, designing rehabilitation programs, or organizing social projects aimed at supporting children with special educational needs and their families. This approach not only increases student motivation but also allows them to see the practical value of the knowledge and skills they acquire (Johnson & Johnson, 2018). Project-based learning is an important tool in the training of special education teachers. Its application contributes not only to improving the quality of education but also to preparing professionals who are adapted to the demands of modern society. This method requires further exploration and development, taking into account students' needs and the current demands of the educational process. It creates opportunities for the development of more effective and adaptive educational programs that promote the successful inclusion

of children with special educational needs into society.

One of the key statements on the importance of project-based learning in professional education is the following: “As a systematically organized activity, the project method plays a crucial role in the formation and development of future professionals’ competencies. This method is not only cognitive but also involves research and creative activities” (Kobernyk et al., 2022). This statement highlights the methodological significance of project-based learning. In the training of special education teachers, project activities not only enhance students’ cognitive engagement but also foster their scientific and research-oriented thinking. By designing programs or methods tailored to specific learners, future educators improve their professional capacities. One of the most important features of project-based learning is its adaptability to students’ individual needs. As noted in the works of Petrovsky et al., (2018), this method can be tailored to varying levels of student preparedness and interests, making it a universal tool in the educational process. Despite its many advantages, the implementation of project-based learning in the training of special education professionals faces several challenges. A major issue is the shortage of qualified instructors who can effectively apply project methods (Hmelo-Silver, 2004).

Additionally, the lack of material and technical resources necessary for organizing full-scale project-based learning remains a significant concern. As Thomas (2000) points out, many educational institutions are not sufficiently equipped with the resources required to support students in implementing their project ideas. Given these challenges, future research on project-based learning in the field of special education should focus on developing effective methodologies and technologies. Comparative studies evaluating the effectiveness of project-based learning versus traditional teaching methods are also needed (Lu, 2021). Moreover, attention should be given to training educators capable of integrating project methods into the learning

process. This includes not only improving the qualifications of current instructors but also preparing a new generation of professionals able to meet the demands of the modern educational landscape (Turcotte et al., 2022). Project-based learning remains a powerful tool for developing the professional competencies required in the field of special education. However, for successful implementation, it is necessary to address challenges such as the lack of qualified personnel and insufficient technical resources. Future research in this area can contribute to improving the quality of teacher training and, ultimately, enhance the educational support provided to children with special needs.

**Materials and Methods.** This section presents the methodology of a study aimed at exploring the content and pedagogical potential of project-based learning in the training of special education professionals. The research is based on a comprehensive approach that includes both theoretical and practical aspects to provide a deeper understanding of how project-based learning can be integrated into the professional training process. To achieve the research objectives, a qualitative method was chosen, as it allows for a deeper understanding of participants’ experiences and perceptions. In addition, both qualitative and quantitative approaches were combined. The study involved 150 students and 30 instructors specializing in the field of special education. Participants were selected from various higher education institutions. The research focused on the integration of project-based learning into the educational process, the challenges faced by participants, and the pedagogical potential of project-based learning. Observations were conducted during lessons where project-based learning elements were implemented. The observation was carried out based on the following indicators:

- 1) The level of student engagement in project work.
- 2) Teaching methods and techniques used by instructors;
- 3) Student interaction and collaboration.

This methodological section provides a comprehensive framework for exploring

the process of training special education professionals through project-based learning. The use of multiple data collection methods enables the formulation of scientifically grounded conclusions and recommendations. The study is planned to be further expanded and deepened in the future.

**Results.** The study identified several key challenges encountered by both students and

instructors in implementing project-based learning (PBL) in the training of special education professionals. According to the survey results (Table 1), lack of time was the most frequently reported difficulty, indicated by 34% of students and 45% of instructors. This demonstrates that time constraints remain a significant obstacle within the academic schedule.

**Table 1**

*Main challenges of project-based learning implementation*

Type of Difficulty	Students (%)	Instructors (%)
Lack of time	34	45
Difficulties in group work	28	22
Lack of planning/management skills	21	18
Assessment-related difficulties	17	15

Difficulties in group work were identified by 28% of students and 22% of instructors, suggesting that collaborative skills may need to be further developed through structured team-based tasks. Another notable challenge was the lack of planning and management skills, as indicated by 21% of students and 18% of instructors. Additionally, assessment-related difficulties were reported by 17% of students and 15% of instructors, highlighting

the need for clear and consistent evaluation criteria in project-based tasks. Before presenting the results, it is important to note how frequently different elements of project-based learning were applied during the observed lessons. The observation results are summarized in Table 2, which shows that group work was the most frequently implemented element, followed by student presentations and creative tasks.

**Table 2**

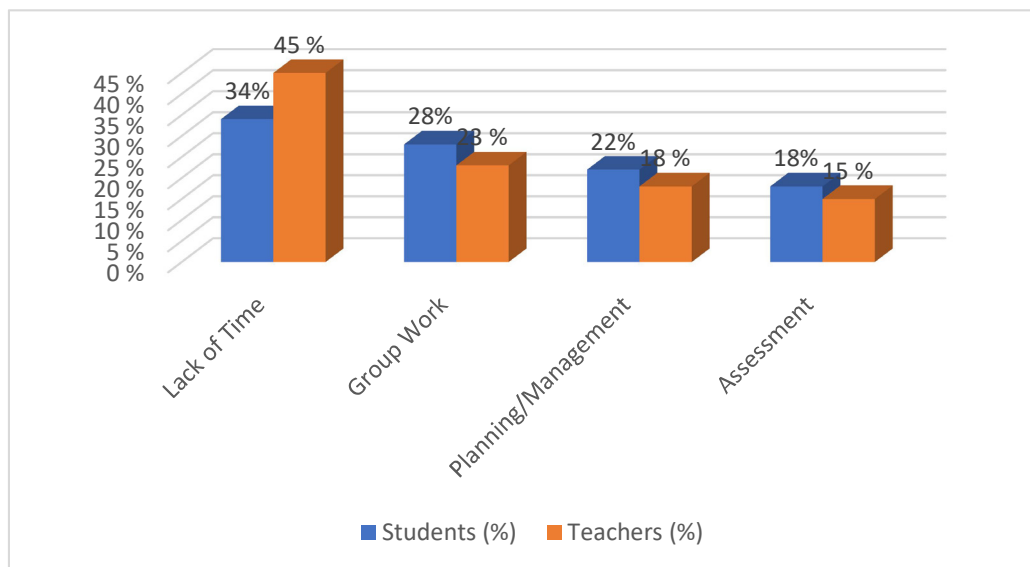
*Frequency of project-based learning element use (based on classroom observation)*

Project-Based Learning Element	Frequency of Use (%)
Group work	80
Presentations	72
Creative tasks	65

As shown in the table, group work was the most frequently applied element (80%), indicating a strong emphasis on collaborative learning. Presentations (72%) and creative tasks (65%) were also widely used, confirming the interactive and engaging nature of project-based learning practices. Figure 1 provides a comparative illustration of the challenges identified by students and instructors. The

most significant obstacle reported was a lack of time, with 34% of students and 45% of teachers highlighting this issue. Difficulties in group work were noted by 28% of students and 23% of teachers, while lack of planning and management skills was reported by 22% of students and 18% of teachers. Assessment-related difficulties were the least reported, cited by 18% of students and 15% of teachers.

**Figure 1**  
Challenges faced by students and teachers during project-based learning implementation



These findings clearly indicate that time constraints remain the most critical barrier to effective project-based learning implementation. Additionally, the results highlight the importance of strengthening collaborative

and management skills to enhance the overall effectiveness of the approach. The frequency of project-based learning elements used during lessons was examined. The results are presented below (Table 3).

**Table 3**  
Frequency of Project-Based Learning Elements Used During Lessons

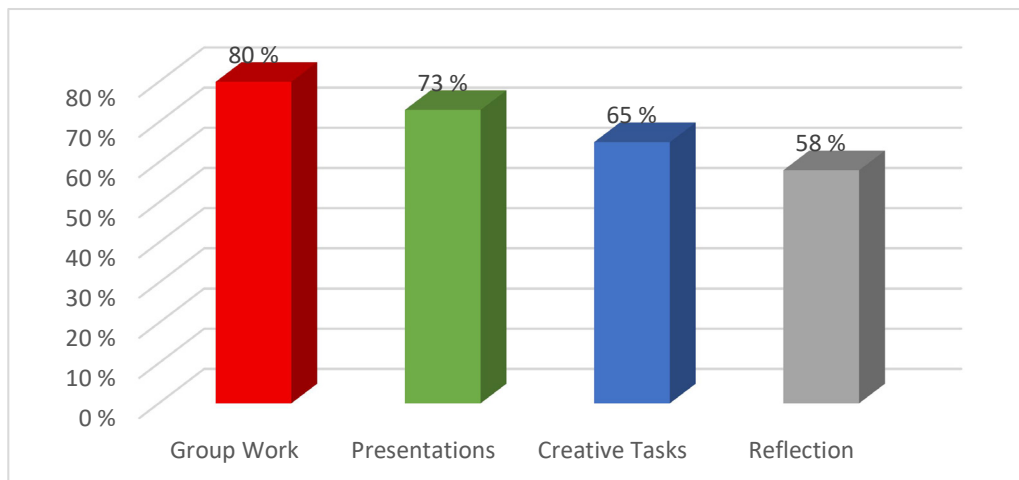
Project-Based Learning Element	Frequency of Use (%)
Group Work	80%
Presentations	73%
Creative Tasks	65%
Reflection	58%

As shown in the table, group work (80%) was the most frequently applied element. This was followed by presentations (73%) and creative tasks (65%). Reflection was observed in 58% of cases, indicating that although collaborative and creative elements are well integrated, reflective practices still require further emphasis. As illustrated in Figure 2, group work was the most frequently implemented

project-based learning element, appearing in 80% of the observed classes. Presentations were the second most common (73%), followed by creative tasks (65%). Reflection, while less frequent (58%), was still present in more than half of the lessons, suggesting that reflective practices are integrated but could be further emphasized in future training.

**Figure 2**

*Frequency of project-based learning elements observed during lessons*



As shown in Figure 2, group work was the most frequently applied PBL element (80%), followed by presentations (73%), creative tasks (65%), and reflection (58%). These findings provide a clear picture of the core components of project-based learning implemented in special education training. Overall, the results demonstrate that project-based learning is actively integrated into the training process of special education professionals, though certain challenges, such as time constraints and limited reflective practices, remain. These findings form the basis for further discussion regarding the pedagogical implications and potential improvements of PBL in teacher education.

**Discussion.** The results of the study highlight both the opportunities and the challenges of implementing project-based learning (PBL) in the training of special education professionals. The frequent use of group work (80%) and presentations (73%) demonstrates instructors' efforts to create collaborative and engaging learning environments. Such practices are consistent with the core principles of PBL, which emphasize active student participation, teamwork, and communication. These findings align with previous studies suggesting that group-based activities contribute to the development of social and professional competencies among teacher trainees (Thomas, 2000). However, the results also reveal several challenges that may limit the effectiveness of

PBL in special education training. The most significant obstacle identified was the lack of time, reported by 34% of students and 45% of instructors. This finding supports earlier research that emphasizes time management as a critical barrier to the successful implementation of PBL in higher education (Bell, 2010). Since project work often requires extended planning, coordination, and execution, academic schedules need to be adapted to provide sufficient opportunities for students to complete tasks effectively.

Another challenge concerns group dynamics. Difficulties in group work were noted by 28% of students and 22% of instructors, indicating that collaboration is not always equally successful. This reflects the need for structured approaches to teamwork, such as clearly defined roles, continuous monitoring, and the integration of conflict resolution strategies. Developing these collaborative skills is particularly important for special education professionals, who will frequently work in multidisciplinary teams involving teachers, psychologists, and parents.

Additionally, a lack of planning and management skills was highlighted by both students (21%) and instructors (18%). This suggests that PBL not only serves as a pedagogical tool but also as an opportunity to foster organizational and leadership abilities among students. Integrating explicit training in project management techniques could

therefore strengthen the effectiveness of PBL and prepare students for future professional responsibilities. Another noteworthy aspect concerns the relatively lower frequency of reflective practices (58%) compared to other PBL elements. Reflection is a crucial component of professional development, enabling future teachers to critically analyze their learning experiences and identify areas for improvement. Its limited use suggests that teacher educators should place greater emphasis on structured reflective activities, such as learning journals, peer feedback, and guided self-assessment.

Despite these challenges, the overall findings confirm the pedagogical value of PBL in the training of special education specialists. By integrating theoretical knowledge with practical tasks, PBL fosters deep learning, critical thinking, and professional identity formation. Moreover, it enhances motivation and prepares students for the complex realities of working with children with special educational needs. In summary, while time constraints, collaboration issues, and limited reflection remain significant obstacles, project-based learning demonstrates strong potential as an innovative teaching method in special education training. To maximize its effectiveness, educators should focus on creating flexible schedules, strengthening teamwork skills, incorporating project management training, and fostering reflective practices. These improvements will contribute to developing highly qualified and

motivated professionals who are prepared to meet the diverse needs of learners in inclusive educational settings.

**Conclusion.** The study confirmed the effectiveness of project-based learning (PBL) as a pedagogical approach in the training of special education professionals. The results demonstrated that PBL promotes the integration of theoretical knowledge with practical skills, fosters critical thinking, and enhances teamwork and communication abilities. At the same time, several challenges were identified, including time constraints, limited planning and management skills, and difficulties in collaborative work.

Despite these barriers, the active use of group projects, presentations, and creative tasks shows that instructors are committed to implementing PBL elements in their teaching practice. Importantly, PBL was found to contribute to students' motivation, professional readiness, and the formation of their professional identity. Overall, the study highlights the significant pedagogical potential of project-based learning for improving the quality of teacher education in special education. Addressing the identified challenges - particularly by strengthening time management, collaboration strategies, and reflective practices - can further enhance its effectiveness. The findings provide a solid basis for the development of curricula and teaching strategies aimed at preparing competent and motivated professionals to work with children with special educational needs.

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