орієнтирів і стратегій та планів розв'язування задач, що сприяє активізації пізнавальної діяльності учнів та формуванню у них відповідних інтелектуальних умінь та математичних компетентностей.

ЛІТЕРАТУРА

1. **Державний стандарт базової середньої освіти** (Затверджено постановою Кабінету Міністрів України від 30 вересня 2020 р. № 898). URL: http://osvita.ua/legislation/Ser_osv/76886/
2. Т.М. Засєкіна, М.Д. Тишковець. **Від «стандарту змісту» до «стандарту результатів» – концептуальні засади реформування загальної середньої освіти**. *Український педагогічний журнал*. 2021. № 4. С. 134-141.
3. О. В. Школьний, Є. П. Нелін, А. І. Миляник, Ю. С. Простакова. **Математика. 7 клас** : підруч. — Харків : Ранок, 2024 (ч.1 – 322 с., ч.2 – 306 с.)
4. Є.П. Нелін. **Математика (алгебра і початки аналізу та геометрія, рівень стандарту)** : підруч. для 10 кл. закл.серед. освіти. – Харків: Ранок, 2023. – 328 с.
5. .П. Нелін. **Алгебра і початки математичного аналізу (профільний рівень)** : підруч. для 10 кл. закл. серед. освіти. – Харків: Ранок, 2023. – 272 с.
6. Є.П. Нелін. **Геометрія (профільний рівень)** : підруч. для 10 кл. закл. серед. освіти. – Харків: Ранок, 2023. – 240 с.

INFLUENCE OF PROBLEM-BASED LEARNING ON THE DEVELOPMENT OF MATHEMATICAL COMPETENCE STUDENTS OF ECONOMIC SPECIALTIES

Larisa Norik
Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine

The approaches to implementing problem-based learning in the educational process, as well as the fundamental principles and specific features of its application in teaching mathematical disciplines for students in economic specialties, are considered. Conclusions are drawn regarding the impact of problem-based learning on the development of mathematical competence in future professionals in economics.

Keywords: problem-based learning, mathematical competence, critical thinking, modeling, interdisciplinary connections

The current stage of innovative development in the global economy intensifies the requirements for the level of training of qualified professionals in economic specialties. There is a gradual shift from information-accumulative technology in the educational process to a competency-based approach focused on acquiring skills applicable to solving real practical problems. In the article [1], competence is characterized, and an analysis of the global experience in implementing a competency-based approach to education and its consequences is conducted.

The development of the substantive component of professional training for economic specialists necessitates the development of innovative approaches to improving the methods and means of forming mathematical competence. This competence is one of the eight key competences identified in the Recommendations of

the European Parliament and the Council of Europe back in 2006. The modern economy requires professionals in economic specialties with a broad spectrum of knowledge, including mathematical skills. Therefore, research into methods capable of enhancing student's mathematical skills is relevant and important. Such research can be beneficial to both the academic community and practitioners in higher economic education.

In the midst of the war in Ukraine, educators persist in implementing innovative methods and employing modern interactive teaching technologies, effectively altering the dynamics of the student-teacher interaction. A pivotal aspect in acquiring new mathematical knowledge and skills is the utilization of problem-based learning (PBL), which entails learning through addressing issues related to future professional activities.

Assessing the impact of PBL on the development of student's mathematical competence can unveil new opportunities for enhancing the educational process and refining teacher-training methods, contributing to the effective implementation of this approach in higher education. The article [2] offers an overview of research by domestic scholars within the context of shaping the professional and mathematical competence of future economists. It identifies the need to implement a specific set of pedagogical conditions, with a priority on improving the content of professional training and problem-solving methods to foster student's critical thinking and ensure the development of cognitive skills. These conditions are characteristic features of PBL, which proves its relevance and importance today. The study [3] examines some approaches to the implementation of PBL and performs its own experiment of using the PBL methodology in solving problems of applied mathematics for a group of engineering students at a Portuguese university. In [3] determined that "PBL method is based on the premise that learning entails the construction of new knowledge to be acquired through the resolution of the proposed problem, which is supported by cognitive science theory, which states that prior knowledge about something can determine the nature and amount of information that students can process and elaborate in order to be assimilated". The experiment [3] demonstrated that in every instance of employing the PBL approach, both teachers and students must play an active role. This involvement is characterized by the commitment of both parties and, of course, demands a significant level of responsibility from the participating students. As stated in [4], this method fosters the development of critical thinking, problem-solving skills, and the application of theoretical knowledge to practical situations. The authors of the paper [4] presented the results of an experiment on the implementation of PBL in physics education. The obtained results indicate that 'the application of PBL in physics helped improve students conceptual understanding of physics, but engagement and time spent on this course were higher compared to traditional teaching in physics courses. In the study [5], an analysis of the use of PBL technology in school geometry classes was conducted, establishing the level of improvement in student learning

outcomes. The author of the article [6] described the results of involving students in mathematical research in the online PBL format, further substantiating the potential of this method.

Undoubtedly, the successful implementation of PBL depends on various factors such as the specific focus of students training, prevailing educational trends, the competency of teachers in applying innovative pedagogical approaches, their opportunities, and aspirations for self-development, as well as the level of interdisciplinary interaction.

Summarizing the existing approaches to PBL allows us to identify key principles that will contribute to the effective integration of PBL into the teaching of mathematical cycle disciplines for students in economic specialties.

These principles include:

providing tasks with a context related to the modern economic environment (e. g., determining optimal production strategies based on quantitative information about market demand, production costs, technological conditions, and data on competitors);

combining mathematical tasks with those from economic disciplines to enhance the practicality of mathematical tools (usage of concepts from marketing, finance, accounting, market competition);

promoting teamwork for solving and discussing mathematical aspects of tasks (organizing students into groups, each responsible for different aspects of the task);

fostering independence in learning, allowing students to develop their own ways of solving problems and choosing optimal solutions (independent studying the content component of tasks and working with various information sources);

providing feedback for giving students the opportunity to enhance skills and understanding (through consultations with experts in the field or teachers);

problem modeling, involving the construction of mathematical models for economic problems using a set of mathematical methods;

encouraging critical thinking through tasks that require reasoned decisions (stimulating discussion);

conducting a real assessment of knowledge (evaluating not only the correctness of solving problems but also the ability to analyze and use appropriate mathematical tools);

ensuring active participation in education (encouraging students to take action in the process of solving economic problems).

Thus, the utilization of PBL in teaching mathematical cycle disciplines to students in economic specialties will enable the demonstration of various mathematical tools in applied economic tasks. Concurrently, solving real-world problems will contribute to the development of students analytical skills and critical thinking – crucial elements of mathematical competence. It is also noteworthy that PBL establishes and strengthens interdisciplinary, complementary connections. This, in turn, enhances motivation to learn, as the educational experience becomes more engaging and meaningful for

students. The opportunity for team problem solving during PBL improves communication skills, a vital aspect of the learning process's effectiveness. Therefore, PBL emerges as a promising method for fostering the mathematical competence of future economists.

REFERENCES

1. A. Pidoprihora, Y. Khvorostina, M. Ostroha, "**Implementation of the competence approach in higher education through the prism of global educational practices**", Education. Innovation. Practice, Vol. 10(3), pp. 44–50, 2022, available at https://doi.org/10.31110/2616-650X-vol10i3-005
2. N. Pidlisnycha, "**Model of formation of professional and mathematic competence of future economists**", Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems, Vol. 52, pp. 384–389, 2018, available at https://vspu.net/sit/index.php/sit/article/view/5342/4767
3. S. Rézio, M. P. Andrade, M. F. Teodoro, "**Problem-Based Learning and Applied Mathematics**", *Mathematics*, Vol. 10(16): article 2862, 2022, available at https://doi.org/10.3390/math10162862
4. L. Marcinauskas, A. Iljinas, J. Čyvienė, V. Stankus, "**Problem-Based Learning versus Traditional Learning in Physics Education for Engineering Program Students**", *Education Sciences*, Vol. 14(2): article 154, 2024, available at https://doi.org/10.3390/educsci14020154
5. F. Bhary, M. Maswar, M. Atikurrahman, A. Afandi, "**Analysis of the problem-based learning (PBL) models on geometry material in improving students' mathematics learning outcomes**", Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika, Vol. 5(2), pp. 207–225, 2023, available at https://doi.org/10.35316/alifmatika.2023.v5i2.207-225
6. E. G. Manalaysay, "**Students' engagement in a mathematical investigation through online problem-based learning**", International Journal on Studies in Education (IJonSE), Vol. 6(1), pp. 51–66, 2024, available at https://doi.org/10.46328/ijonse.175

PRACTICAL CLASS IN HIGHER MATHEMATICS IN TECHNICAL UNIVERSITIES AND ITS STRUCTURE

Viacheslav Oleksenko
National Technical University "Kharkiv Polytechnic Institute", Kharkiv, Ukraine

The structure of a practical class in higher mathematics was studied. Rules for effective monitoring of students' performance of homework are proposed. In order to improve the quality of students' knowledge in practical classes, a self-analysis scheme by the teacher of the conducted class has been revealed.

Keywords: higher mathematics, control, practical class, structure.

At the technical university higher mathematics is studied at lectures and practical classes. At the same time, special attention is paid to practical classes. It is well known that a practical class is a training session in which the teacher organizes a detailed examination of the students of certain theoretical provisions of the discipline and forms