TEACHING PROBLEM SOLVING IN MATHEMATICS THROUGH TECHNOLOGY: OPPORTUNITIES FOR INTEGRATING THE NATIONAL CONTEXT

Ana Markozashvili
Iakob Gogebashvili Telavi State University 5th-Year Student of the Bachelor's and Master's Integrated Program of Primary Education:, Telavi Georgia

Scientific Supervisor: Professor Nino Nakhutsrishvili

Abstract

In the modern educational landscape, the integration of digital technologies has become an essential part of teaching. It promotes student engagement in diverse ways, enhances critical and creative thinking, and fosters active participation in the learning process. This paper highlights how the curriculum content of mathematics can be connected with national culture and real-life contexts in primary school education. Information and communication technologies and history are closely connected with mathematics. The article explores the importance of enhancing national consciousness through the use of technologies.

Global trends and national educational strategies require the purposeful use of digital technologies at all levels of instruction to spark interest in learning and increase student motivation. The starting point of today's educational approaches is the creation of a learner-centered environment, where the student is not a passive recipient of knowledge but an active participant in the learning process. According to this principle, teaching and learning should encourage the activation of inner potential, the construction of knowledge, the connection of prior knowledge and experience, and the development of learning strategies. Technologies transform the student from a passive listener into an active explorer and create opportunities for developing these competencies by taking into account their unique abilities, personal experiences, needs, and learning styles. On the other hand, mathematical knowledge and digital skills help students to acquire professional education and cope with the challenges of modern life. Feelings of national identity and citizenship also play a major role in building intelligent society, whose members understand public interests and are aware that they must persue their individual interests while acting with civic responsibility [1, p. 5]. For national identity and citizenship, feelings of belonging, attachment, and loyalty to society as a whole have a crucial part in the development of the country [1, p. 4]. Introducing national context into mathematical activities helps students see the connection between the subject and life. This can be ensured by integrating

technologies. Modern life fosters the expansion of national-patriotic education through the use of digital devices.

The circumstances were different in the Soviet Union's educational system. The pressure to cover all the theoretical material was so high that practical applications did not receive detailed attention [2, p. 44]. Students' individual learning needs and their pace of studying the material were largely ignored [2, p. 45]. The main requirements for the textbooks included communist ideology. Mathematics textbooks used in Georgian schools during the Soviet period incorporated Russian geographical and cultural elements, while the local, Georgian environment was almost completely absent. This shows that there was a lack of national context in the progress of teaching mathematics. The teaching materials were less connected to the everyday reality of students, which made it difficult to study the subject and strengthen national identity.

As already noted, nowadays technologies make it possible to enhance students' national consciousness. The purpose of integrating technologies into education is to improve the effectiveness of teaching and learning. The use of digital devices makes the teaching and learning process far more engaging. Involving various technological tools makes learning more dynamic and accessible, as it is adapted to different learning styles, students' abilities and their levels of readiness. This, of course, contributes to increasing students' motivation and stimulating their interests. The pandemic period clearly demonstrated the universality of technology use, as well as the necessity of virtual classrooms, discussion forums and collaborative activities. This period revealed the need for the active use of technologies in the learning process not only in similar situations but also, more generally, in everyday teaching and learning.

Teaching tasks that incorporate national context through the use of technologies helps students see the connection between mathematics, information and communication technologies, and history. Through a teaching process organized in this way, students develop logical and critical thinking as well as creative skills. This is closely related to Bloom's taxonomy of cognitive skills. This approach is particularly valuable from the elementary level, because in addition to the above, it increases motivation, interest and engagement in the learning process. At the same time, the student clearly sees the possibilities for using mathematical knowledge.

The integration of technology and national context into mathematics can be implemented through various activities while teaching problem-solving tasks. For example, students can solve tasks related to Georgia's cultural heritage, such as calculating the perimeter of a churchyard wall, determining the ages of Georgian kings and the duration of their reigns, or representing statistical data using tables or diagrams through PowerPoint or Canva. It is also possible for students to use GeoGebra to create

and present Georgian ornaments made from various geometric figures or to model monuments of cultural heritage. In addition, the teacher can present tasks to students using Padlet. By doing so, the teacher can view students' responses on their notebook without having to approach each student individually during the lesson to check their answers.

In the process of exploring this issue, I obtained interesting results from the small "experiments" I conducted at Telavi Public School No. 5. This concerned the topic of on fractions and proportions in 5th-grade mathematics, integrating national historical context. The aim was to increase student engagement and strengthen mathematical skills. 25 students were divided into two groups based on their interests: 11 students decided to solve textbook exercises on fractions and proportions, and 14 students searched the internet for historical data related to king Erekle II. Both groups consisted of students with high academic achievement as well as students with lower academic performance. Based on the collected information, student created and solved the following problems: king Erekle II's army at the Battle of Aspindza included approximately 1500 soldiers. If the army is divided evenly into 5 battalions, how many soldiers will each battalion have? If there are 12 fortresses and 1/4 are located in the western region, how many fortresses are in that region?

The first group solved the exercises more quickly and accurately, as they worked directly with structured textbook material. However, student engagement and motivation were significantly higher in the second group. The integration of technology and national context enhanced motivation and inquiry-based learning, while the cultural relevance of the tasks made them more meaningful for students. Overall, the second method proved especially effective, as it fostered critical thinking, problem-solving skills, and creativity.

No less interesting for the students was completing the following type of task, in which every student in the class participated. another activity was related to Georgian culture and technology. Students chose one painting by famous painter Pirosmani. They identified the main colors of "Fisherman in a Red Shirt" (red, black, white, yellow, blue, green). They estimated the fraction of the canvas covered by each color: black – 2/3, yellow – 1/8, red – 1/5, other – 1/8. Then students created a pie chart to show the color distribution using Google Sheets. The majority of students were actively engaged: 21 students (84%) participated actively. They completed all steps independently – identifying the main colors, estimating the fractions of the canvas, and creating a pie chart in Google Sheets. This task shows that the activity generated high engagement and interest among the students, highlighting the effectiveness of integrating technology and national culture into mathematical activities.

The activity also proved interesting and effective for the 6th-grade students. In this activity about Zacharia Paliashvili's music, five groups of musicians performed in his concert: 4 guitarists, 6 pianists, 3 violinists, and 2 percussion players. Using this information, the students made a table in Excel and used a formula to calculate what part of the total concert each group represented. They changed the answers into fractions, showing the share of each group in the whole concert. The majority of students were actively engaged: 20 students (80%) participated actively in all steps – collecting the data, creating the Excel table, using the formula, and converting the results into fractions. This shows that the activity generated high engagement and interest among the students, demonstrating the effective integration of technology and national context into mathematical activities.

The implementation of these activities in the 5th and 6th grades showed that students' interest in the learning process increases when performing activities in which the mathematical topic is integrated with technology and the national context. No less enthusiasm was generated among the students by the group task, which involved creating problems related to Georgian culture. To solve these problems, each group had to search for information and express ideas about how technology could be used to solve them. After presenting their tasks, the groups evaluated them according to several criteria: how well the task reflected information about Georgian culture, whether it was interesting and why, and whether the use of technology was considered appropriately for solving the problem. The students' interest and active participation clearly demonstrated the value of such tasks in the learning process.

Thus, modern information technologies shape the future of education and lay the foundation for the development of our world and for creating favorable conditions for human adaption to it. For Georgia, as an independent country, the strategic goal of education should be the preservation and development of the nation's cultural and historical traditions and values, as well as its integration into the global community, which naturally increases the demands on general education and brings new challenges. To address the challenges, it is necessary to combine existing pedagogical experience and scientific research with modern information technologies [4, p. 6]. Considering that teaching through traditional methods and approaches leads to a loss of interest and motivation among students, making them passive recipients of knowledge, it is highly valuable to introduce innovative approaches in teaching and learning, which enhance student engagement and motivation. An example of this can be seen in using various technological tools to deliver information, encouraging discovery-based learning, and supporting students in activity constructing their own knowledge. This paves the way for the development of students' independent and

collaborative work, logical and critical thinking, creative skills and presentation abilities. All of the above indicates that the issue is highly relevant and important, both for students' academic progress and for enhancing the effectiveness of teachers' pedagogical activity.

References

1. Mitaishvili-Rayyis, Y. (2023). Educational Reforms in Georgia: Past Progress and Future Directions https://gfsis.org/wp-content/uploads/2023/07/GSFIS_Educational_Reforms_Mitaishvili-Rayyis_July-5-1.pdf
2. Boyko, M. (2019). Soviet Mathematics Curriculum Reforms (1958-1985): Redefining the Purpose of Mathematics Education. https://share.google/qjTlEGuOZ6JSqY6tO
3. Machkhaneli N. (2023). Applying Bloom's Taxonomy in Practice. https://mastsavlebeli.ge/?p=36778
4. Chachanidze, G. Sartania, V. (2004). The technologies of Internet-Education and the Perspectives of its Development. Tbilisi.