VETechConn

Co-funded by the European Union

ERASMUS-EDU-2024-CB-VET programme

Elevating Vocational Education in Bosnia and Herzegovina and Montenegro through Collaborative Enhancement of VET Teachers

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Deliverable 2.1 Skills Gap Analysis Report

Responsible partner: Centar za stručno obrazovanje Podgorica

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PROJECT DESCRIPTION

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Summary of the VETechConn project

The VETechConn initiative is dedicated to enhancing the digital proficiency of vocational education and training (VET) teachers across Bosnia and Herzegovina (B&H) (in Sarajevo and Vogošća) and Montenegro (MNE) (in Nikšić and Podgorica), alongside educators from relevant vocational institutions (in Sarajevo, Zenica, Goražde and Široki Brijeg in Bosnia and Herzegovina and Podgorica in Montenegro).

This endeavor aims to empower these teachers by providing them with comprehensive resources and training materials accessible through a cutting-edge digital platform, symbolically named VETTechConn. Partner organizations from the Western Balkans (WB) countries will develop customized training programs with guidance and expert support from experienced partners from the European Union (EU), Croatia and Slovenia. Through this cooperation, WB organizations will expand their knowledge and competences, drawing on European best practices. This collaborative effort is geared towards bridging the gap between the evolving demands of the vocational education sector and the digital transformation challenges faced by vocational institution personnel. The project will carefully plan an integrated distribution of tasks throughout B&H and MNE, understanding the vital importance of its international implementation. Through this transformative initiative, which focuses on fostering digitally adept teachers and institutional staff, students will greatly improve their digital literacy. Consequently, this will increase their competitiveness in the job market and have a good impact on the socioeconomic environment of the entire community.

A key outcome of the project VETechConn is expected to be the qualitative improvement of teaching processes in vocational institutions in Bosnia and Herzegovina and Montenegro. Through the exchange of knowledge and experiences, educators will be equipped to integrate the latest technologies and tools into their teaching methods, thereby enhancing the overall quality of education and facilitating better acquisition of knowledge and skills among students.

The progress of professional education in Bosnia and Herzegovina and Montenegro is hindered by several key challenges, including insufficient digital skills among educators, inadequate systems for professional and structured teaching, and limited collaboration and interaction with other professional institutions within the EU. Additionally, a significant gap exists between the educational system and the demands of the labor market, making it difficult for students to acquire the skills necessary for successful employment.

The VETechConn consortium

The consortium for the VETechConn project is composed of the following partners: 12 beneficiaries (BEN), signatories of the grant agreement (GA), and 2 associated partners (AP):

1. **SVEUCILISTE ALGEBRA (AU)**, PIC 879465051, Croatia
2. **JAVNI ZAVOD CENE STUPAR-CENTER ZA IZOBRAZEVANJE LJUBLJANA (CILJ)**, PIC 892831263, Slovenia
3. **LJUDSKA UNIVERZA, ZAVOD ZA IZOBRAZEVANJE IN KULTURO, ROGASKA SLATINA (LURS)**, PIC 949340262, Slovenia
4. **NAUCNOISTRAZIVACKI INSTITUT VERLAB ZA BIOMEDICINSKI INZINJERING MEDICINSKE UREDAJE I VJESTACKU INTELIGENCIJU (VI)**, PIC 886943169, Bosna and Herzegovina
5. **CENTAR ZA STRUCNO OBRAZOVANJE (CSO)**,PIC 937728004, Montenegro
6. **UNIVERZITET DZEMAL BIJEDIC U MOSTARU (UNMO)**, PIC 966318366, Bosnia and Herzegovina
7. **JU Institut za razvoj preduniverzitetskog obrazovanja (IRPO)**, PIC 884491494, Bosnia and Herzegovina
8. **JAVNA USTANOVA ZAVOD ZA ODGOJ I OBRAZOVANJE (ZZOO)**, PIC 883030480, Bosnia and Herzegovina
9. **JU Srednja strucna skola Niksic (SVSN)**, PIC 893885653, Montenegro
10. **JAVNA USTANOVA SREDNJA ELEKTROTEHNICKA SKOLA VASO ALIGRUDIC PODGORICA (HSEVA)**, PIC 893666336, Montenegro
11. **JU Srednja masinska tehnicka skola Sarajevo (MTSS)**, PIC 878704668, Bosnia and Herzegovina
12. **Javna ustanova Srednjoskolski centar Vogosca (HSCV)**, PIC 878707675, Bosnia and Herzegovina
13. **Pedagoski zavod BPK Gorazde (PZ BPK)**, PIC 883062878, Bosnia and Herzegovina
14. **Pedagoski zavod Zenicko-dobojskog kantona (PZ ZDK)**, PIC 883350677, Bosnia and Herzegovina

VETechConn

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Deliverable 2.1 Skills Gap Analysis Report

Introduction

This document aims to present a detailed analysis of various approaches currently applied in the field of digital upskilling for vocational education and training (VET) teachers across Bosnia and Herzegovina and Montenegro. It will identify and elaborate on best practices that have proven effective and sustainable, with a particular focus on those that are adaptable to the specific needs and contexts of these two countries. These best practices will serve as key inputs in the development of a tailored methodology for improving digital competencies among VET educators in both countries.

To ensure that the proposed methodology is grounded in the real needs of the VET sector, surveys were conducted among both teachers and students to assess the current state of digitalization in schools. The surveys explored the technologies currently in use, the main obstacles to adopting new digital tools, and the general attitudes and trends related to improving teaching through digital transformation. In addition to quantitative data, qualitative insights were gathered through interviews with teachers and administrative staff. These discussions provided a clearer picture of the everyday challenges and opportunities within vocational institutions, further enriching our understanding of the educational environment in Bosnia and Herzegovina and Montenegro.

By examining successful models and strategies from the EU and beyond, and combining them with locally collected data, this document provides a solid foundation for shaping a locally relevant and internationally informed training approach. The findings and recommendations will contribute to the broader objective of the VETechConn initiative – fostering digitally competent educators who can deliver high-quality, future-oriented vocational education.

Analysis of Digital Education in EU Countries

In EU member states, digital education is gaining strategic importance and is increasingly integrated into national education systems. Almost all countries have digital education strategies, with about half having specific national strategies, while others incorporate digital education into broader education frameworks.

Curriculum and digital competences

- Digital competence is recognized as a key competence and is included in the school curricula of most countries.
- Countries apply European definitions of digital competence (DigComp) or develop their own national definitions.
- In primary education, digital competences are addressed as: a separate compulsory subject (in 11 countries), integrated into other subjects (in 10 countries) or through a combination of both approaches.

In secondary education, there is an increasing number of countries offering it as a compulsory standalone subject, especially at the lower secondary level.

Teacher training and support

- Two-thirds of education systems include digital competences in teacher competence frameworks.
- Some countries (e.g., Estonia, Austria, Croatia, Spain) have developed specific frameworks for teachers' digital competences.
- Continuous professional development is institutionalized in most countries, and some promote the use of self-assessment tools (e.g., TET-SAT).

Student assessment

- Only half of the countries assess digital competences through national examinations.
- These assessments are mostly conducted at the upper secondary level, while primary schools use them less frequently.
- Digital technologies are used in national testing in three-quarters of education systems, predominantly at higher education levels.

Infrastructure and school support

- Most countries invest in digital infrastructure and require schools to develop digital development plans.
- Some countries appoint digital coordinators in schools (e.g., Ireland, Finland, Slovenia), while others provide guidelines for the use of digital teaching materials and develop their own quality standards.

EU countries are actively working on integrating digital education through systemic reforms, teacher support, and student assessment. While approaches vary between countries, the common trend is a shift towards a comprehensive strategy for the digital transformation of education.

Situation in Bosnia and Herzegovina

Digital competencies have been recognized as a "core literacy" in the national working document **Priorities in the Integration of Entrepreneurial and Digital Competencies 2019–2030**, which highlights the need to embed them at all levels of education, including vocational secondary education [1]. However, the transition from declarative to operational implementation is still in its early stages. In educational practice, the integration of digital tools and approaches remains fragmented and insufficiently systematic, while educators often lack access to modern resources and training opportunities that would enable them to keep up with digital trends.

With the aim of addressing these challenges, an analysis of the existing digital competencies of vocational education teachers in Bosnia and Herzegovina was carried out within the VETechConn project.

Regulatory and Strategic Framework

- State level – **The Framework Law on Secondary Vocational Education and Training (2008)** only generally mentions the use of information and communication technologies, without defining any operational goals [2].
- Entity/cantonal levels – T**he Development Strategy of the Federation of Bosnia and Herzegovina 2021–2027** includes, under Priority 1.1.3, the goal of “improving the digital skills of the population,” and under Priority 2.1.4, “promoting ICT in secondary schools.” However, operational plans for vocational education and training (VET) are yet to be developed [3].
- With its accession to the **Digital Europe Programme** (May 2024), Bosnia and Herzegovina has gained access to funding opportunities for advanced digital skills and the establishment of Digital Innovation Hubs [4].

- According to the **ETF Country Page for Bosnia and Herzegovina (2025)**, EU technical assistance (TA-VET 2024–26) includes plans for teacher training and upgrading school ICT infrastructure [5].

Despite the existence of strategic documents that recognize the importance of digital competencies and the integration of Information and Communication Technologies (ICT) into education, the current situation indicates a lack of concrete operational measures, particularly in the field of secondary vocational education. Although certain objectives are clearly defined at the national level, their practical implementation is still neither systematically designed nor institutionally supported. Participation in EU programs represents an important step toward strengthening digital capacities, but it requires coordinated implementation and the active involvement of educational institutions. To ensure sustainable transformation, it is necessary to develop clear operational plans, provide continuous training for teaching staff, and enhance both infrastructure and inter-institutional cooperation.

The VETechConn project represents a meaningful step in this direction, contributing to the advancement of digital competencies in vocational education through targeted support, collaboration, and the development of practical solutions.

Digital infrastructure is a fundamental prerequisite for the successful integration of digital technologies into the educational process. Without adequate school equipment and internet access, even the highest-quality educational content and training programs cannot be effectively implemented. Infrastructure limitations directly affect the availability of digital tools, the quality of teaching, and the opportunities for developing digital competencies among both teachers and students. Assessing existing capacities and investing in their improvement is crucial for ensuring equal educational opportunities and enhancing the overall quality of teaching.

The internet penetration rate in the country stands at 83.4% (as of early 2024), but the average fixed internet speed is only 29 Mbps, and nearly half a million people remain offline [6]. According to **UNICEF's school mapping**, around 14,000 students in over 500 schools still lack internet access [7]. In April 2024, the EU donated 1,000 computers to 15 vocational secondary schools, with the total value of the package amounting to €432,000 [8]. In Republika Srpska, the "Dositej 1:1" project equipped 847 classrooms by the end of 2020 with 20,360 laptops for students and 1,529 laptops for teachers, although mainly in primary schools [9].

In Bosnia and Herzegovina, schools most often receive equipment or support through local funding calls and through the Ministries of education, as well as from donor countries within the European Union. While such initiatives provide valuable support, they are often fragmented and depend on individual projects rather than a coordinated national strategy, which further highlights the need for systemic planning and long-term investment in digital infrastructure.

In addition to investments in digital infrastructure, it is equally essential to invest in the continuous professional development of teachers. Access to equipment and internet connectivity alone does not guarantee effective use of digital tools in the classroom. Teachers must be equipped with the necessary digital competencies, pedagogical strategies, and confidence to integrate technology meaningfully into their teaching practices.

Training programs should go beyond basic digital literacy, focusing instead on practical, context-specific applications that enhance teaching quality and student engagement. Furthermore, capacity building must be ongoing, flexible, and aligned with evolving technological trends and educational needs. Only through a balanced approach that simultaneously strengthens both infrastructure and human resources can the full potential of digital transformation in vocational education be realized.

Various initiatives have been launched in recent years to support teachers in developing their digital competencies, particularly in the context of vocational education and training (VET). According to the **ETF factsheet** (2019, updated 2020), only 51% of VET teachers in Bosnia and Herzegovina had received formal training in digital skills; notably, 98% of this training occurred in Republika Srpska, highlighting significant territorial disparities [10].

Ad-hoc e-learning opportunities have also emerged — in April 2021, the **OSCE** launched a free online course titled Teacher Competencies for Inclusive & Quality Education, available to all teachers in the country [11]. The **DigiEdu** platform, initiated in 2023 by the University of Sarajevo, UNICEF and USAID, offers accredited online courses designed to strengthen both digital and pedagogical skills. However, access to DigiEdu requires stable internet connectivity and self-funded equipment [12]. Looking ahead, the EU's **TA-VET** programme (2024–2026), as noted in the ETF country update, is set to focus on providing systematic teacher training and upgrading digital infrastructure in VET schools [5].
Several promising initiatives are currently underway, offering both immediate support and long-term potential for strengthening digital education in vocational schools. Around twenty VET schools in Bosnia and Herzegovina are participating in the SELFIE pilot project (GIZ + ETF,

2023–2024), where they use a self-assessment tool to evaluate their digital maturity and develop action plans for implementing digital learning strategies [13].

Furthermore, by signing the **Agreement on Association to the Digital Europe programme** in May 2024, Bosnia and Herzegovina has gained access to a €7.5 billion fund dedicated to advanced digital skills and the development of Digital Innovation Hubs. This represents a significant opportunity to secure new sources of funding aimed at the modernization and digital transformation of the VET sector [4].

Despite clearly defined strategic goals, the development of digital competencies in Bosnia and Herzegovina's vocational education and training (VET) system remains slow. This is primarily due to:

- non-binding curricular guidelines regarding digital skills,
- a lack of systematic and ongoing professional development for teachers, and
- uneven access to digital infrastructure across regions and schools.

These structural and implementation gaps limit the effective integration of digital technologies into teaching and learning, and pose a risk of increasing educational inequality.

To accelerate progress and ensure equitable access to quality digital education in VET schools, the following actions are recommended:

- Align all VET curricula with the DigCompEdu framework, and integrate mandatory modules focused on digital competence development for both teachers and students.
- Introduce a continuous professional development model based on micro-credentials, supported by funding from Europe programmes. This would allow teachers to acquire targeted digital skills in a flexible and scalable way.
- Standardize pedagogical ICT requirements, including minimum hardware, software, and technical support standards across all schools. Establish a real-time national monitoring system to track school connectivity and infrastructure status, ensuring timely interventions and resource allocation.

These measures would lay the foundation for a more cohesive, inclusive and future-ready VET system in Bosnia and Herzegovina.

Survey results

Teachers

As part of the analysis of teachers' digital skills, an online survey was conducted among teachers at vocational secondary schools in Bosnia and Herzegovina (B&H). A total of **392 teachers** participated in the survey, providing a relevant sample for assessing the current state and needs in the area of digital literacy and the use of technology in education.

Based on the data collected through the survey, the majority of teachers who participated in the study come from the field of technical sciences (149 teachers), which is expected given the profile of vocational secondary schools in B&H. They are followed by social sciences with 127 teachers, natural sciences with 89, arts with 16, and sports with 11 teachers.

This distribution provides insight into the diversity of educational backgrounds among the teachers included in the analysis, while also indicating that the results hold significant representativeness in terms of the various educational disciplines present in vocational secondary schools.

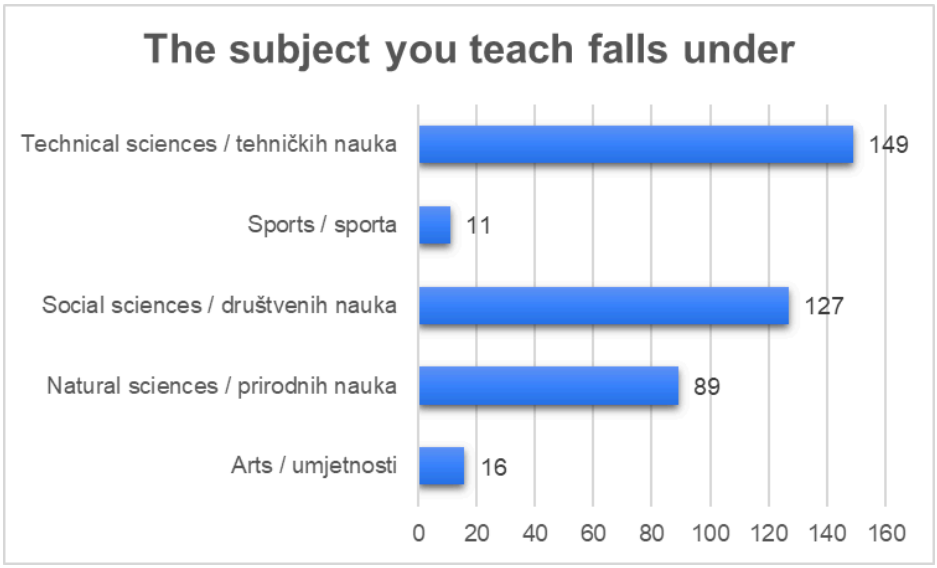

Figure 1. Distribution of teachers by subject areas

The data obtained from the survey show that the majority of teachers have significant work experience in education. Out of a total of 392 respondents, as many as 307 teachers (78%) have been working in education for more than five years. Teachers with 1 to 5 years of experience

make up 57 respondents (15%), while the smallest group consists of those who have been in education for less than one year — a total of 28 teachers (7%).

These findings indicate that most survey participants have been engaged in the education system for many years, which further adds to the credibility of their responses regarding digital skills and the need for professional development in this area.

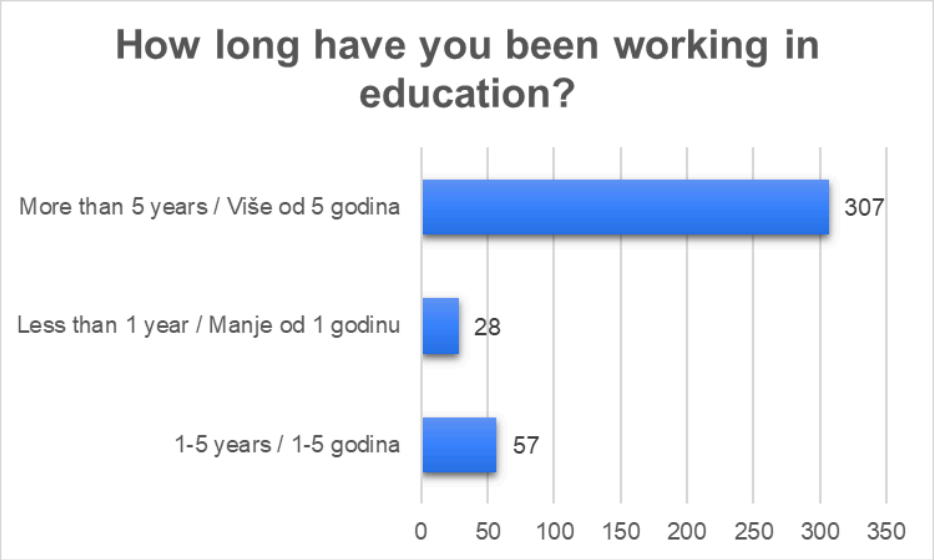

Figure 2. Work experience of teachers

Regarding the frequency of using digital tools in teaching, the results show diverse practices among teachers in vocational secondary schools in Bosnia and Herzegovina. The largest number of teachers (146) report using digital tools occasionally, while 123 teachers (31%) use digital tools daily. Additionally, 108 respondents use them several times a week, whereas 15 teachers (less than 4%) state that they do not use digital tools at all.

These results indicate that most teachers have integrated digital tools into the teaching process to some extent, although there is room for improvement, especially in terms of more regular and systematic use of technology in the classroom.

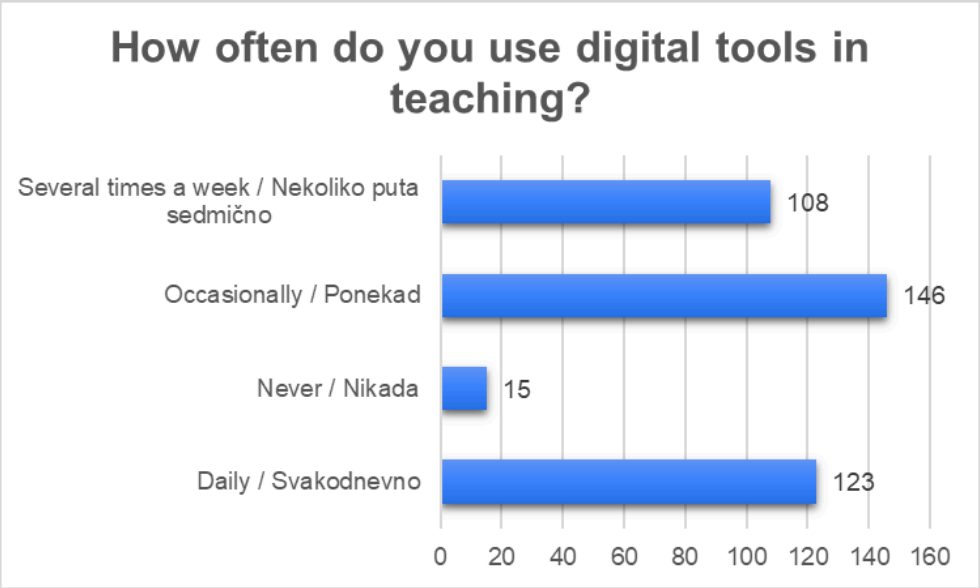

Figure 3. Frequency of using digital tools in teaching

The survey showed that teachers in vocational secondary schools in B&H use a wide range of digital tools to some extent in their work. The most commonly used tools are those for creating and presenting visual teaching materials, such as PowerPoint, Prezi, and Canva, which are used by as many as 300 teachers. These tools enable clear and engaging delivery of content to students. For organizing online lectures, sharing materials, and communicating with students, the most prevalent tools are MS Teams and Google Classroom, used by 197 teachers. These tools have become essential in hybrid or online teaching environments, a trend that gained particular importance during the Covid-19 pandemic. Interactive knowledge assessment tools, such as Kahoot and Quizizz, are used by 105 teachers, indicating a tendency toward more dynamic and engaging teaching. Digital platforms for managing courses, assignments, and teaching content (such as Moodle and Edmodo) are used by 43 teachers, while software for simulations and practical training, which allow virtual representation of real processes or experiments, are used by 67 teachers. Virtual reality (VR) technologies, which enable interactive simulations, are rarely used, with only 12 teachers employing them, whereas artificial intelligence tools (for personalized learning, automatic feedback, and content generation) are used by 58 teachers. The use of social media and platforms like YouTube for sharing educational videos and encouraging multimedia learning was reported by 228 teachers.

On the other hand, 18 teachers stated that they do not use any of the listed digital tools.

These results indicate that digital technologies are integrated into the teaching process to a certain degree, with an emphasis on visual and communication tools, while more advanced technologies like virtual reality and artificial intelligence remain less commonly used.

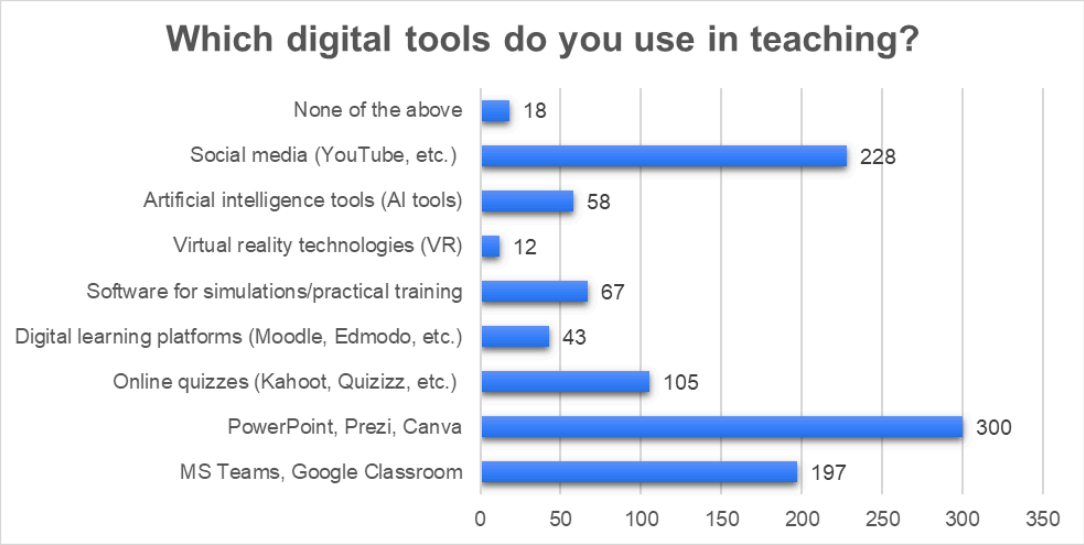

Figure 4. Usage of different digital tools in teaching

The surveyed teachers most often rated their digital skills at an intermediate level, with 209 respondents—more than half of the participants (53%)—indicating this. A basic level of digital skills was reported by 99 teachers (25%), while 62 teachers (16%) considered themselves advanced digital users. A beginner level of digital skills was reported by 22 teachers (6%).

These results show that the majority of teachers have solid digital competencies, but there is a significant number who need additional support and training, especially to raise their skills from basic and beginner levels to a higher level of digital literacy.

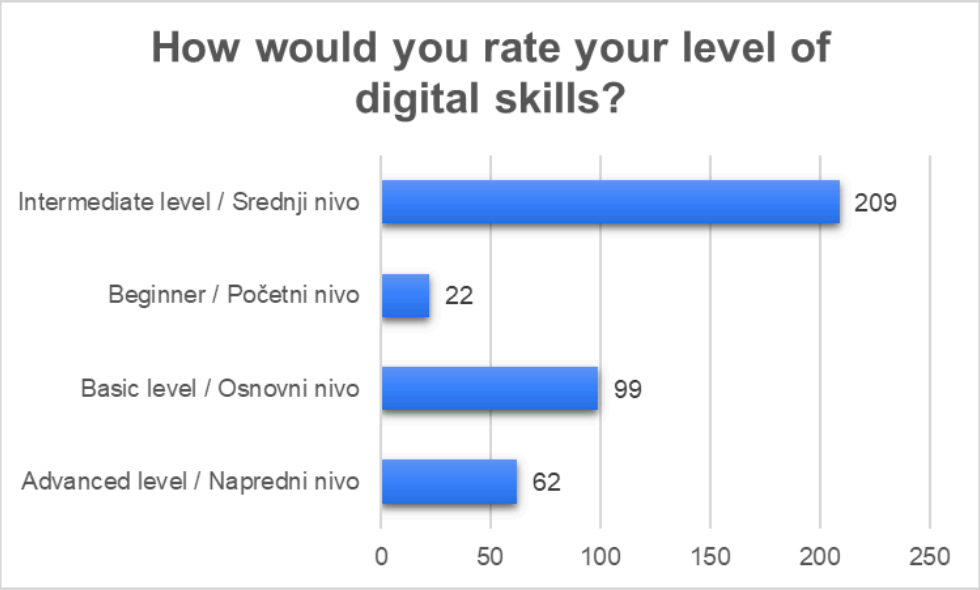

Figure 5. Self-assessment of digital skills proficiency

The surveyed teachers identified several key obstacles that hinder their use of digital tools in the teaching process. The most common challenge is the lack of adequate equipment in schools, which was highlighted by 280 teachers, or about 71% of the survey participants. This result clearly points to the infrastructural challenges schools face. Insufficient knowledge or training was mentioned as a barrier by 121 teachers, while 127 respondents emphasized the lack of time for preparation as a significant obstacle. Additionally, 47 teachers recognized a lack of support from school administration, and 71 teachers believe that low student interest further complicates the use of digital tools.

These findings emphasize the need to improve technical conditions, organize additional training and support, and motivate students to enable more effective integration of digital tools into the teaching process.

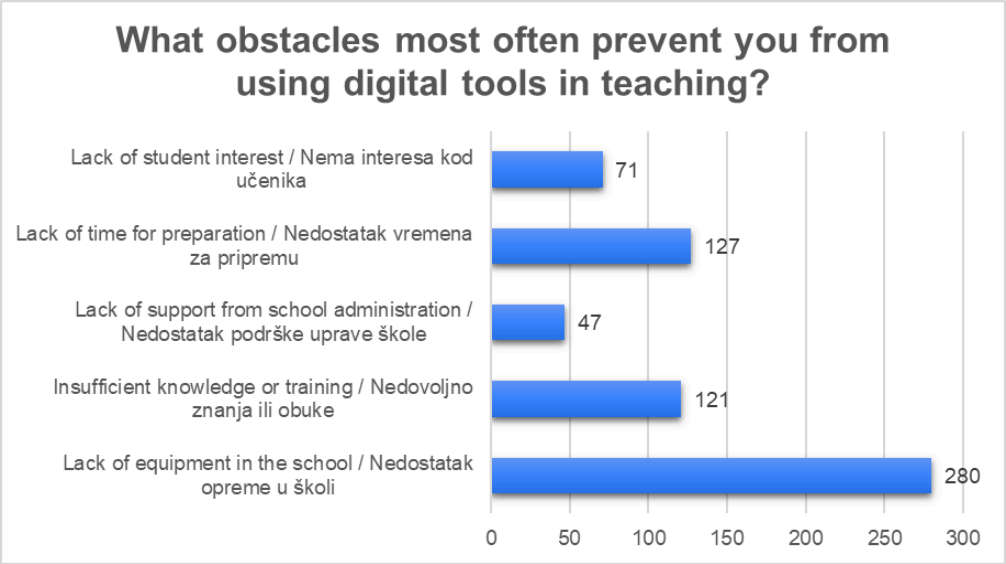

Figure 6. Barriers to the Use of Digital Tools in Teaching

Survey results show that just over half of the vocational secondary school teachers in Bosnia and Herzegovina (54%) have had the opportunity to participate in training on digital skills. However, a significant number of teachers (46%) have not undergone such training.

While this is an encouraging sign, digital skills encompass a wide range of knowledge and competencies, and it is clear that there are areas that have not yet been fully covered. Therefore, there is both room and need for additional training to enable teachers to continuously improve and better navigate an increasingly demanding digital environment.

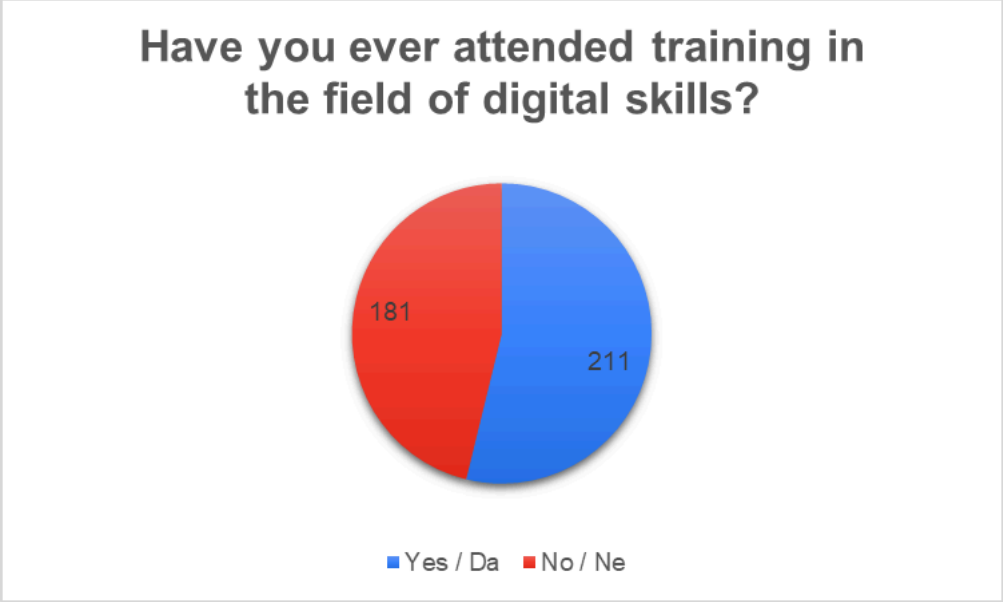

Figure 7. Teachers' previous participation in professional development for digital skills

The majority of vocational secondary school teachers in Bosnia and Herzegovina demonstrated a high level of interest in additional training on digital skills. Specifically, as many as 341 teachers (87%) expressed a desire to expand their knowledge and improve their skills in this area, while 51 teachers (13%) indicated that they are currently not interested in further training.

These results highlight the importance of continuous professional development and the need to organize new, high-quality educational programs that would enable teachers to keep up with modern trends and use digital tools more effectively in teaching.

Figure 8. Teachers' interest in additional training on digital skills

Teachers expressed varied interests in topics they would like to see covered through additional training. The greatest attention was given to the development of interactive digital materials, such as presentations, quizzes, and animations, which was indicated by 242 teachers. A large number of teachers also showed interest in the use of artificial intelligence (AI) in education (177), as well as in 3D modeling and creating educational content (174).

The application of virtual reality (VR) in teaching attracted interest from 128 teachers, while the use of augmented reality (AR) in practical lessons interested 118 respondents. Additionally, a significant number of teachers want further training in basic and advanced digital skills such as MS Office and internet security (126), as well as in digital pedagogy and planning digitally supported lessons (117).

The topic of managing online learning platforms, such as Moodle and Google Classroom, was also of interest to 117 teachers, while the introduction of gamification in the educational process attracted the attention of 52 teachers.

These data clearly indicate diverse needs and priorities among teachers regarding digital professional development and provide guidance for planning future educational programs.

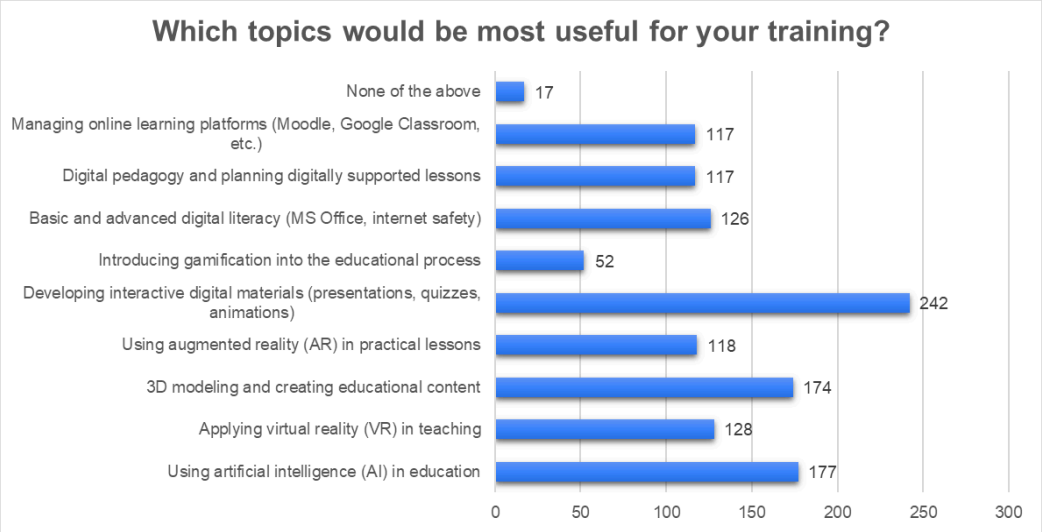

Figure 9. Chosen topics for training

When it comes to the preferred mode of training among vocational secondary school teachers, the largest number (140) prefer live workshops, highlighting the importance of direct interaction and hands-on practice during professional development. This is followed by a combination of multiple training formats, chosen by 115 teachers, suggesting a need for flexible approaches that incorporate various learning methods.

Self-paced online learning through video lessons and materials suits 69 teachers, while 60 respondents expressed a preference for online training in the form of webinars. A smaller number of teachers (8) did not find any of the offered formats suitable for their needs.

These results indicate that effective professional development requires offering diverse training methods tailored to different learning styles and accessibility.

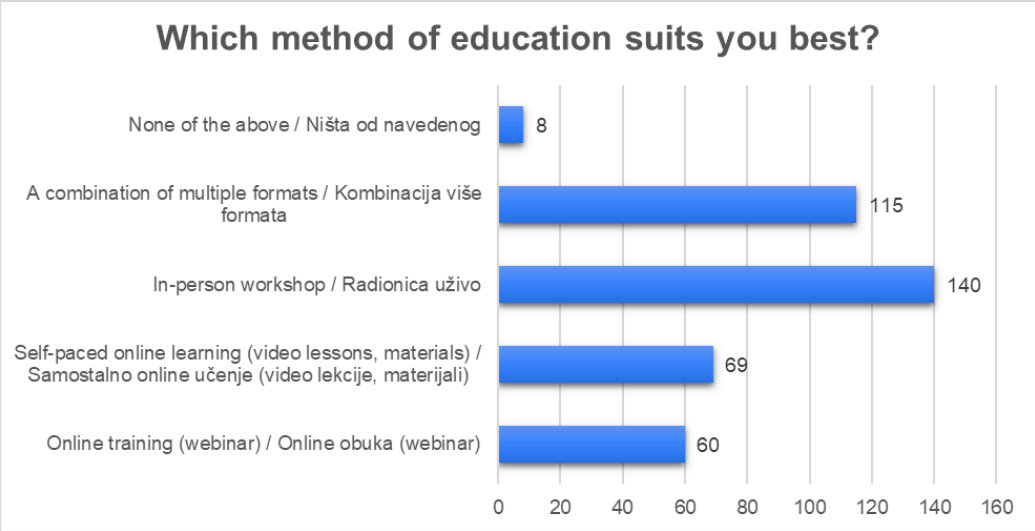

Figure 10. Chosen methods for education

The survey results show that vocational secondary school teachers in Bosnia and Herzegovina recognize the significant potential of digital technologies to enhance the educational process. The majority of respondents (138) believe that digital technologies will substantially improve the quality of teaching within the next five years, reflecting an optimistic attitude toward technological innovations in education.

At the same time, a large number of teachers (135) view digital tools primarily as a valuable supplement to traditional teaching methods, while 99 respondents see the possibility of digital technologies replacing certain parts of conventional instruction. This diversity of opinions reflects openness to change as well as an awareness of the need for a balanced approach that combines the best of both worlds—digital and traditional.

Only a small number of teachers believe that digital technologies will not have a significant impact, and a minority remain uncertain about the future direction of development. Overall, these results confirm that digital technologies already occupy an important place in education today, and their role in the future is likely to be even more significant, providing new opportunities for innovative approaches to learning and teaching.

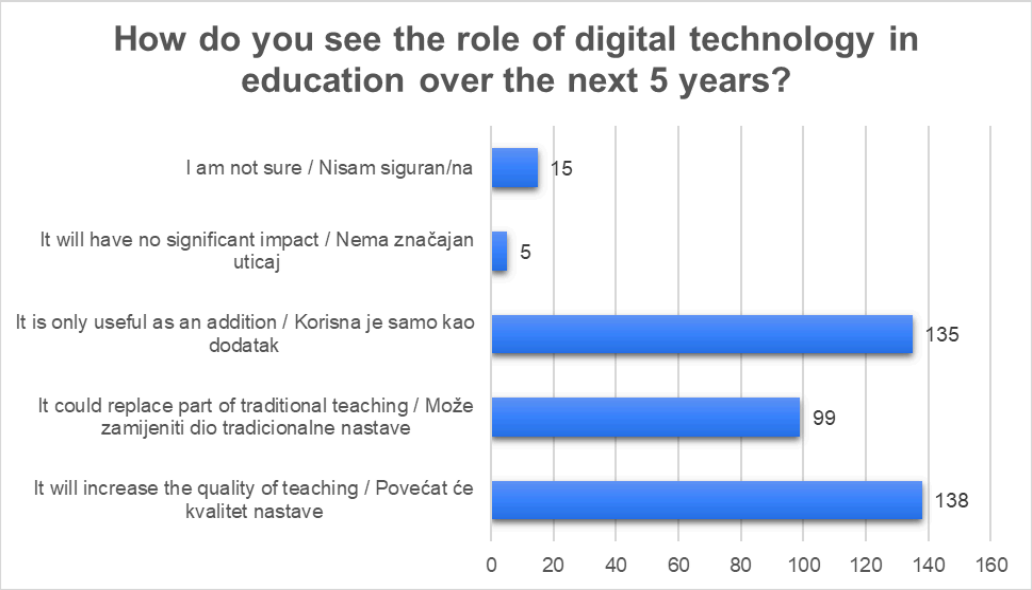

Figure 11. Future of digital technologies in education

Conclusion: The analysis of the survey results conducted among **392** vocational high school teachers in B&H shows that the use of digital tools in teaching is widespread, but significant obstacles still exist, such as the lack of equipment and time for preparation. Most teachers possess a moderate to advanced level of digital skills, and a considerable number have already participated in some training sessions, indicating a readiness for further professional development. However, the strong interest in additional training—especially in the areas of developing interactive materials, applying artificial intelligence, and virtual reality—points to the need for continuous and more targeted professional education. According to the respondents, the most effective forms of training are live workshops and combinations of multiple formats. Additionally, teachers recognize digital technologies as a key factor for improving the quality of teaching in the next five years but emphasize the need for a balanced approach that combines digital and traditional methods. These findings indicate significant potential for the further development of teachers' digital competencies, as well as the importance of adequate support from the school system in terms of equipment, time, and the organization of training sessions.

Students

In order to better understand the experiences, needs, and challenges faced by students of vocational secondary schools in B&H regarding the use of digital technologies in teaching, an online survey was conducted. A total of **1865** students from different parts of the country participated in the survey. The largest number of respondents are first-year students, totaling 750, which accounts for over 40% of the entire sample. Second-year students form the second-largest group with 573 responses, followed by 396 third-year students. Fourth-year students are the least represented, with only 146 participants. Based on this distribution, it can be concluded that the findings presented below primarily reflect the experiences and perspectives of students in the lower grades.

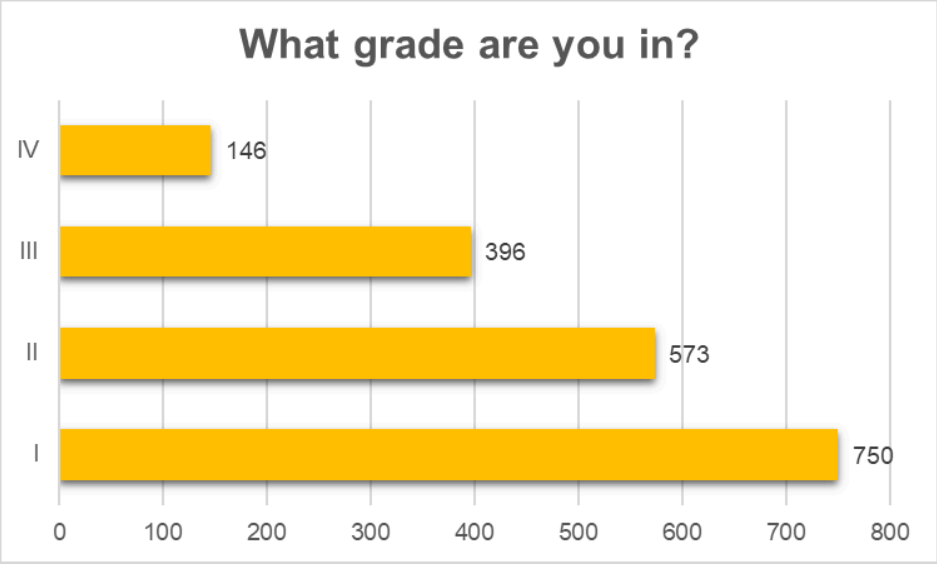

Figure 12. Distribution of students by grade level

When asked how often they use digital technologies at school—such as computers, tablets, smartphones, and various applications—the majority of students (934 respondents, or approximately 50%) stated that they use them every day. This suggests that digital tools are relatively well integrated into the school environment for a significant portion of students. However, despite this seemingly encouraging result, the situation is far from ideal. The term *digital technologies* encompasses a wide range of tools and skills—from basic device use to complex problem-solving, coding, and digital collaboration. Daily use does not necessarily imply effective or meaningful use that supports the development of broader digital competencies.

In addition, 355 students reported using digital technologies a few times a week, while 488 students indicated occasional use. These numbers suggest that access to and the use of digital tools are not consistent across schools, and may depend on factors such as school infrastructure, teacher readiness, or subject-specific requirements. Notably, 88 students (less than 5% of the total sample) reported that they never use digital technologies at school. While this is a relatively small group, it nonetheless points to a digital divide that deserves attention—especially considering the essential role digital skills play in modern education and future employment.

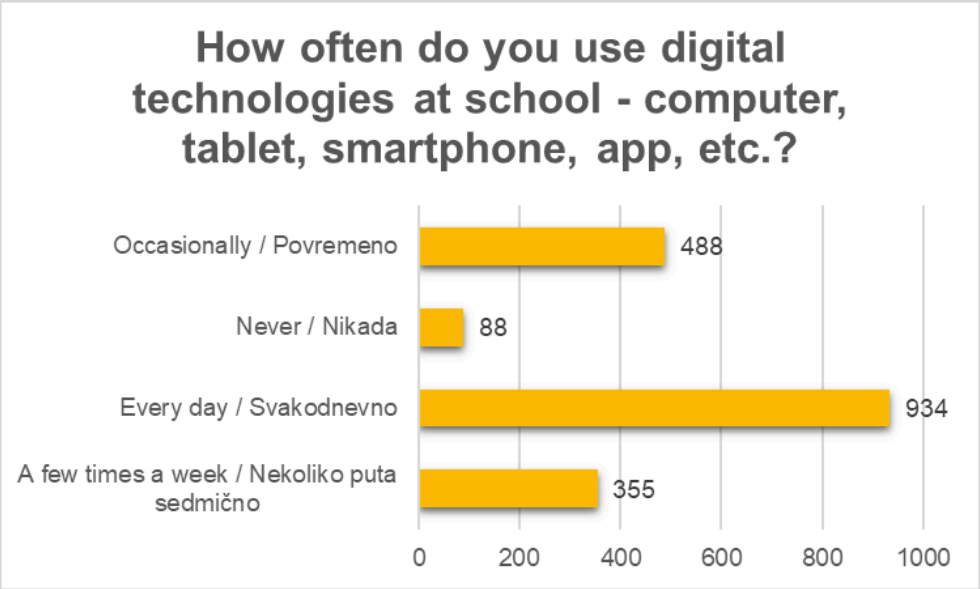

Figure 13. Usage of digital technologies in schools

Students were also asked which digital tools they use for learning. The most frequently mentioned tool was AI-based applications such as ChatGPT or Copilot, with 1,046 students indicating their use. This result reflects a growing trend among young people to experiment with and adopt new technologies independently, often outside the formal school framework. YouTube (818 responses) and presentation tools like PowerPoint and Canva (789 responses) also rank high on the list, which points to a preference for visual and creative formats of learning. These tools are often used to prepare assignments or to better understand complex topics through video content and visual aids. Traditional school platforms such as Google Classroom (536 responses) and Microsoft Teams (104 responses) are still in use but to a lesser extent, which may reflect either limited implementation at the school level or student preferences for more flexible and intuitive tools. Interestingly, only 83 students reported using structured

learning platforms like Moodle or Edmodo, and a mere 22 students have experienced the use of virtual reality (VR) in teaching. Additionally, 3D modeling tools were mentioned by just 96 students.

These low numbers point to a lack of more advanced or immersive technologies in regular school practice, which limits opportunities for deeper engagement with STEM fields and hands-on digital skills development. Moreover, 212 students stated that they do not use any digital learning tools, which is a concerning finding. It reinforces the notion that, while digital tools are present in many schools, their use is still uneven and fragmented.

In summary, while the data suggests that many students are actively engaging with a range of digital tools—especially those outside traditional curricula—there is significant room for improvement in how systematically and purposefully these tools are integrated into teaching and learning. In particular, the use of advanced tools like AI, VR, and learning platforms should be further supported and aligned with clearly defined educational goals.

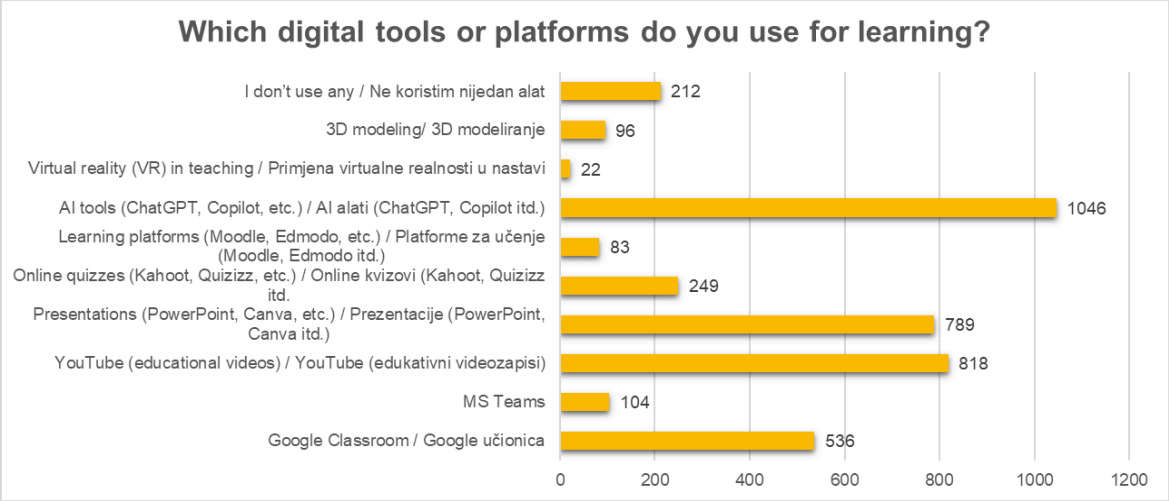

Figure 14. Digital tools or platforms used in schools

When it comes to the use of digital tools at school for homework or communication with teachers, the majority of students — 1,202 of them, or around 65% — responded affirmatively. This data indicates that digital tools, at least in their basic function of exchanging information and assignments, are relatively well accepted in educational practice.

However, a significant number of students — 663, or more than one-third of respondents — stated that they do not use digital tools for these purposes, which shows that digital communication between students and teachers is still not universally present in vocational secondary schools.

In the context of the increasing digitalization of education, these results point to the need for a more systematic approach to the introduction and use of digital tools — not only for teaching but also for assigning and monitoring homework, as well as for building effective communication between teaching staff and students. Such an approach would contribute to strengthening students' digital skills and improving the quality of the educational process.

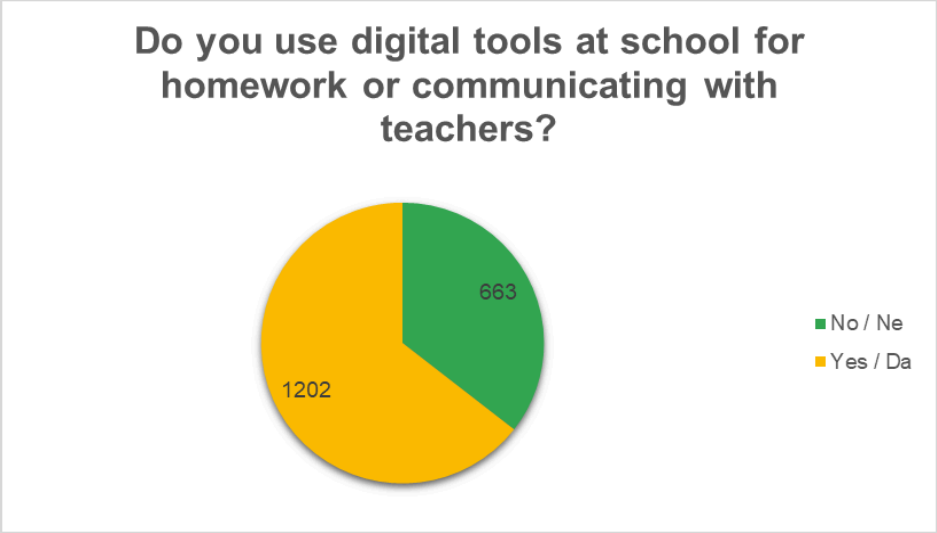

Figure 15. Usage of digital tools at school for homework or communication with teachers

The survey results show that the majority of students possess a solid level of digital skills. The largest number of students (910) report being able to use various digital tools such as Word, presentation creation tools, and quiz platforms, indicating the presence of functional digital literacy within the educational environment. A significant number of students (482) state that they only have basic knowledge, such as using internet search engines, YouTube, and email, suggesting that some students are still not sufficiently empowered for more advanced digital tasks. It is particularly important to highlight that 433 students report having advanced digital skills, including programming, video editing, and working with AI tools, which represents a valuable potential for further development of digital competencies within the school system. On the other hand, 40 students report difficulties in using digital tools. Although this is a smaller number, it still points to the need for additional support and tailored approaches in digital education in order to avoid digital exclusion.

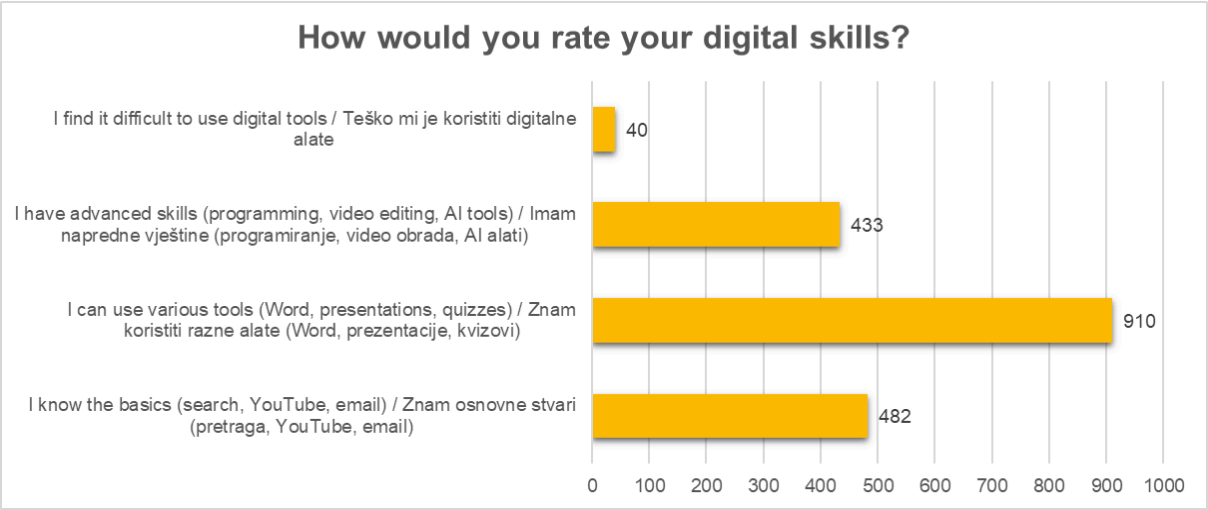

Figure 16. Self-assessment of digital skills proficiency

The majority of students (1,246) believe that using digital tools in class, such as quizzes, videos, and presentations, helps them learn better. This demonstrates that digital content can significantly increase engagement and understanding of the material. Around 564 students express a mixed attitude, stating that they sometimes enjoy using digital tools, while other times they prefer the traditional approach. This result highlights the need for a balanced approach that takes into account different learning styles. A smaller number of students (55) prefer exclusively traditional lessons without digital aids, suggesting that traditional teaching methods still have their role but are not dominant.

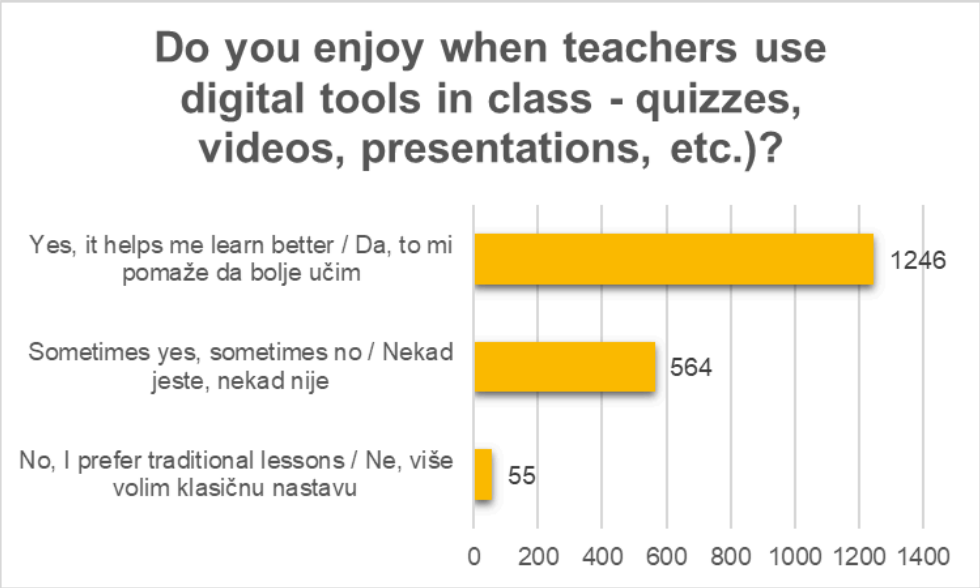

Figure 17. Students' Attitudes Toward the Use of Digital Tools in Teaching

The results show that the biggest barriers to using digital tools in schools are related to technical and infrastructural issues. The largest number of students (1,166) cite the lack of sufficient equipment as the key challenge, while 1,058 students highlight the problem of inadequate internet connectivity. A smaller number of students (141) find it difficult to understand digital tools, indicating the need for support in mastering digital technologies from teachers who are additionally trained in this area. Lack of motivation to use digital tools is reported by 241 students, while 206 students claim that technology is not used at all in their school, further confirming the uneven integration of digital technology in teaching.

These results point to the importance of investing in infrastructure, training for both teachers and students, and the need for a strategic approach to introducing technology into the educational process.

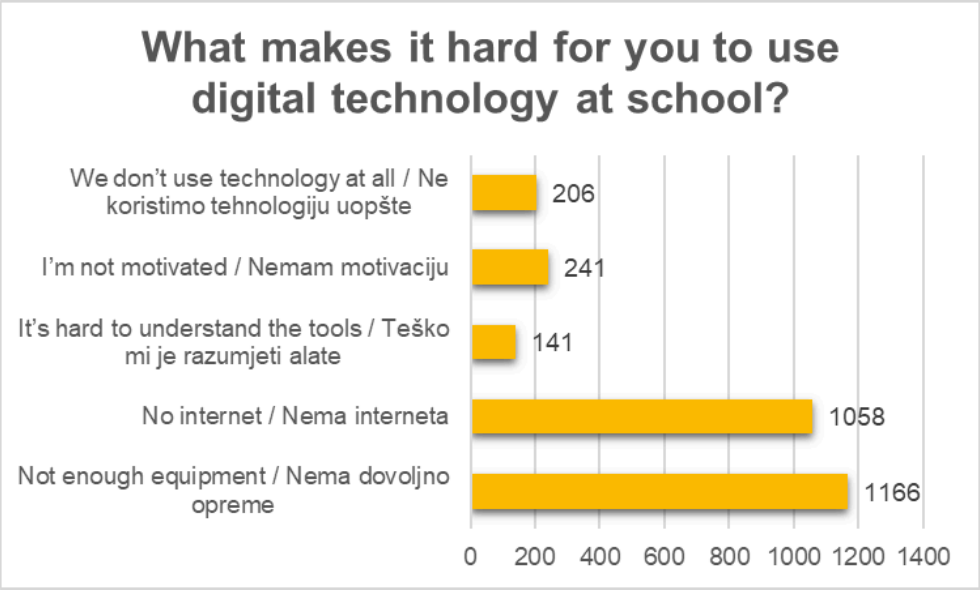

Figure 18. Barriers to the use of digital tools in teaching

The results show that the majority of students (1,512) want to learn more about using digital tools and technologies, clearly indicating a strong interest in acquiring additional digital competencies. These findings emphasize the need for teachers to be properly trained and further educated in the field of digital technologies. Only through quality training of teaching staff can students be enabled to effectively and modernly acquire digital skills, which are essential for their future professional readiness.

Therefore, investing in continuous teacher education should be a priority so that they can competently teach and support students on their path to digital advancement.

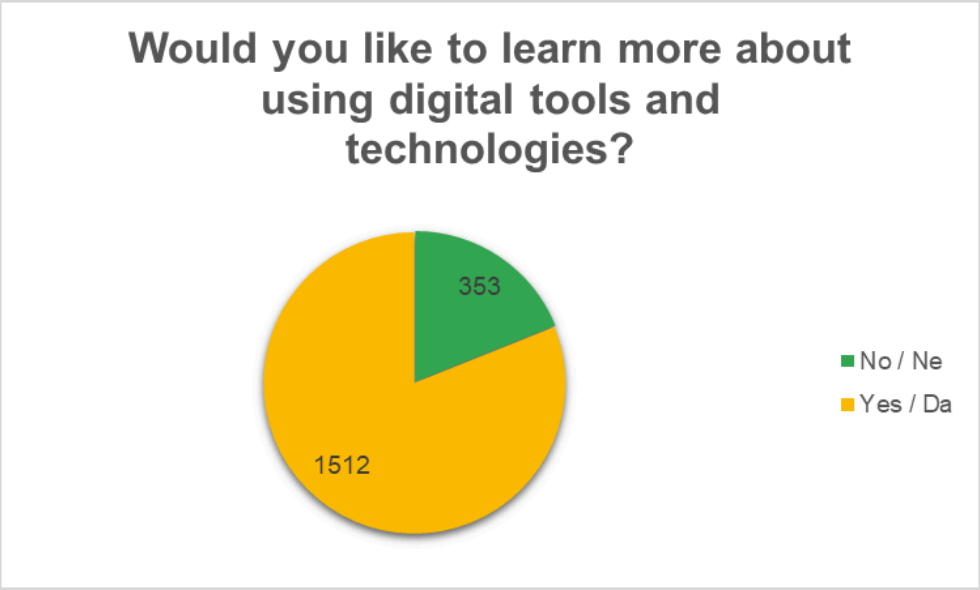

Figure 19. Students' interest in further developing digital skills

The survey revealed a diverse range of topics that interest students regarding digital skills. The greatest interest is in learning through AI tools (e.g., ChatGPT), chosen by 805 students, indicating their curiosity and readiness to engage with modern technologies and explore all the possibilities these tools offer. Additionally, a large number of students want to learn more about creating presentations and video content (730), as well as about virtual reality, robotics, and new technologies (672), suggesting the appeal of practical and innovative digital topics. More traditional, yet still highly demanded topics include basic programming (662), using computers for schoolwork (622), and safe internet use (621), highlighting the importance of foundational digital literacy and security. Interestingly, gamification in learning (657) is also recognized as an engaging approach, pointing to the potential for more creative and interactive educational methods.

These data clearly show which areas should be further developed and integrated into the curriculum to meet the real needs and interests of students.

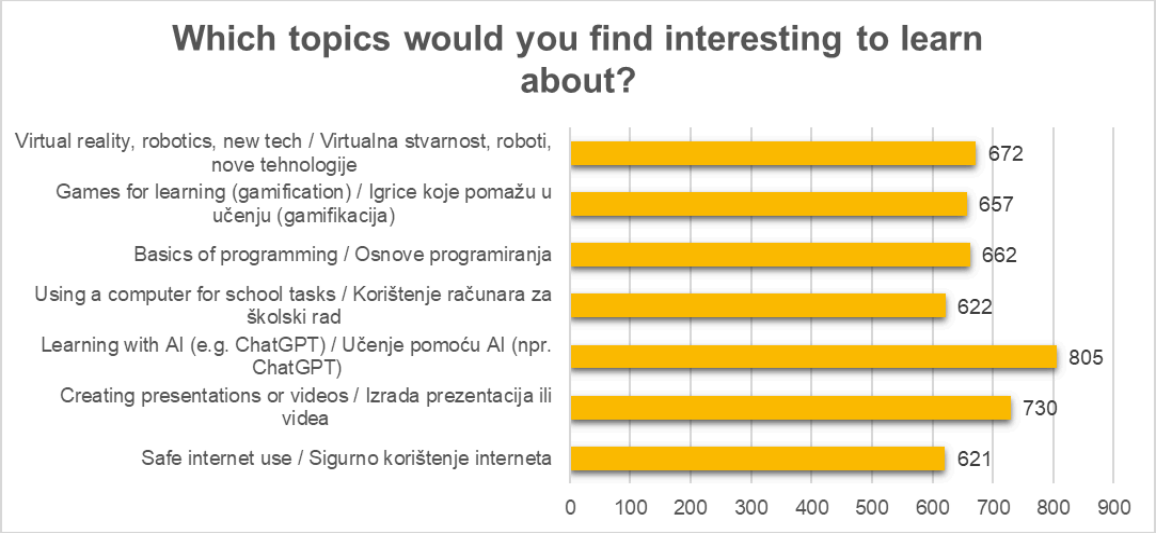

Figure 20. Interesting topics for students

The results show that among students, the most popular form of learning is live, in-school workshops, chosen by 734 students. This data highlights the importance of direct interaction and a practical approach in acquiring digital competencies. The second most popular preference is a combination of online and in-person learning (452 students), indicating a need for flexibility and blending different methods. Online lessons and quizzes are also well-represented (425 students), demonstrating students' readiness for independent and digital learning with interactive content. A smaller number of students (254) expressed disinterest in further learning digital skills, which may point to the need for additional motivation and adaptation of teaching methods.

These results clearly emphasize the importance of diverse, interactive, and practical learning methods to meet the varied needs and preferences of students.

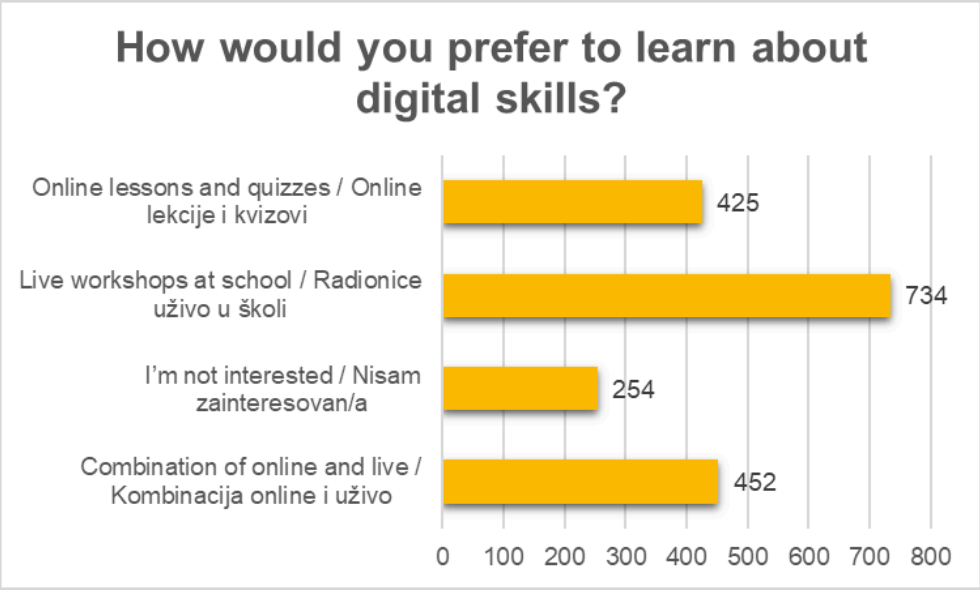

Figure 21. Best ways of education

Conclusion: A total of 1,865 students from vocational secondary schools across various regions of Bosnia and Herzegovina participated in the survey, with the majority being from lower grades. Although about half of the students use digital technologies daily at school, their use is still not systematic or consistent enough, especially when it comes to advanced tools such as artificial intelligence, virtual reality, and specialized educational platforms. Many students possess basic or intermediate digital skills, while a smaller number have advanced competencies, and some report difficulties in using digital tools. Students show strong interest in further development, particularly in the areas of safe internet use, learning with AI assistance, creating presentations and videos, and basic programming. However, significant barriers such as lack of equipment and internet access hinder the effective use of digital tools. The majority of students prefer practical and interactive learning methods for digital skills, with a special emphasis on live workshops and a blended approach combining online and in-person learning. A smaller number of students show disinterest, indicating the need for additional motivation and adaptation of teaching content. In conclusion, to improve digital literacy and the quality of education in vocational schools, it is essential to further train teachers and provide adequate infrastructure. A systematic approach to introducing and using digital technologies, aligned with the real needs of students, is crucial for preparing them for the challenges of the digital society and the labor market.

Interview results

As part of a study on the digital competencies of vocational secondary school teachers in Bosnia and Herzegovina, interviews were conducted with 10 teachers from various vocational fields, including textile, electrical engineering, mechanical engineering, and other technical schools.

The following three questions were asked:

1. **Can you describe specific situations when you used digital tools in class? What was successful and what was a challenge?**
2. **Which digital skills do you consider the most important for your job, and where do you think you need additional support or training?**
3. **What would you like an ideal digital skills training to look like – what would you learn, how and in what format?**

These questions were carefully selected in order to identify:

- specific practices related to the use of digital tools in teaching,
- areas where teachers feel the need for additional training,
- their recommendations for designing an ideal professional development program in digital skills.

The results show that most teachers regularly use digital tools in the classroom, with PowerPoint being the most frequently used for presenting lesson content, and Google Forms used for creating online quizzes and tests. The benefits of these tools were reported to include the ability to use images and videos to facilitate understanding and increase student engagement, as well as the fast and easy processing of test results through digital platforms.

The main challenges identified by teachers were the time required to prepare digital teaching materials and a lack of advanced digital knowledge.

When it comes to additional training needs, respondents most commonly expressed a desire to learn how to work with:

- network systems and network management,

- Arduino microcontrollers,
- 3D printers,
- software for creating interactive presentations such as Prezi,
- as well as support for creating video materials and using CNC machines.

Regarding the format and duration of training, most teachers expressed a preference for:

- practical workshops led by experienced mentors,
- project-oriented training that includes work on real-world problems from the school context,
- longer-term training programs conducted after the end of the school year (in June or January), lasting more than the usual two- or three-day seminars.

These findings clearly indicate a high level of motivation among teachers to improve their digital skills, as well as the need for targeted, practical, and time-appropriate training programs that reflect the specific nature of vocational schools and the rhythm of the school calendar.

Situation in Montenegro

Regulatory and Strategic Framework

The Reform Agenda of Montenegro for the period 2024–2027 [14] is a key strategic document aimed at accelerating the country's integration into the European Union through the implementation of necessary reforms. This document was developed in cooperation with the European Commission and is part of the broader EU Growth Plan for the Western Balkans. Significant reforms are planned in the education system, including investments at all levels of education and the digitalization of the education system.

When it comes to the digitalization of education, key development obstacles have been identified, including: outdated educational information systems, lack of a digital ecosystem, and low levels of digital skills and competencies among students and teachers. In response to these challenges, the Government of Montenegro adopted the **Strategy for the Digitalization of the Education System 2022–2027** [15].

The goal of this reform measure is to implement the Strategy by strengthening the digital ecosystem and enhancing the digital skills and competencies of teachers and students through:

- Creating and developing the Montenegrin **Digital Competence Framework for Teachers**, linguistically adapting the **SELFIEforTEACHERS** [16] tool, conducting training for its use, developing new training programs to enhance and apply digital competences in teaching, delivering training to a portion of teachers, and implementing training for the **SELFIE** self-evaluation tool. By December 2025, 2,000 participants/teachers will be trained, and by December 2027, an additional 5,500, totaling 7,500.

- Establishing **EdTech hubs/laboratories** in primary and secondary schools, which will include:

- Procurement of plastic recycling and 3D printing equipment, teacher training for using 3D printing software and for more advanced modeling, and creating a self-guided course to be hosted on the "**Digital School**" platform;

- Developing and implementing **AI training programs** (basic and advanced levels) for teachers and students, including the creation of self-guided courses to be made available on the "Digital School" platform;

- Procuring educational kits for **learning robotics**, along with training for teachers;

- Procuring **computers/laptops** for the hubs/laboratories.

In addition to these hardware prerequisites, **interdisciplinary curricula** will be developed to increase the use of technology (STEAM), so that schools are not equipped without comprehensive preparation (i.e., accumulation of technology not used for educational purposes). The process of acquiring digital skills must include all children, ensuring access to digital equipment even for those without particular interest in robotics or programming. The goal is to develop skills needed in the labor market and ensure the integration of all children, regardless of whether they have engineering, managerial, or other inclinations. The approach promotes the idea that everyone can contribute to a team (with multiple roles available).

By June 2026, **EdTech hubs/labs** [17] are expected to be established in **17%** of primary and secondary schools, providing opportunities for **25%** of children to participate (about 50% of whom are girls). By June 2027, this is projected to expand to **34%** of schools, engaging **50%** of children (again, about 50% girls).

To ensure more effective implementation of the digitalization process, educational institutions will continue to be equipped with IT equipment. At the beginning of 2024, equipment worth €6.3 million was distributed to schools, achieving a computer-to-student ratio of **1:13**. By the end of 2027, the goal is to reach a **1:11** ratio. This equipment will extend beyond computer labs to other classrooms, enabling the integration of ICT into all subjects. This includes the procurement of **computers, laptops, televisions, and projectors**.

The **Ministry of Education, Science and Innovation** is responsible for implementing these activities, in partnership with the **Bureau for Education**, the **Center for Vocational Education**, the **National Education Council**, and **primary and secondary schools**, with **teachers and students** of these schools as the target groups.

Expected activities until 2027: 2,000 teachers participated in training sessions on digital competencies within the framework of the adopted Digital Competence Framework for Teachers; 7,500 teachers/participants (cumulatively for the entire period) took part in training sessions on digital competencies in accordance with the adopted Digital Competence Framework for Teachers;17% of the total number of primary and secondary schools have an EdTech Hub, and 25% of students (approximately 50% of whom are girls) have the opportunity to use it; 34% of the total number of primary and secondary schools have an EdTech Hub, and 50% of students (approximately 50% of whom are girls) have the opportunity to use it; In primary and secondary schools, there is on average at least one technological device (laptop, desktop computer, TV, tablet) available for every 11 students:

In 2023, the Ministry of Education, Science and Innovation conducted an analysis of relevant international and national recommendations for improving teachers' digital competence and provided recommendations, which were integrated into the activities proposed under this reform measure. The most significant outcome is the development and adoption of the **National Framework for Teachers' Digital Competence**, based on the **European Framework for the Digital Competence of Educators (DigCompEdu)**, the inclusion of the **SELFIEforTEACHERS** self-evaluation tool, and the implementation of a corresponding training program.

The implementation of the digital education reform measure may face several challenges, mostly related to the following:

- Teachers' readiness to adapt to changes and participate in various trainings offered and tailored to different levels of digital literacy needs;
- Teachers' flexibility to accept new teaching methods using digital tools;
- Administrative obstacles: the integration of digital tools into curricula will depend on the effective adaptability of the relevant legal framework and the willingness of all stakeholders to cooperate;
- Sometimes procurement procedures for digital infrastructure can be unexpectedly complex and have uncertain timelines;
- Creating specialized approaches for students with special needs;
- Developing content for EdTech hubs.

In Montenegro, there are 163 primary and 50 secondary public schools. EdTech hubs will not be a mandatory part of the curriculum but will be strongly promoted as a tool for developing numerous skills. The Ministry has resources to monitor the process using surveys on the number of hubs, the number of participating teachers, and the number of involved students. The accuracy of data is guaranteed by school leadership, as they will provide feedback on the surveys.

The education information system of Montenegro contains records of all existing ICT equipment in schools. Each school is required to update all relevant data about the ICT equipment in the school. The equipment records include data on equipment specifications, year of purchase, location within the school, etc. For example, location data is very important because the Ministry can distinguish between computers used for administrative purposes and those used for teaching/learning.

Insufficient motivation of teachers to attend training sessions has been recognized as a moderate-level risk, which will be addressed through strong promotion of the importance of modernizing the teaching process, as well as by providing a set of tools that will facilitate teachers' self-evaluation and access to skills improvement, thereby ultimately easing the process of applying new teaching methods.

Survey results

Teachers

As part of the analysis of teachers' digital skills, an online survey was conducted among teachers of secondary vocational and mixed schools in Montenegro. A total of 251 teachers participated in the survey, representing a relevant sample for assessing the current state and needs in the field of digital literacy and the use of technology in education.

Based on the collected data from the research, 63 teachers from the technical sciences, 111 from the social sciences, 51 from the natural sciences, 21 from the arts, and 5 from sports participated.

The results show a diversity of educational profiles among the teachers included in the analysis, indicating that the findings are highly representative of the different educational disciplines present in secondary vocational schools.

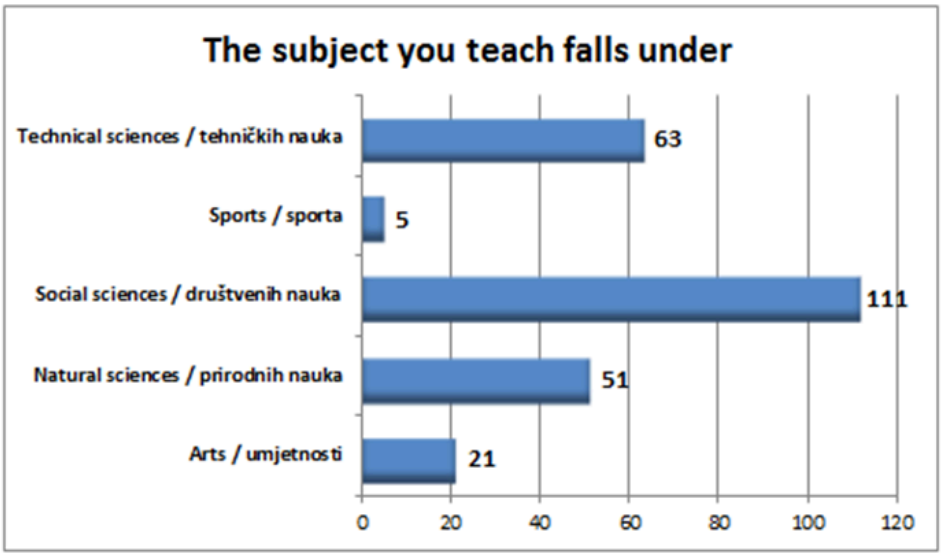

Figure 22. Distribution of teachers by subject areas

The results obtained from the survey show that the majority of teachers have significant work experience in education. Out of a total of 251 respondents, as many as 169 teachers (67%) have been working in education for more than five years. Teachers with 1 to 5 years of experience make up 65 respondents (25%), while the smallest group consists of those who have been in education for less than a year a total of 17 teachers (6%).

Considering that the majority of the teachers who participated in the study have been employed in the education system for many years, the data they provided regarding digital skills and the need for professional development in this area is of great importance.

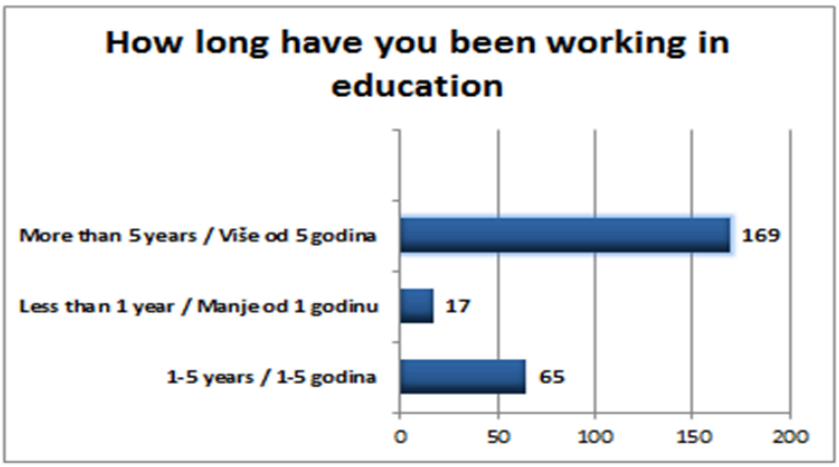

Figure 23. Work experience of teachers

As for the frequency of using digital tools in teaching, the results show different practices among teachers in vocational and mixed schools in Montenegro.

The largest number of teachers, 87 of them, report using digital tools several times a week, which accounts for 34% of the total number of respondents. Nearly the same number of teachers, 83 (33%), use digital tools daily, 79 (31%) use them occasionally, and only 2% do not use digital tools at all.

The results indicate that most teachers use digital tools in the teaching process, but there is a need to work on making the use of digital tools more regular in order to improve teaching.

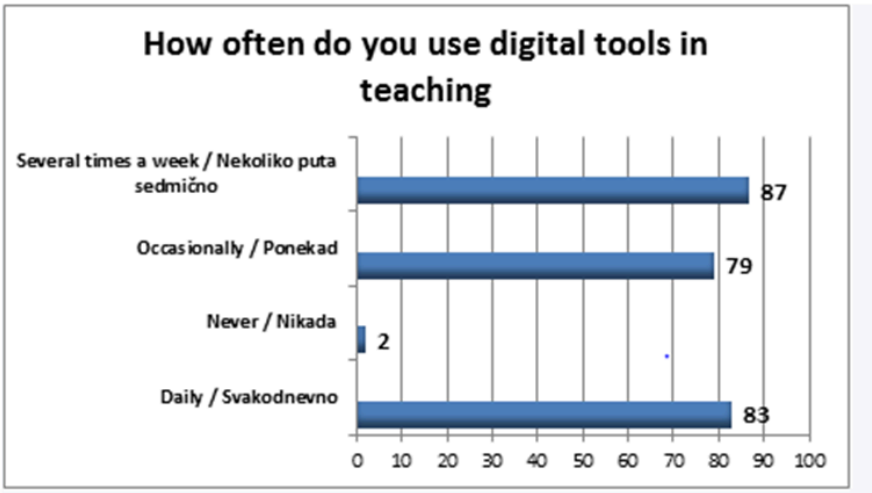

Figure 24. Frequency of using digital tools in teaching

The research has shown that teachers in vocational schools in Montenegro use a narrower range of digital tools in their work. The most commonly used tools are those for organizing online classes, sharing materials, and communicating with students, such as MS Teams and Google Classroom, which are used by 143 teachers (56%). Tools for creating and presenting visual teaching materials (PowerPoint, Prezi, Canva) are used by 71 teachers, or 28%.

Interactive tools for assessing knowledge, such as Kahoot and Quizizz, are used by only 11 teachers, which indicates a lower orientation towards more dynamic and engaging teaching. The use of social media and platforms like YouTube for sharing educational videos has been reported by just 12 teachers. Digital platforms for course, assignment, and teaching content management (such as Moodle and Edmodo), as well as software for simulations and practical training, are used by only 6 teachers. Virtual reality (VR) technologies, which allow for interactive simulations, are used by only 1 teacher, while artificial intelligence tools are used by 3 teachers.

Finally, 4 teachers reported that they do not use any of the listed digital tools.
These results indicate that digital technologies are somewhat integrated into the teaching process, but they are mostly limited to visual and communication tools. Other mentioned technologies are rarely used.

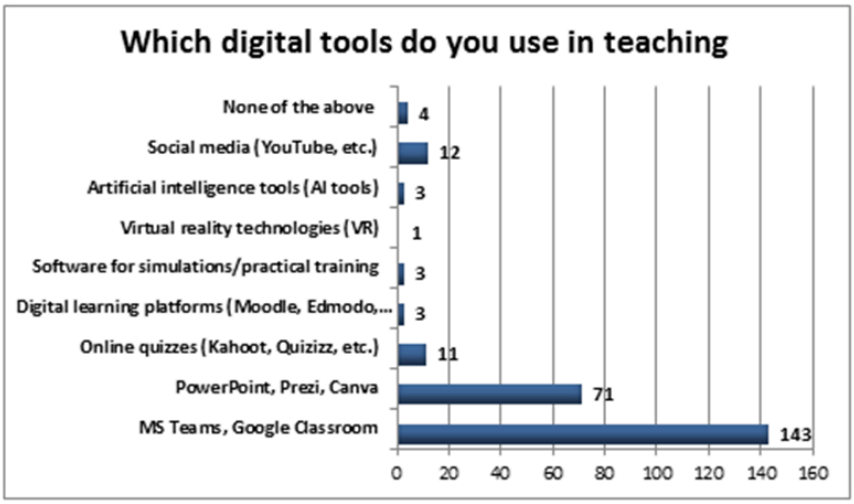

Figure 25. Usage of different digital tools in teaching

The largest number of teachers, 113, rated their digital skills as average, which is nearly half of the participants (45%). 67 teachers (26%) reported having basic digital skills, while 58 teachers (23%) reported possessing advanced digital skills. 13 teachers reported having beginner-level digital skills.

The results show that most teachers have good digital competencies, but a significant number of them require additional support and training to move from basic and beginner levels to a higher level of digital literacy.

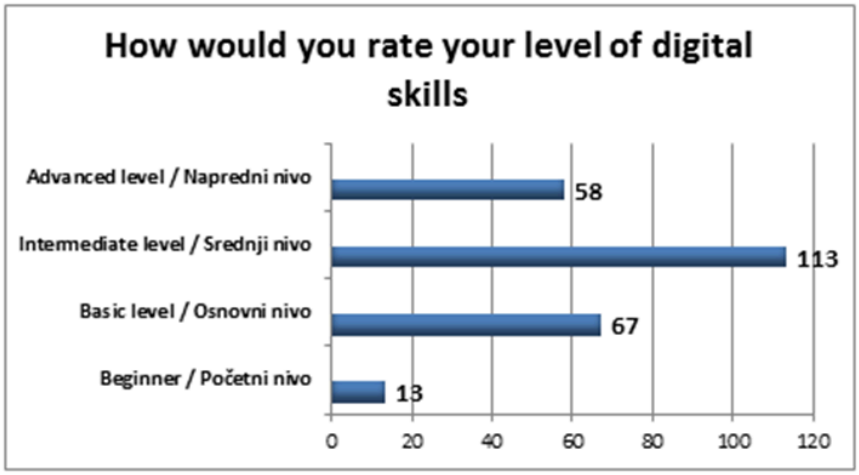

Figure 26. Self-assessment of digital skills proficiency

The surveyed teachers identified several key barriers that hinder their use of digital tools in the teaching process. The most common challenge is the lack of adequate equipment in schools, which was highlighted by 113 teachers, or about 45% of the survey participants. A lack of time for preparation was cited by 72 teachers (28%), while 32 teachers identified insufficient knowledge or training as an obstacle, and 31 teachers believe that students' low interest further complicates the use of digital tools.

The results suggest that improvements are needed in the technical conditions of schools, the organization of additional training, and an increase in student motivation in order to achieve better results in the integration of digital tools into teaching processes.

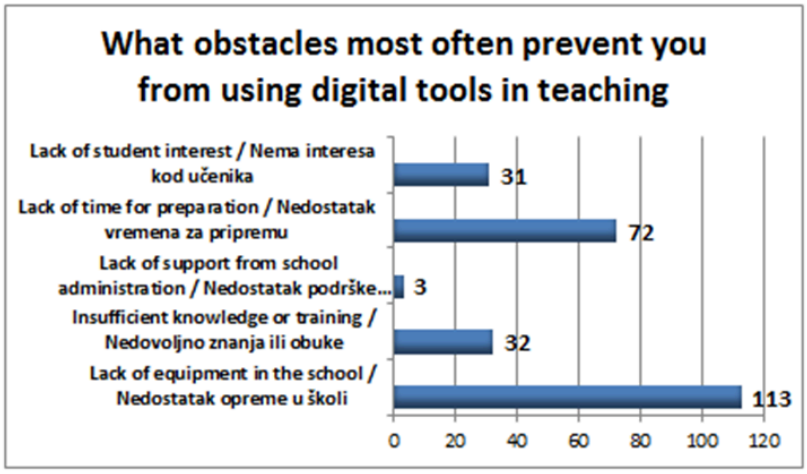

Figure 27. Barriers to the Use of Digital Tools in Teaching

The survey results show that a large number of teachers from vocational and mixed schools in Montenegro (70%) have had the opportunity to participate in training to improve their digital skills, while a smaller number of teachers (30%) have not undergone such training.

Despite the positive results of this survey, there is still a need for additional training to ensure that all teachers are able to further enhance their digital skills.

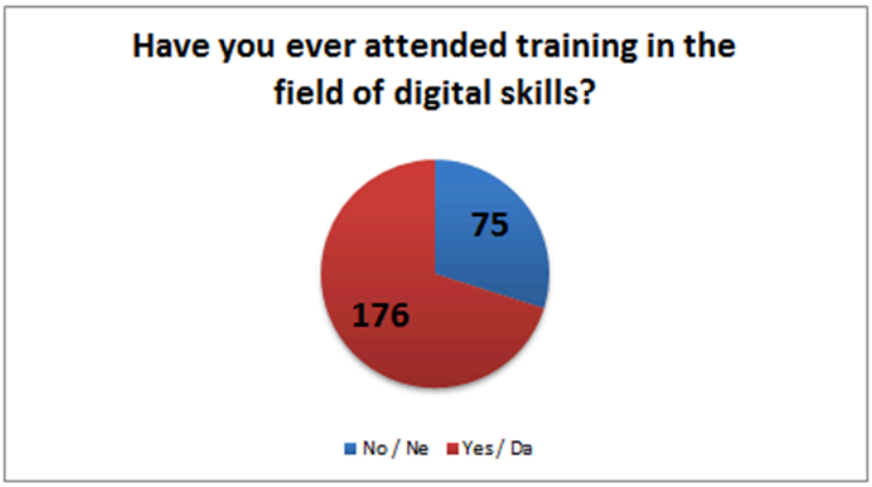

Figure 28. Teachers' previous participation in professional development for digital skills

The majority of teachers from vocational and mixed schools in Montenegro have shown a high level of interest in additional training on digital skills. Specifically, as many as 230 teachers (91%) expressed a desire to expand their knowledge and improve their skills in this area, while 21 teachers (9%) stated that they are currently not interested in further professional development.

These results highlight the importance of continuous professional development and the need to organize new, high-quality training programs.

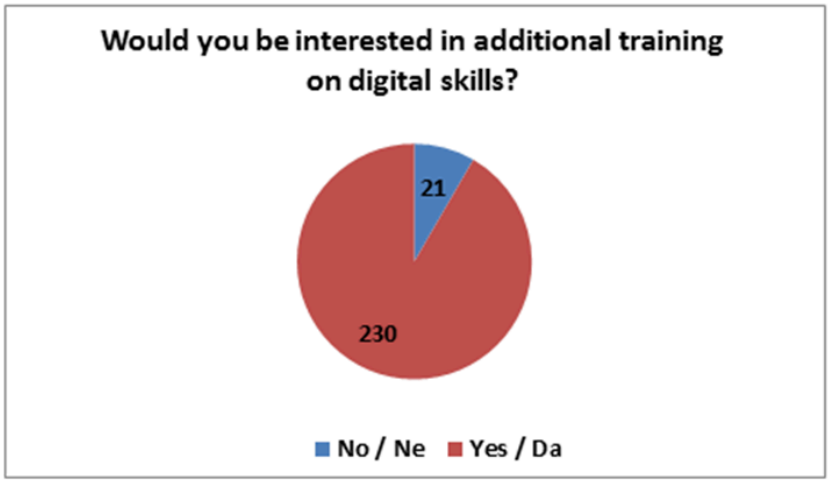

Figure 29. Teachers' interest in additional training on digital skills

Teachers expressed diverse interests in the topics they would like to be covered in additional training. The greatest interest was shown for 3D modeling and creating educational content, with 218 teachers expressing interest. A large number of teachers also showed interest in using artificial intelligence (AI) in education, with 136 teachers, as well as in developing interactive digital materials, with 132 teachers.The application of virtual reality (VR) in teaching attracted the interest of 90 teachers, while 92 teachers expressed interest in the topic of digital pedagogy and planning digitally supported lessons. The use of augmented reality (AR) in practical teaching was of interest to 80 respondents, and 84 teachers requested training in basic and advanced digital skills. The topic of managing online learning platforms, such as Moodle and Google Classroom, interested 76 teachers, while the introduction of gamification into the educational process caught the attention of 49 teachers. Only 5 teachers did not express interest in any of the topics.

It is clear that there are varying interests among teachers for digital skill development, which provides clear guidance for planning future training programs.

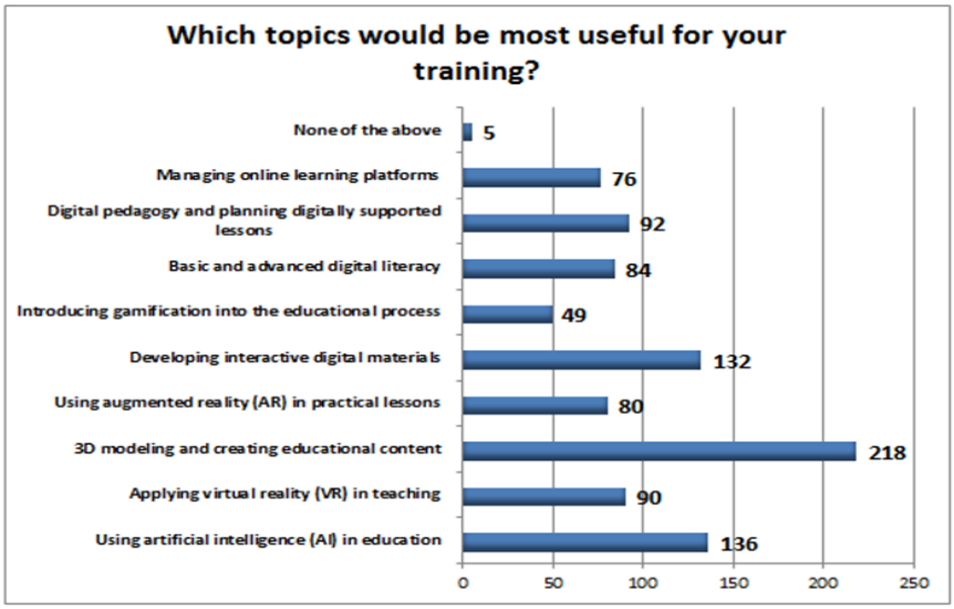

Figure 30. Chosen topics for training

As for the training methods, teachers from vocational and mixed schools in Montenegro most prefer live workshops, with 98 teachers choosing this option. A large number of teachers, 81, opted for a combination of multiple training formats, indicating the need for flexible approaches that include different learning methods. 45 teachers expressed interest in online training in the

form of webinars, while 25 teachers preferred self-paced online learning through video lessons and materials. A smaller number of teachers (2) did not choose any of the provided formats for their needs.

Clearly, these results suggest that teachers need training programs that combine various methods and learning styles.

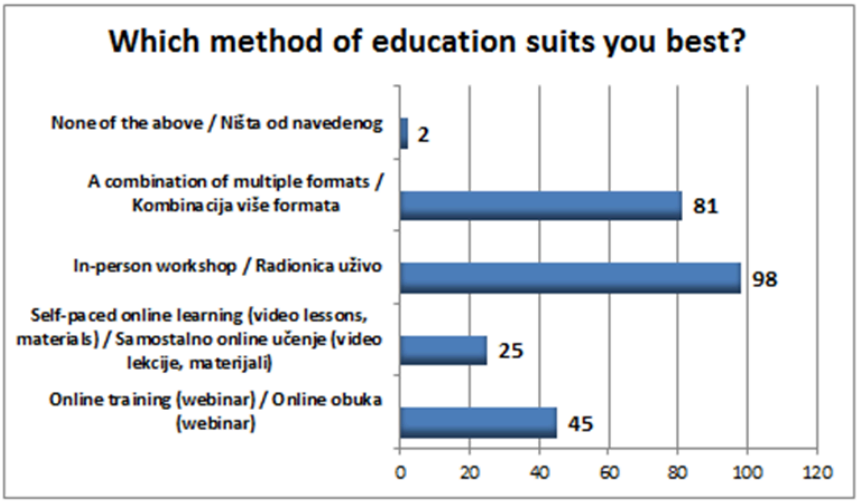

Figure 31. Chosen methods for education

The majority of teachers, 99 of them, believe that digital technologies will improve the quality of teaching in the next five years. At the same time, a large number of teachers, 75, consider digital tools useful as a supplement, while 66 teachers view them as a complement to traditional teaching methods. A smaller number of teachers believe that digital tools will have no significant impact or are unsure about their future effect on education.

These results clearly indicate that digital technologies have taken a significant place in education and will likely become even more important in the future.

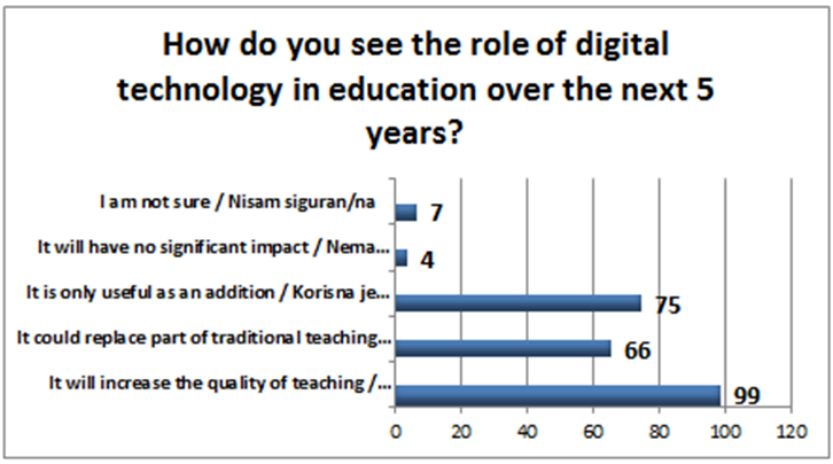

Figure 32. Future of digital technologies in education

Conclusion: Based on the analysis of the survey conducted, which was answered by 251 teachers from Montenegro, it can be concluded that the use of digital tools in teaching is highly prevalent. According to the survey, the majority of teachers possess an intermediate level of digital skills and have a desire for further professional development. The largest portion of them expresses interest in training in the areas of 3D modeling and creating educational content, using artificial intelligence (AI) in education, as well as developing interactive digital materials. According to the teachers' opinions, the most effective forms of training are live workshops and a combination of multiple formats. Although the lack of equipment in schools and the lack of time for material preparation were mentioned as problems in the development of digital skills in teaching, for the next five-year development period, they believe that digital technologies will contribute to improving the quality of teaching and will be a valuable addition to traditional education.

These results suggest that there is potential for further development of teachers' digital competencies, but support is needed from both the school system in improving working conditions for teachers, in terms of equipping schools, as well as investments in additional teacher training.

Students

In order to gain insight into the needs and experiences related to the use of digital technologies in teaching, a survey was conducted among students of secondary and mixed schools in Montenegro, with 813 students participating.

The largest number of students who completed the survey are in the second grade, totaling 325, which makes up 40% of the total sample. A significant number of students are also in the first grade 282 students, or 34% of the total. The number of students in the third grade who completed the survey is 152, while the smallest number comes from the fourth grade, with only 54 students.

Based on this, the presented results and student responses primarily reflect the experiences and perspectives of lower-grade students.

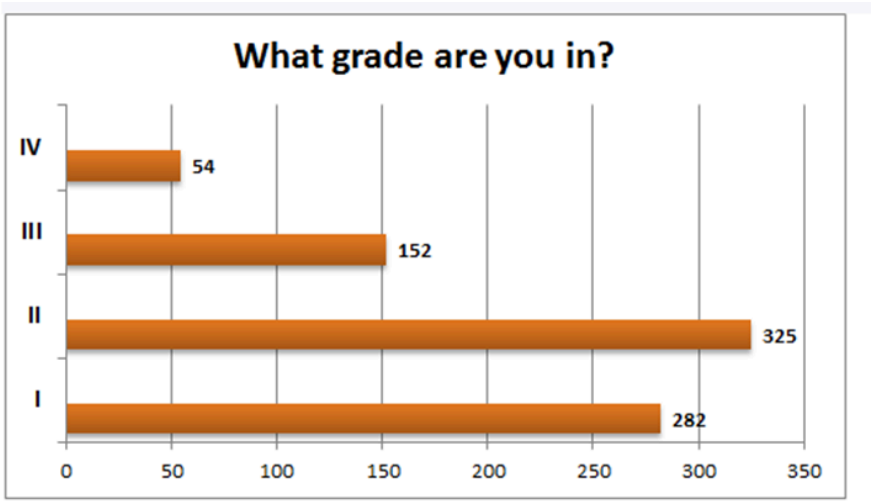

Figure 33. Distribution of students by grade level

In response to the question about how often they use digital technologies at school, such as computers, tablets, smartphones, and various applications, 272 students (33%) said they use them occasionally. A nearly identical number, 266 students (32%), reported using them daily, while 230 students said they use them several times a week. These results show that the vast majority of students, around 95%, use digital tools in schools, as only 45 students stated that they never use digital tools at school.

However, these results do not reveal whether the use of digital tools is related to the teaching process or the students' personal use. This likely depends on the conditions and equipment available in schools, as well as on how teachers organize instruction and implement the use of digital tools.

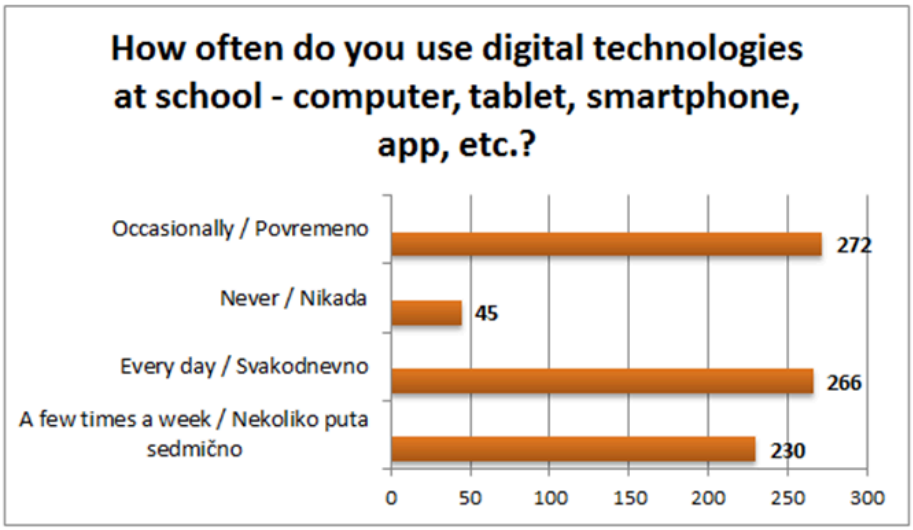

Figure 34. Usage of digital technologies in schools

In response to the question about which tools and platforms they most commonly use for learning, 381 students (46%) stated that they frequently use presentation tools such as PowerPoint, Canva, and similar. Educational videos from YouTube are used by 293 students (36%), while 289 students (35%) reported using AI tools such as ChatGPT, Copilot, etc., indicating that students favor visual and creative learning formats. Online quizzes like Kahoot and Quizizz are used by 224 students (27%), suggesting that students independently experiment with and adopt new technologies, often outside the formal school setting.

School platforms such as Google Classroom are used by 221 students, and Microsoft Teams by 116 students, indicating these are the most commonly used tools within schools and for organizing instruction. A very small number—32 students—use structured learning platforms such as Moodle or Edmodo. Only 20 students have used virtual reality (VR) in the classroom, and just 19 students mentioned using 3D modeling.

A total of 108 students (13%) stated that they do not use any digital tools, which, although a relatively small number, is still a concerning indicator for teachers and schools as organizers of the educational process.

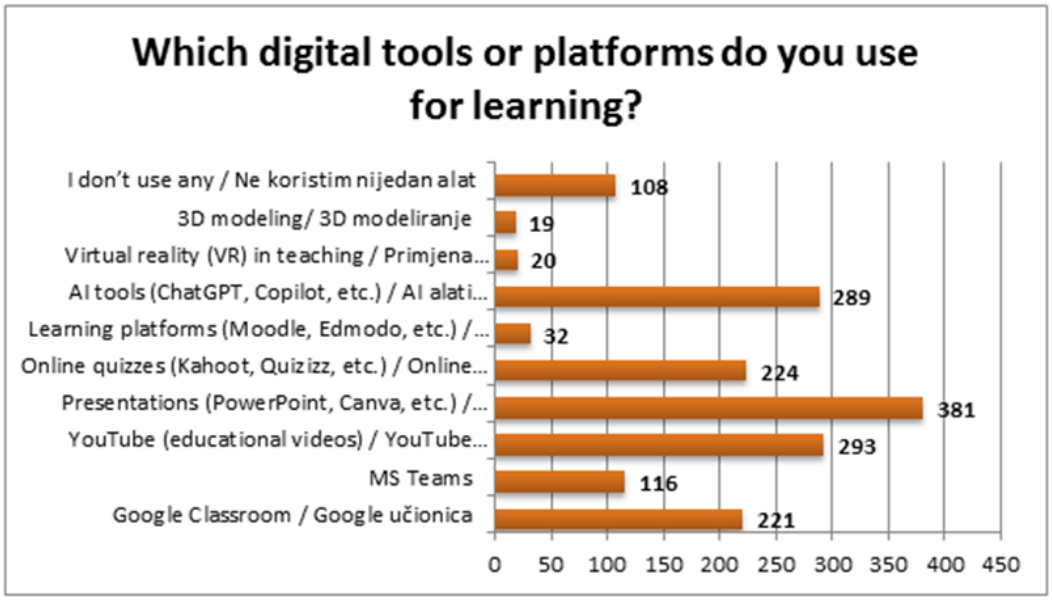

Figure 35. Digital tools or platforms used in schools

When it comes to using digital tools at school for homework or communication with teachers, the majority of students, 484 of them or 60%, responded affirmatively. However, a significant number, 329 students or 40%, said they do not use digital tools for these purposes, which is not a negligible portion.

From this, it can be concluded that communication between teachers and students is not at a high level in vocational secondary schools in Montenegro and that it needs improvement. In particular, the use of digital tools for creating and monitoring students' homework would certainly enhance the quality of the teaching process in schools.

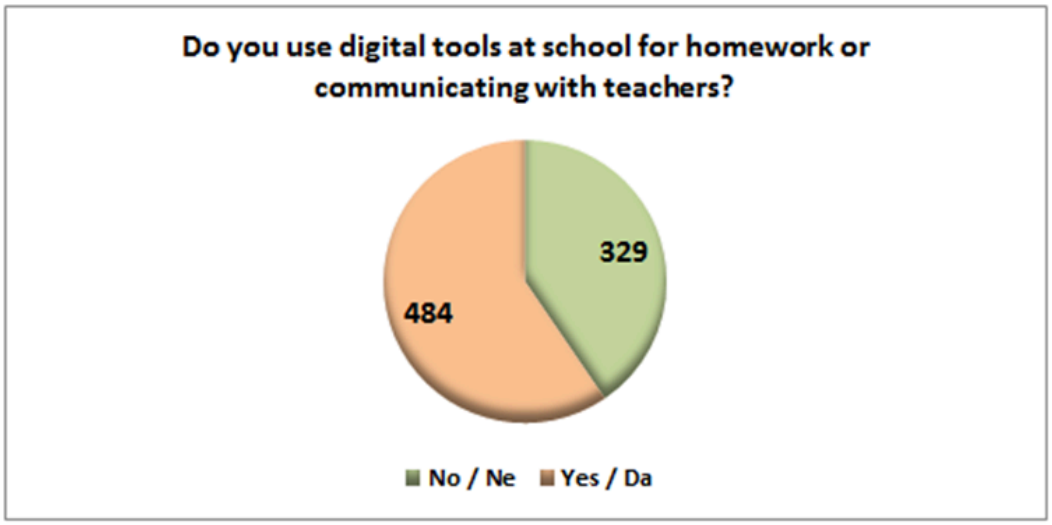

Figure 36. Usage of digital tools at school for homework or communication with teachers

The largest number of students, 400 of them or 49%, reported that they are able to use various digital tools such as Word, presentation software, and quiz platforms, indicating a solid level of digital literacy. A smaller number, 243 students or 30%, stated that they have basic skills, such as using internet browsers, YouTube, and email.

A total of 144 students or 17% reported having advanced digital skills, including programming, video editing, and working with AI tools, which suggests that students are generally not well, equipped for more advanced digital tasks.

Only 26 students or 3% reported having difficulties using digital tools, indicating that these students need support in developing their digital competencies.

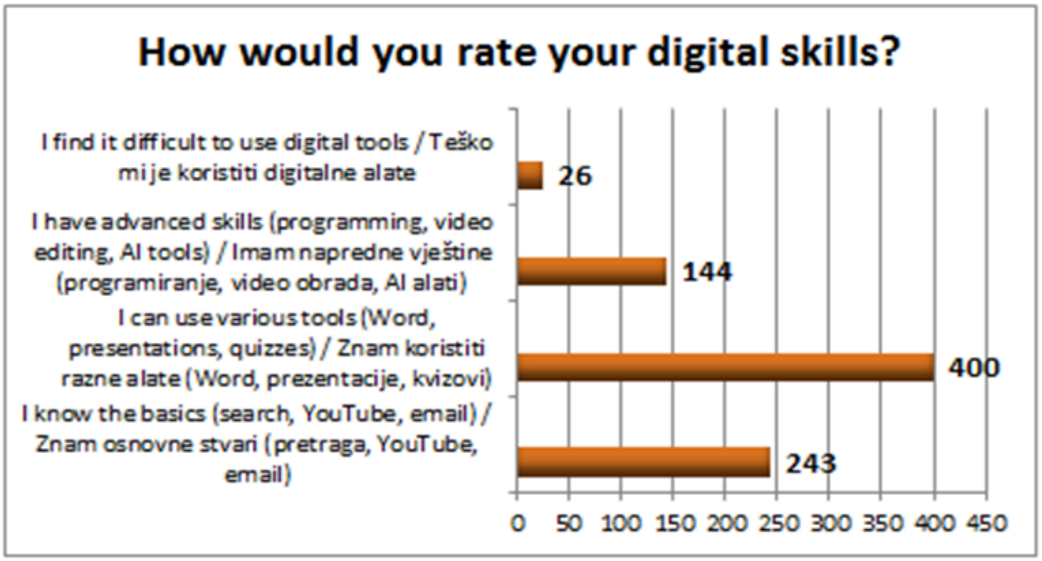

Figure 37. Self-assessment of digital skills proficiency

The majority of students, 516 or 63%, stated that using digital tools in class, such as quizzes, videos, and presentations, helps them learn better. A smaller portion of students, 260 or 32%, believe that digital tools are helpful in some cases but not in others, and that in those situations they prefer traditional teaching methods.

A very small number of students, 37 of them, expressed the opinion that they prefer traditional teaching without the use of digital tools.

In any case, it can be concluded that both traditional teaching and teaching that involves the use of digital tools and platforms have their place in the educational process.

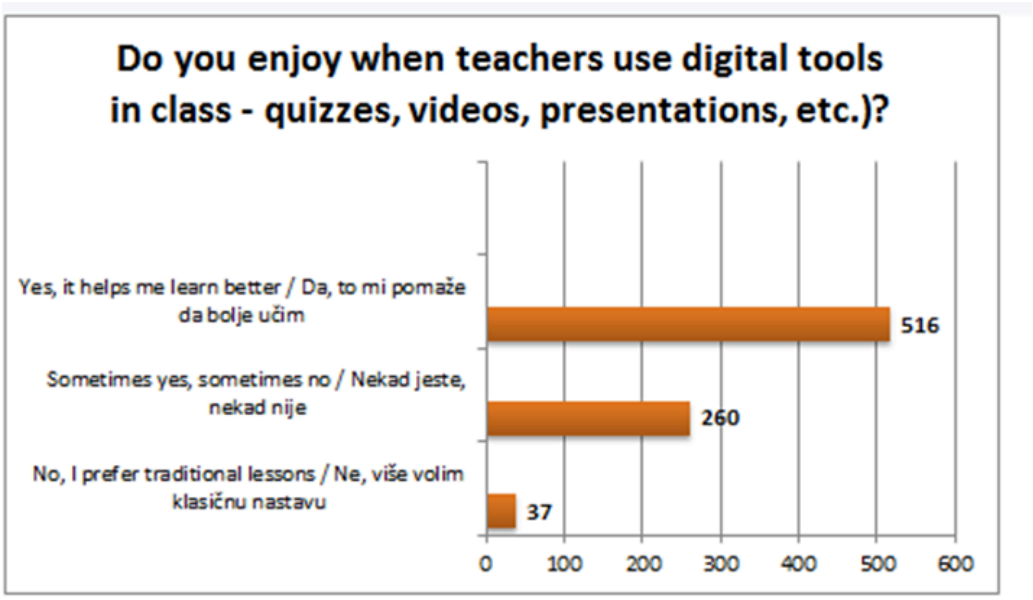

Figure 38. Students' Attitudes Toward the Use of Digital Tools in Teaching

The survey results show that the biggest obstacles to using digital tools in schools are related to technical issues and the level of equipment in schools. A total of 376 students or 46%, see the lack of a good internet connection as a barrier to using digital tools, while 370 students or 45%, point to the lack of adequate equipment in schools.

A lack of motivation to use digital tools was reported by 132 students or 16%, and 96 students stated that they do not understand how to use digital tools and platforms. A smaller number, 91 students, said they do not use digital technologies at all. These last three results are concerning, as they indicate that students need support in mastering and using digital technology in the teaching process.

Certainly, part of the survey results suggests that efforts should be made to raise awareness in order to improve school equipment and ensure the necessary conditions for the use of digital tools.

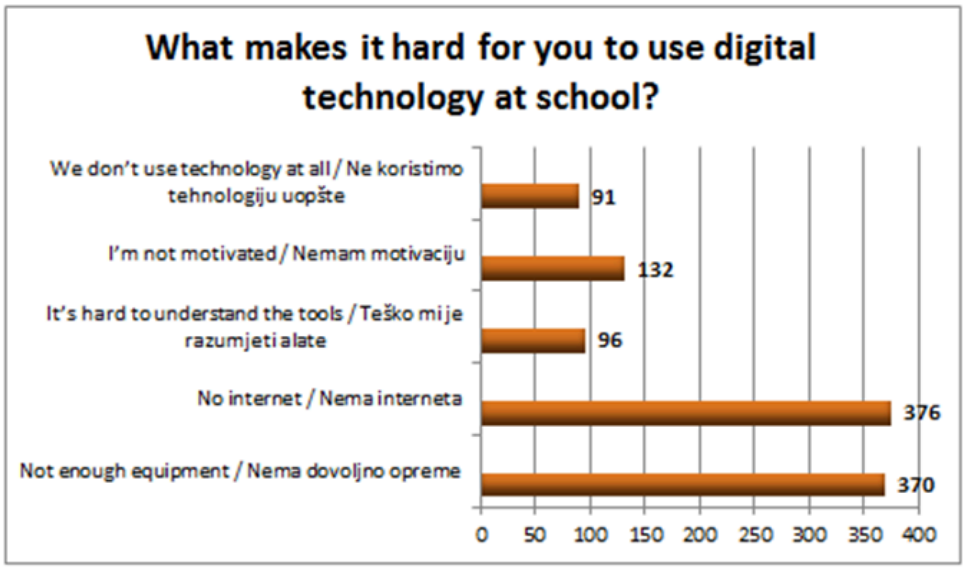

Figure 39. Barriers to the use of digital tools in teaching

The survey results show that the majority of students, 592 or 72% want to learn more about using digital tools and technologies, which indicates a strong interest in advancing in these areas. However, the number of students who did not express a desire to improve their digital competence, 221 or 28% should not be overlooked.

These results suggest that greater investment is needed in teacher training so that educators can effectively teach students and help boost their motivation to develop digital skills.

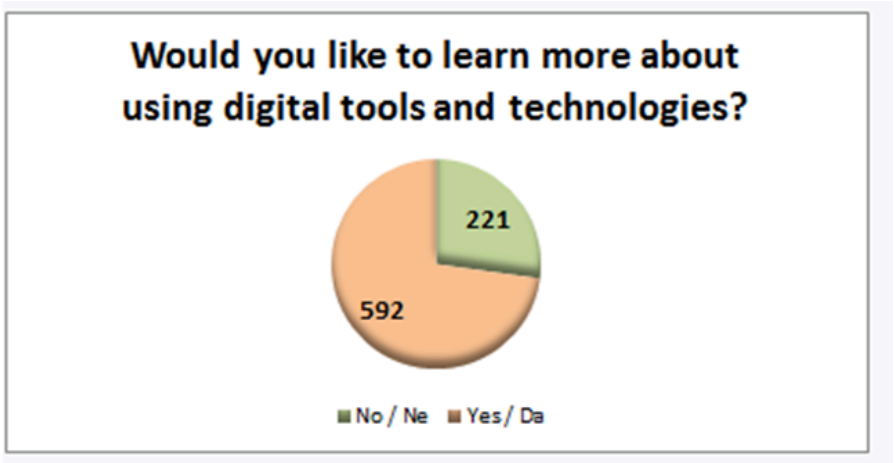

Figure 40. Students' interest in further developing digital skills

The students' responses show a wide range of topics they are interested in when it comes to acquiring digital skills. According to the number of interested students, 376 or 46% want to learn more about virtual reality, robotics, and emerging technologies. A total of 307 students are interested in learning more about creating presentations and video content, while 296 are interested in learning about safe internet use, indicating that they recognize the importance of online safety.

According to the survey, 255 students see gamification in learning as a way to acquire knowledge and skills in a more creative and interactive way.

A more traditional approach, learning the basics of programming, appealed to 204 students, while nearly the same number expressed interest in learning through AI technologies as a modern way of building digital competencies. A smaller number of students, 194, chose the use of computers for schoolwork as a topic they find interesting.

What stands out from this survey is that students are clearly thinking in multiple directions about how to acquire digital skills that will also help them master school subjects more effectively.

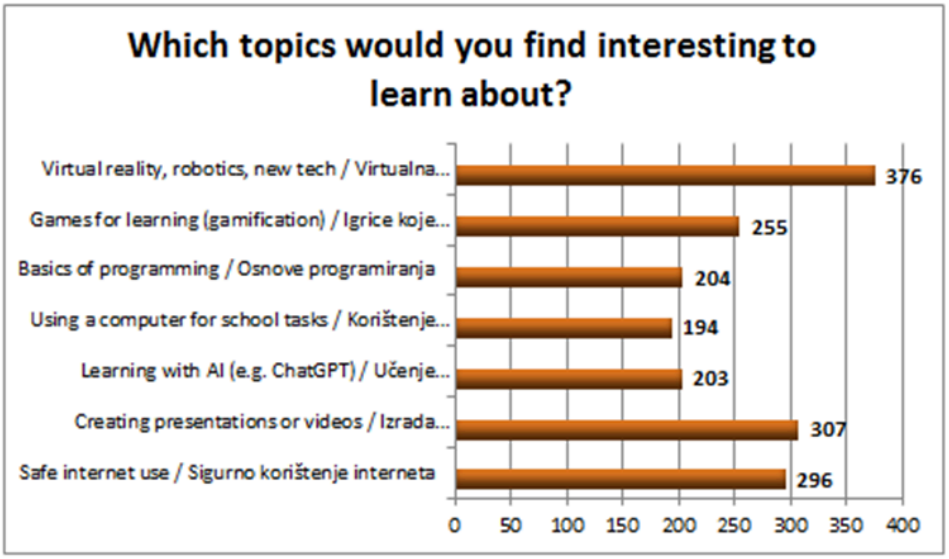

Figure 41. Interesting topics for students

According to the survey, the largest group of students 300 or 36% prefer in-person learning through workshops at school, clearly indicating that students value direct, hands-on approaches to developing digital competencies. Online lessons and quizzes were the second most preferred

method, chosen by 230 students. A blended learning approach, combining online and in-person methods, was preferred by 161 students, showing that many students benefit from a mix of different learning formats.

A smaller number of students 122 expressed a lack of interest in further developing their digital skills, which may indicate the need for greater teacher engagement and the adaptation of teaching methods to better meet students' needs.

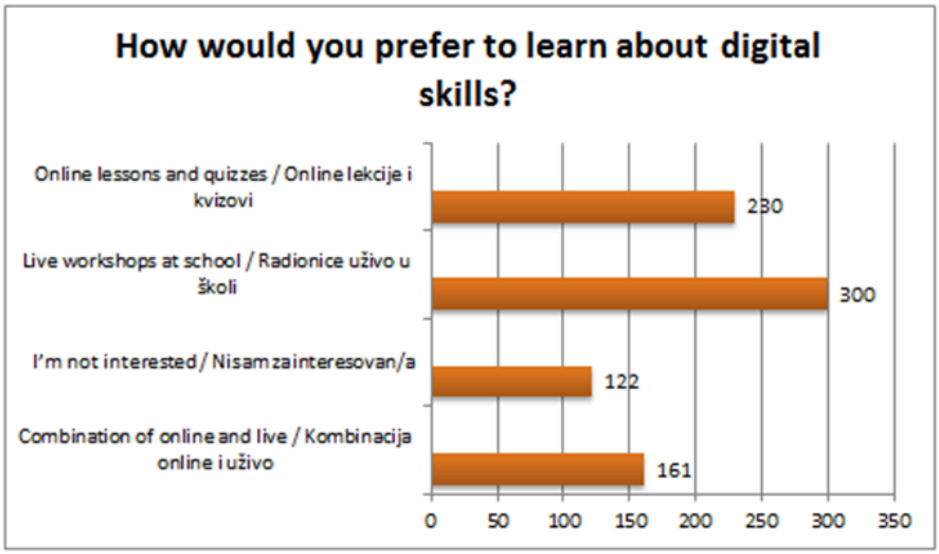

Figure 42. Best ways of education

Conclusion: A total of 813 students from secondary and mixed vocational schools in Montenegro participated in the survey, the majority of whom were from the first two years of study. More than half of the surveyed students use some form of digital tools, but in most cases, these are tools for presentations, educational videos, and AI tools. This indicates that students are independently experimenting with and adopting new technologies, often outside the formal school framework.

More than half of the students confirmed that they use digital tools in school or for communication with teachers, while a very small number reported having advanced digital skills. This highlights the need to improve the quality of the teaching process.

The survey results show that the biggest obstacles to using digital tools in schools are related to technical issues and the level of school equipment. An interesting finding is that students are clearly thinking in multiple directions about how to acquire digital competencies that will also

help them learn school material more efficiently. It can be concluded that both traditional teaching and teaching that incorporates digital tools and platforms have their place in the educational process.

Students mostly express interest in interactive learning methods, such as live workshops and blended learning approaches that combine in-person and online methods. A small number of students stated that they are not interested in developing digital skills or are not motivated to use digital tools and platforms. This suggests that communication between teachers and students in vocational schools is not at a high level and needs improvement. In particular, the use of digital tools for assigning and tracking homework could significantly enhance the quality of the teaching process.

As a final conclusion, the research suggests that investing in school infrastructure, teacher training, and the use of interactive learning methods can increase student motivation, which ultimately leads to a significant improvement in students' digital competencies.

Interview results

As part of a study on the digital competencies of teachers in vocational and mixed secondary schools in Montenegro, interviews were conducted with 10 teachers from various professional fields: electrical engineering, economics, tourism, and others.

The following three questions were asked:

1. **Can you describe specific situations when you used digital tools in the classroom? What was successful and what was challenging?**
2. **Which digital skills do you consider most important for your work, and where do you feel you need additional support or training?**
3. **What would your ideal digital skills training look like – what would you learn, how, and in what format?**

Teachers' responses:

1. The use of digital tools in teaching has become an integral part of modern education, andm the experiences of teachers in vocational and mixed secondary schools in Montenegro clearly confirm this.

Results show that most teachers use a wide range of digital tools such as: Moodle, Teams, Google Drive, Zoom, Google Classroom, Canva, Kahoot, and Mentimeter – each with its specific function in planning, implementing, and evaluating the teaching process.

According to the teachers, these tools enabled students to collaborate on shared documents in real time, which increased their engagement and improved teamwork. Interactive quizzes further motivated students and made learning more fun. Brainstorming sessions using Padlet encouraged creativity and discussion among students, while virtual guest lectures via Zoom opened doors to global collaboration.

However, challenges emerged in the form of technical issues such as internet connectivity interruptions, varying levels of digital literacy among students, and the need for continuous learning due to the constant evolution of digital technology.

A common conclusion among all participants is that digital tools greatly contribute to the quality of teaching and student engagement, but at the same time bring technical and organizational challenges that must be addressed systematically.

2. Teachers believe that they need additional training to improve their practice, as they increasingly rely on digital skills in their daily work. Some of them consider the tools they use to be indispensable for their job, but also note that they mostly learned to use them on their own, leaving room for deeper professional development.

Teachers identified the need for training in creating and securely managing student databases, using LMS platforms such as Google Classroom, and improving IT support skills, since they often face technical problems for which they are not adequately trained.

They also emphasized the need for further training in using video conferencing tools like Zoom and in creating dynamic content with Canva, as well as tools for interactive learning (Padlet, Nearpod, etc.). Teachers also expressed interest in training for software such as Adobe Photoshop, Corel, Adobe Premiere, Sound Forge, Fontographer, FontLab, and others.

All participants agree that the most important digital skills for them are those related to classroom management, communication, and data analysis. At the same time, they recognize their own limitations and the need for targeted support in advanced techniques, technical security, and programming literacy.

3. Regarding the ideal digital skills training, all participants emphasized the need for practical, tailored, and flexible programs that would enable efficient knowledge acquisition and its direct application in the classroom.

Teachers believe that the best training model would include hands-on work with digital tools, from installation and basic use to mastering advanced features. The ideal training format for most teachers would be a blended model: in-person sessions (for real-time feedback) combined with online self-paced learning modules.

All respondents agree that ideal training must be interactive, thorough, and available in multiple formats (in-person, online, individual, and group-based), with a focus on real classroom scenarios, expert support, and continuous improvement through experience sharing.

All of this clearly indicates that teachers are motivated to improve their digital skills and, accordingly, are eager to participate in additional training that would enhance their approach to the teaching process and their work with students.

Conclusion

The results of the comprehensive analysis of digital competencies among teachers and students in vocational secondary schools in Bosnia and Herzegovina and Montenegro clearly indicate significant potential, but also notable challenges in the digital transformation of vocational education. Although the use of digital tools is increasingly present in teaching practices and students show strong interest in acquiring digital skills, implementation remains unsystematic—limited by infrastructure, a lack of continuous training, and unequal access to digital resources across schools.

The majority of teachers demonstrate a willingness for further professional development, particularly in advanced technologies such as artificial intelligence, virtual reality, and 3D modeling. On the other hand, students express a strong interest in acquiring digital skills through interactive and practical methods but face limited opportunities due to technical barriers. In both Bosnia and Herzegovina and Montenegro, strategic documents recognize the importance of digital transformation, but their concrete operational implementation is still in development.

The VETechConn project offers a unique opportunity to ensure a systemic and sustainable digital transition of vocational education through international cooperation, professionally guided training, and targeted investments in infrastructure. By developing locally tailored methodologies, supporting the professional development of teaching staff, and strengthening students' digital literacy, it is possible to improve the quality of education and ensure a greater alignment with the modern labor market and the demands of a digital society.

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