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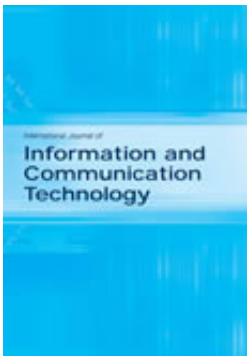

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Vocational schools in the use of information technology by educational profiles

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Abstract: Information technology, or IT enablement in education, is becoming an essential part of the digital world, forcing us to adapt to the IT-enabled new normal. Despite this, as an educational assessment, this exam evaluates the strong application of technology in different school settings to determine its suitability. This study investigates Kosovo vocational schools from three areas – health, engineering, and business – on the use of IT tools in the teaching and learning going on. This study is based on the technology acceptance model (TAM) and data from 638 contributors, explores the types of ICT being used, barriers to the use of ICT, and opportunity for growth. The results show that while key stakeholders in education and the labour market see value in ICT – the actual educational delivery is constrained by poor infrastructure, lack of training, and insufficient funding for tools and resources.

Keywords: vocational schools; information technology; IT; educational profiles; software applications.

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1 Introduction

The criticality of information technology (IT) in teaching and learning has become one of the main concerns in the rapidly changing global environment. The ability to use IT equipment and services has turned from a desirable thing to a real must in the race for people's success in the modern workforce as the move toward the digital age continues.

This is most specifically the case for vocational education, which has a crucial role in delivering students the facts and capabilities necessary for isolated occupations.

Vocational schools aim to prepare students for specific jobs by offering them practical instruction along with theoretical learning. This makes them distinctive in the educational landscape.

Vocational schools strive to develop graduates who are not just academically aware but also skilled in the practical aspects of their chosen careers, whether those sectors are healthcare, engineering, business, or any number of other fields. Since technology is a major player in almost any profession, IT is not only desired but, in most instances, it is highly required to be effectively integrated into vocational education. However, no one approach can serve all IT needs. Unlike other types of institutions, vocational education provides unique educational profiles characterised by IT usage.

The current focus of the study is to identify the complexities of IT use in the vocational school's context and provide a consideration of how students with different levels of performance in their education, or who would come to levels of performance, use applications to acquire knowledge and experience of the labour market. In this context, all difficulties or impediments to using IT in vocational schools would also be carefully analysed based on evaluation and analysis of a range of similar suggestions for IT use in vocational schools, which delineate various characteristics (there are also educational fields studied from the perspectives of various educational profiles).

A well-known challenge related to this issue still seems to match the public vocational school system in Kosovo, where a public educational response is the only sensible way to thoroughly examine all possible factors in this context.

The entire process is thus utilised for measuring the level of IT integration in vocational education and identifying the very specific demands and conditions of diverse educational profiles. Analysis and recommendations are needed for an optimal use of technology in vocational schools so that the students are adequately prepared for digital age expectations in career selection; thus, the aim will be to provide critical reviews that would be beneficial for stakeholders, legislators in policymaking processes concerning education funding requirements, among others, and for teachers (stakeholders).

2 Theoretical framework

This study uses two established models as theoretical guides: the UNESCO ICT competency framework for teachers (ICT-CFT) and the SAMR model (substitution, augmentation, modification, and redefinition). Both models provide a basis for evaluating the pedagogical potential of technology and the readiness of institutions to integrate it.

The ICT-CFT lays out the essential competencies teachers should develop to meaningfully include technology in their practice and emphasises the following six areas:

- the role of ICT in education
- curriculum and assessment
- pedagogy
- ICT organisation and administration
- professional learning

- digital skills: lifelong learning.

The SAMR model represents a framework for classifying how ICT is utilised in an educational environment. Although there are purveyors of SAMR who will provide you with defined descriptions of the four levels,

- Substitution: technology acts as a direct tool substitute, with no functional change.
- Augmentation: technology acts as a tool substitute with functional improvement.
- Modification: technology allows for significant task redesign.
- Redefinition: technology allows for the creation of new tasks, previously inconceivable.

This research evaluates the level of IT adoption among vocational schools in Kosovo across various professional profiles and determines their level of integration within this spectrum. This conceptual framework facilitates both comparative analysis and practical recommendations.

3 Literature review

The incorporation of information and communication technologies (ICT) in vocational education has been a major global and regional issue. International documents (e.g., UNESCO, 2009, 2015) highlight ICT as an enabler for changing education and labour market contexts. The European Commission (2020) and Cedefop (Cedefop, 2015, 2020) also emphasised ICT as critical to developing digital competencies and digital infrastructure needed for navigating VET contexts, particularly for employability and adaptability.

Kosovo's national policies, such as the education strategic plan (MEST, 2022a) and the Digital Agenda for Kosovo (2021), emphasised improving the digital infrastructure in Kosovo, enhancing teacher capacities, and a coordinated approach to ICT development that considers economic priorities.

However, it continues to be hampered by issues with infrastructure development, capacity building for teachers, and coordination of policy approaches (Shala and Krasniqi, 2021; Peci et al., 2023).

The European Training Foundation (ETF, 2023) reports on the pilot implementation of smart classrooms in vocational education and training (VET) institutions in vocational schools in the region of the Western Balkans, emphasising the potential of digital solutions to enhance practical contexts in learning environments. However, the report also acknowledgement issues related to infrastructure and teacher readiness.

GIZ (2022) similarly examines the use of ICT in VET in the Western Balkans, identifying challenges as well as opportunities. The report findings highlighted the importance of strengthening institutional frameworks and capacity development to better leverage ICT use in VET.

Research from the region involved in the Balkans (e.g., Marku, 2022; UNEVOC, 2020) reflects the major issues that Kosovo is grappling with: limited access to up-to-date equipment, ICT training was often fragmented, and limited engagement of students in digital experiences with regard to the environment. A clear conclusion was that there

were differences in ICT usage, especially between technical and service-oriented vocational profiles.

With regard to Kosovo, the Ministry of Education, Science, and Technology (MEST, 2022b) has announced the TiDA 2030 Digital Transformation Agenda, which includes framework and strategic directions for change in digital education and transformation as a strategic priority; including improving school digital skills and improving the infrastructure of schools including educational vocational institutions.

On a more technical level, Shrestha and Pokharel (2021) were using educational data mining techniques on data from use of the Moodle platform highlighting that learning analytics can provide information for improving online education. This information is certainly relevant as more vocational education institutions adopt e-learning systems now. May also come from a more informative regional perspective, Al-Odeh (2020) who compared the online education system of Middle Eastern universities with the American model providing conceptions that can be applied for planning advancing of their digital education system.

Recent research in Kosovo (Avdyli and Beqiri, 2021; World Bank, 2021) indicates that while stakeholders generally acknowledge the importance of using ICT in vocational schools, actual usage tends to be restricted to simple basic applications. Furthermore, these practices reflect a lack of strategic coherence in educational and vocational education policies.

4 Methodology and research methods

We investigated seven vocational schools in Kosovo to carry out this scientific study. The study is based on data collected from a literature review and explores both theoretically and empirically to the role of IT in the teaching process. The aim is to produce results related to the impact of IT, enabling both students and teachers to acquire new skills and innovations. We will conclude from these results about how vocational schools can use technology to influence the teaching process.

Statistical data, graphs, and tables are used to support the study's conclusions. The scientific methods used include empirical, comparative, and statistical methods. The empirical method made it possible to collect facts and data, describe the phenomenon, and analyse cases related to the impact of IT in vocational schools. The data analysis used descriptive statistics (frequencies, percentages, and means) and comparative analyses based on both stakeholder roles and school profiles. All data were analysed using Excel software to ensure statistical validity and internal consistency. The statistical analyses aligned with the purpose of this study and allowed the identification of:

- perceived importance and ease of use of ICT
- actual use of ICT
- the primary barriers to ICT involvement exist.

We collected and analysed 629 responses. In 2022, questionnaires were developed regarding the key issues related to the assessment of ICT utilisation. The participants included in this study were as follows: school directors (7) from the seven vocational schools; quality coordinators (7) from the seven vocational schools; teachers (30 teachers from the seven vocational schools, totalling 210 teachers); students (40 students from the

seven vocational schools, totalling 280 students); and parents (20 parents from the seven vocational schools, totalling 140 parents).

The total number of participants in this study was 644. The information obtained from literature and other sources was utilised for developing the questionnaires. Findings indicate that while stakeholders consider ICT to be of high value to education and the labour market, the level of implementation is constrained by a lack of infrastructure, untrained users, and funding. Ultimately, the study recommended improvements to ICT infrastructure, increased teacher training, and ICT tools that are suitable for the learning and teaching of vocational curricula.

This study refers to practices in developing countries, aiming to provide new information related to the use of IT in vocational schools. Through online questionnaires, students from seven secondary vocational schools in Kosovo, as well as their teachers, school principals, quality coordinators, and parents, were involved in the study. The study employed a combination of qualitative and quantitative methods, utilising face-to-face interviews for qualitative analysis and online questionnaires for quantitative analysis.

Vocational schools provide practical and theoretical training in a particular field of knowledge and skills, preparing students to perform a specific occupation in the labour market with a focus on developing their competencies and abilities.

5 Vocational schools in the use of information technology by educational profiles

IT is a discipline taught in vocational and professional training programs that emphasise its business applicability and relevance to other career paths while also providing more focused courses that are designed to prepare learners with knowledge and skills specific to particular sectors. The purpose of professional schools teaching IT is to equip them with practical skills in the computer sciences at once.

World Bank (2021), 'The growing significance of digital technologies highlights the urgency for education systems, especially vocational training, to enable all learners to acquire the digital skills needed for the workplace of the future.'

To promote the idea that IT skills are relevant and may apply differently depending on the field they study in college, students should be encouraged to use them more often in various disciplines. To enhance their skills and provide them more chances to apply their knowledge in practical ways, it is necessary for them to realise how important IT skills are in certain academic fields. Moreover, wherever they learn, be it traditional or technological systems, students should be provided opportunities to do so in different ways, which include acting on what they know without fear of mistakes being made.

EU Commission (2020), 'VET must equip individuals with both technical skills and adaptability to enable them to keep up with changing technologies and labour market demands.'

MEST (2010), The Ministry of Education, Science, and Technology (MEST) published a report in 2010. Professional education and training imply the acquisition and education of skills that aim to equip people of all ages with employability skills. Professional education is part of the system of professional education and training that enables students who have completed nine years of compulsory education (5 + 4) or those who have reached the age of 15 and older to acquire skills for employment within professional education institutions.

Education is a crucial prerequisite for economic growth (European Commission, 2013). Europe needs to support national efforts to help students learn better, provide better teaching to teachers, and make school systems more effective. We need personalised learning systems that can be effectively adapted to a wide variety of contexts. Such an approach is the key to the successful modernisation of education and training systems in Europe.

IT-specialised vocational institutions are important in providing learners with IT skills and knowledge essential for competent application of IT in different business and job settings.

Here are some crucial things related to IT-specialised vocational schools:

- Practical knowledge and skills: in these IT courses, students are given hands-on training that is relevant to the real world. Students learn the practical deployment of IT tools in this wide field, which includes programming for computers, handling databases or networks, and security, among others.
- Career-oriented: making students ready for careers in the IT sector is the key mission of IT vocational training institutions, also known as career-oriented education centres. Such schools provide classes that are usually designed for specific professions like network engineering, software development, and IT support, among others. Here, one can specialise in a particular expertise area they may be interested in, IT.
- Industry-relevant curriculum: maintain relevance in the presence of constant change; graduates from IT vocational schools should be taught having relevance to the current industrial trends so that new technologies can be grasped and employee demands in the IT sector are met.
- IT skills application: a wide range of areas and careers widely use the application of skills in IT. This is why different educational institutions have consistently customised their curricula and tracks to provide learners with tailored knowledge in areas such as video game production and medical informatics.
- Better ways of studying: there are several ways that IT can alter the understanding of students in various fields. To illustrate, computer simulations can aid students in their comprehension of intricate matters related to biology, physics, and also engineering. Hence, experience-based interactive learning improves the quality of education as it becomes more intriguing and enjoyable.
- Value in education: the value of incorporating IT in the classroom is immeasurable. Students can learn at their preferred tempo, access multiple resources on the internet, and interact with their peers or professionals from other parts of the world. It can improve the education system and individual learning.
- Adaptation to changing workforce needs: changing workforce needs must be adapted to, and this calls for the continued existence of vocational IT schools since they ensure that students do not lag behind in acquiring job market-relevant skills regardless of advancements in technology.

Figure 1 'It presents the standardised profiles of professional schools in Kosovo, according to the curricula of the ministry of education and technological sciences' (see online version for colours)

Vocational technical school:	Construction, Architecture, Geodesy, telecommunications, print graphics, graphic design, graphic preparation
Vocational school of economic and legal:	Accountant, Banking and Insurance, Marketing, Shipping and Logistics, Office Administration, Administrative Assistant,
Voactional school of medicine:	Professional Nursing Assistant, Physical Therapy Technician, Dental Technician, Medical Laboratory Technician, Pharmacy Technician
Vocational school of informatics:	Computer Science, Software Application Developer, ICT Systems Technician, Electronics Technician, Energetics, Electrical Installer
Vocational school of trade:	Wholesale and Retail Trader, Chef, Restaurant Assistant
Vocational school of agriculture:	Agrobusiness, Horticulture, Mixed Crop Cultivator and Animal Raiser, Plant Protection, Food Processor, Veterinarian
Vocational school of music:	Instrumental, Collaborative Musician.

Vocational schools focused on IT assist in preparing students for lucrative careers in the IT industry. With a hands-on type of teaching and focused programs in place, they are able to deliver the information and skills that young people need for success in an environment where changes happen rapidly because of technological advancements. Additionally, the integration of IT in education allows students from various fields to benefit from improved study opportunities and new possibilities.

World Economic Forum (2020), 'Technology can enable a more flexible, personalised, and workplace-relevant delivery of training, strengthening the link between education and employment'.

MEST (2010), Ministry of Education, Science, and Technology (MEST – Professional schools with specialised profiles according to the Ministry of Education, Science, and Technology in Kosovo:

OECD (2019), 'Digital skills are not just a desirable additional competency; they are essential for employment and participation in society in the 21st-century labour market.'

Cedefop (2015), 'VET plays a key role in strengthening the competitiveness and adaptability of the workforce, fostering social cohesion, and smoothing the transition from education to employment.

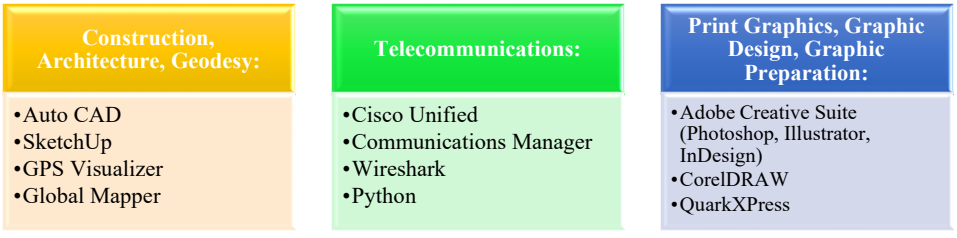
Vocational schools that incorporate IT into their educational profiles can enhance the learning process and better prepare students for their specific fields by utilising various software applications and other resources. The types of applications that can be opted for are bound to differ based on a particular educational profile and the knowledge and skills that are to be learned by the students.

World Economic Forum (2020), 'Technology is reshaping the workplace and the profile of skills that workers need. Digital transformation is not a threat to employment; it is a process that brings new opportunities for upskilling and deskilling'.

General insight into the types of applications that can be useful in different educational profiles:

> "The use of these application programs is made in vocational schools and the sectors of construction, architecture, geodesy, and telecommunications, in addition to using the programs within print graphics as well as graphic design. Application programs assist students in enhancing the overall ease, precision, and creativity. Because of these application programs, students can assist professionals in these sectors based on the industry's high-quality standards. Knowing these apps will make you more competitive and help you provide the best service in the job market".

Figure 2 Technical schools: leverage the use of design, simulation, and cad software (see online version for colours)



Application to the professional school of tourism is necessary because it prepares the student with knowledge and skills that can qualify them for success in the employment market. Through such programs, graduates should be able to uphold the inventory, client relationships, e-commerce, and financial operations necessary in the wholesale and retail sectors. Programs in this respect allow chefs and restaurant assistants to plan menus, administer recipes, and run restaurants, including bookings and food safety. Easy-to-operate instruments are crucial for staying competitive in the high-paced and customer-driven domains of wholesale, retail, and culinary arts within the tourism and hospitality sectors.

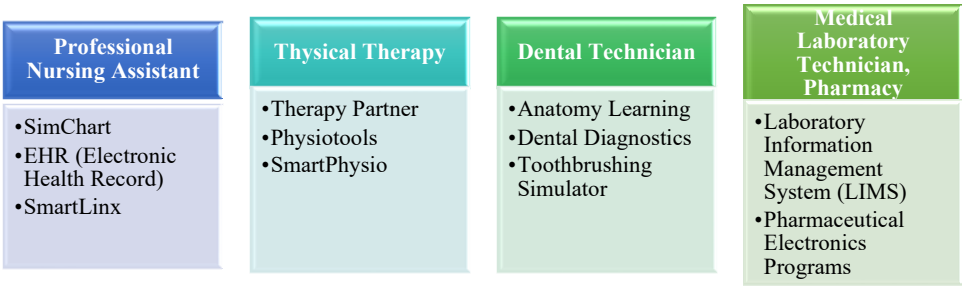
Figure 3 Trade and tourism: trade and tourism: introduce restaurant management software, inventory systems, and e-commerce tools (see online version for colours)

Professional medical schools would design application programs to equip students with the skills they need to succeed in the job market. These resources will allow students to excel in patient care management, electronic health records, diagnosis, and laboratory procedures'.

Understanding these applications is essential for providing quality care, ensuring patient safety, and complying with industry standards and regulations, especially as technology rapidly shapes the future of healthcare. When medical practitioners have that

kind of understanding about these programs, they will have everything required by the contemporary healthcare system so that all their patients can access high-quality treatment.

Figure 4 Medical schools: employ electronic health record systems, diagnostic tools, and laboratory software (see online version for colours)

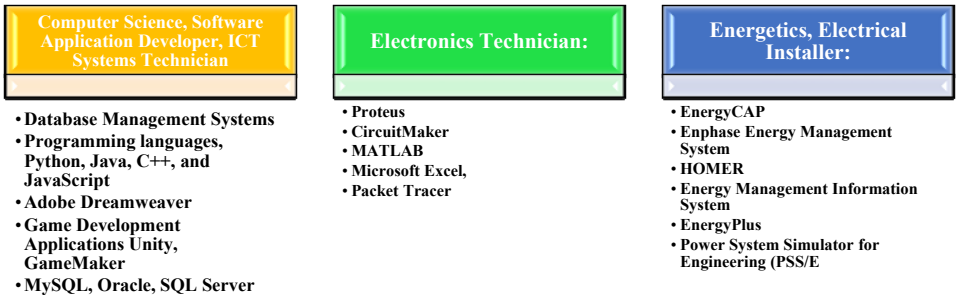


Application programs should be integrated into the teaching process in professional profiles such as economics and law, as they provide students with expertise and professionalism for employment in the era of digitalisation. Adequate application programs, tailored to the educational profiles, facilitate efficient task execution and completion among students. Students should be skilled in managing budgets, customer relations, and marketing plans, as well as organising transport and logistics, etc. Proficiency in using these programs equips graduates to meet industry needs, increase productivity, and successfully contribute to the success of businesses in a competitive market.

Figure 5 Economics and law: use accounting systems, customer relationship management (CRM) software, and business analytics tools (see online version for colours)

Professional schools teaching computer and electrical engineering should offer more application programs, as they provide students with real information and skills necessary to become more successful in the job market. These programs equip graduates with the ability to face a labour market focused on advanced technologies through the use of server-based databases, programming languages, artificial intelligence, coding, electronic circuits, energy systems, and software production. A profound understanding of these technologies is essential for producing quality solutions and being relevant in a rapidly changing industrial environment.

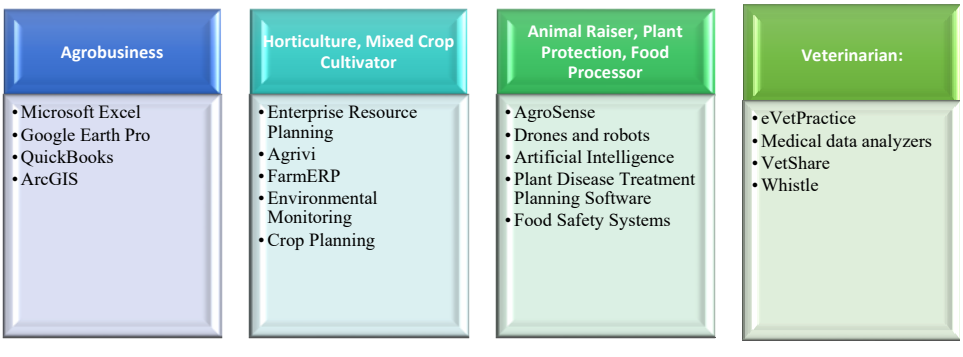
Figure 6 Informatics and electronics: educate students on coding, circuit design, and energy systems simulations (see online version for colours)



Vocational schools of agriculture and technology need application programs because they equip students with practical experience and skills necessary to stand out in today's labour market. Application programs in agricultural operations management, animal health, and food processing are important for increasing productivity, making informed decisions, and meeting industry demands. Success in a veterinary or agricultural business requires mastery of these tools to succeed in the rapidly changing agribusiness sector.

Music professional schools ought to offer application programs since they prepare students with the skills, knowledge, and instruments for them to survive in the workforce. Whether as collaborative musicians with ensembles and orchestras or as instrumentalists who strive for technical perfection through technology, artists must adapt to the changing and evolving music industry, and these applications play a key role in their development. Mastering the use of these applications offers musicians flexibility, creativity, and the ability to meet the demands of the general music industry and achieve success in the modern music business.

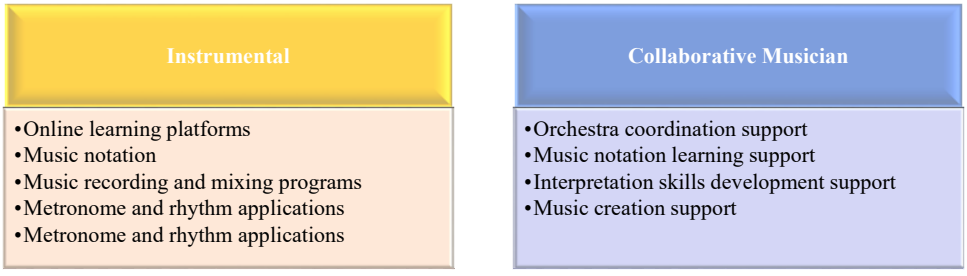
Figure 7 Agribusiness: utilise food processing machines and agribusiness management computer programs (see online version for colours)



Pedersen et al. (2006), one can understand the use of IT in schools as a deliberate intervention to ensure the success of the teaching process for students.

Curriculum and practical skills related to each type of schooling should guide the selection of particular software programs. Vocational schools should also consider providing various industry-standard software and tools to prepare students for obstacles in the actual world for their chosen careers.

Figure 8 Music schools: do notation, editing, and production software help students learn and perform? (see online version for colours)



Jonathan (2010), the use of IT in vocational schools has a significant impact on society. It is unimaginable how a modern society can continue to learn without IT.

Delič (2008), the changes in our education system over the next three decades will be evident, particularly in how we educate students to apply theoretical knowledge in practice. Knowledge of IT is a fundamental element of reading and human culture in the modern world. There is no doubt that the use of computers in the teaching process significantly facilitates working with students. The development of IT in the last decade has brought significant changes to education. Equipping schools with modern computers is one of the priorities of educational reform.

World Bank (2021), 'digital technologies enable new forms of employment, requiring education and training systems to respond to changing skill profiles.'

According to these sources, there is an indispensable role for IT in education, especially in vocational institutions. It has been recognised as a major catalyst for adjustment in an ever-changing world, rendering it easy to put knowledge into practice and completely transforming the delivery of education. Adapting education to equip students for success in the twenty-first century prioritises the integration of contemporary technology into the classroom.

6 Results and data interpretation

Presentation, analysis and discussion are important processes in scientific research, as well as in analysing and collecting data. These processes involve a detailed study and analysis of the data to identify trends and patterns. We can explore data using various statistical analysis techniques and create data visualisations through graphs and charts.

Table 1 Presents the scale of responses to the questionnaire

Respondents	*Distributed*	*Completed*	*Returned rate*
Principals of vocational schools	7	7	100%
Quality coordinators	7	7	100%
The teachers	210	210	100%
Students	280	274	98%
Parents	140	140	100%
Total	644	638	average 99%

The presentation of the results is based on data collected from online questionnaires sent to the principals of vocational schools. In the questionnaires received from the principals of vocational schools, there are two types of online questionnaires, which we will present following the results in different graphs. The results showed broad-based support for the use of ICT in vocational education but highlighted uneven implementation and limited infrastructure. Even with clear agreement on its significance among stakeholders, actual change in terms of its effective integration had only been modestly achieved in most of the schools. If change is to occur, then there are challenges to overcome, particularly with regard to training, infrastructure, and funding.

6.1 Rate of respondents

From the 644 online questionnaires distributed to vocational schools in the Municipality of Prishtina, a total of 638 were answered by respondents, which means that 99% were reclaimed for the research, which enables us to provide valid assessments for the questions in this study.

7 This section presents the analysis and data from questionnaires completed by principals of vocational schools, quality coordinators, teachers, students, and parents

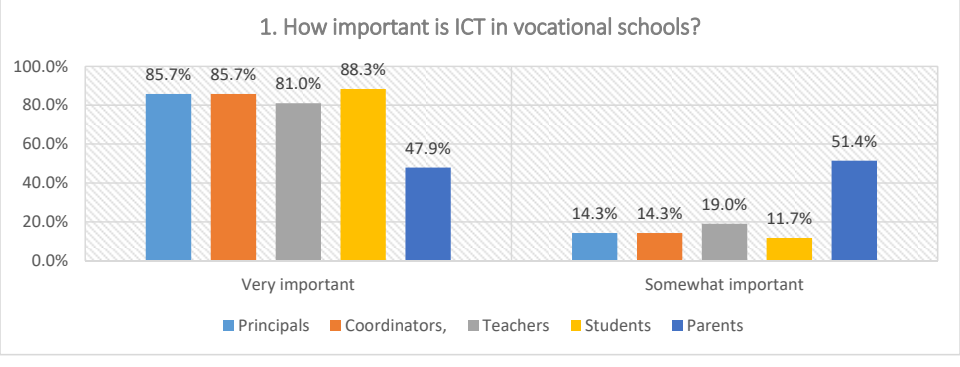
Figure 9 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'How important is ICT in vocational schools?' According to the survey, 85.7% of principals consider ICT extremely essential, while 14.3% view it as moderately significant. Among coordinators, 85.7% say ICT is critical, and 14.3% say it is important. Teachers predominantly view ICT as critical (81%) or somewhat important (19%). The majority of students (88.3%) consider ICT highly important, with 11.7% stating it is important, while 47.9% of parents view it as critical and 51.4% as somewhat important. Social interpretation: Parents scored ICT as less important than the other stakeholder groups. Their response could be the result of limited exposure to ICT in the school environment and virtual learning tools. The difference in the generational experience could also create a digital divide or ongoing differences in perceptions of ICT between generations. Pedagogical interpretation: The reason for the groups, Atlantic Education International Teachers and Principals, to rate ICT as critical, along with the ICT coordinators, is because they have experienced the possible impact it has had on learning outcomes. This demonstrates our level of professional awareness of how the use of digital tools supports educational quality and the preparedness of students.

Figure 10 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'How would you rate the current level of ICT integration in your school, on a scale from 1 to 10?' principals rated it 4, coordinators 5, teachers 4, students 6, and parents 4. The average level falls between 4 and 5, indicating that ICT integration in vocational schools is not yet up to standard.

Social interpretation: With regard to the current level of ICT integration, both parents and teachers issued lower scores. The teachers are most affected by the absence of infrastructure or access to proper training, whereas, because of their restricted visibility into the day-to-day practices within schools, the parents may derive their perceptions

from expectations that are too high. Pedagogical interpretation: Teachers' lower ratings reveal challenges they are confronting in utilising. ICT in daily instruction. The findings thus indicate an obvious need for formal support, ongoing professional development, and effective curriculum alignment with digital tools.

Figure 9 Displays the responses from 638 respondents (principals, coordinators, teachers, students, and parents) in 7 vocational schools in Kosovo regarding the importance of ICT in vocational schools (see online version for colours)



Note: The results indicate that ICT is considered crucial.

Figure 10 Displays responses from 638 participants across seven vocational schools in Kosovo – including principals, coordinators, teachers, students, and parents – regarding the question, 'how would you rate the current level of ICT integration in your school on a scale from 1 to 10?' the average rating was 6 (see online version for colours)

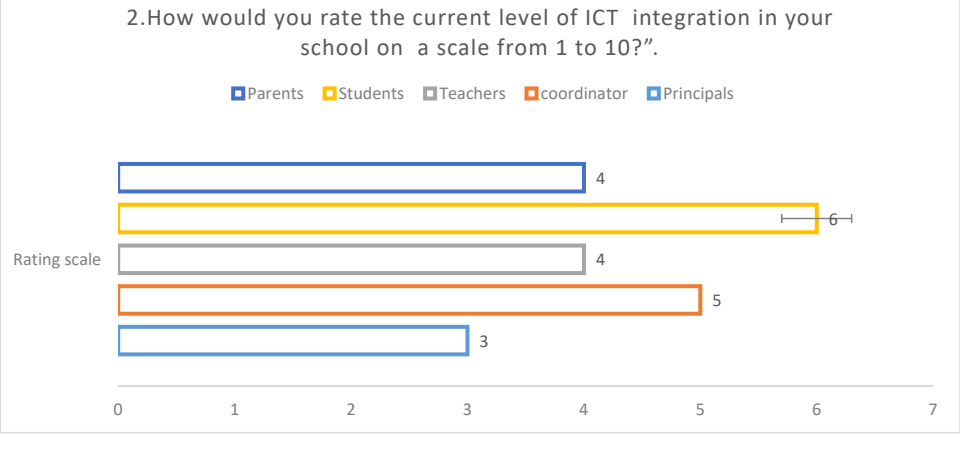
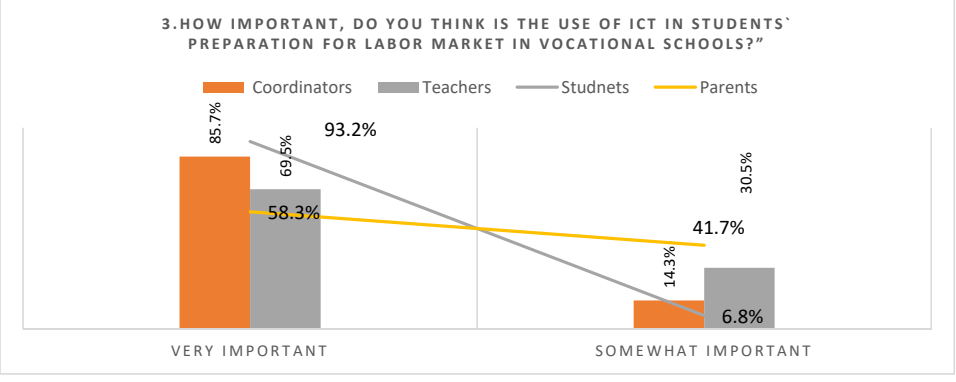


Figure 11 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'how important do you think the use of ICT is in preparing students for the labour market in vocational schools?' principals rated ICT use as critical (71.4%) and somewhat important (28.6%). Coordinators considered it critical (85.7%) and somewhat important (14.3%), while teachers saw it as important (69.5%) and somewhat important (29.5%). Social interpretation: While teachers generally agreed on the role of ICT in preparing students for the labour market, some teachers

suggested less agreement, which might be due to a lack of confidence in how well vocational schools currently connect digital learning with the employment needs of the labour market. Pedagogical interpretation: The findings illustrate that a disconnection exists between curriculum design and the requirements of the job market. Additionally, it emphasises the importance of aligning vocational programs with today's real-world technological needs and enhancing teachers' abilities to support these requirements.

Figure 11 Displays responses from 638 participants in seven vocational schools in Kosovo regarding the importance of ICT in preparing students for the labour market (see online version for colours)



Notes: The results highlight strong agreement on ICT's importance and the need for increased investment in ICT infrastructure.

Figure 12 Shows responses from 638 participants in seven vocational schools in Kosovo on the importance of vocational education for students' future careers, highlighting strong agreement on its value and the need for technology integration (see online version for colours)

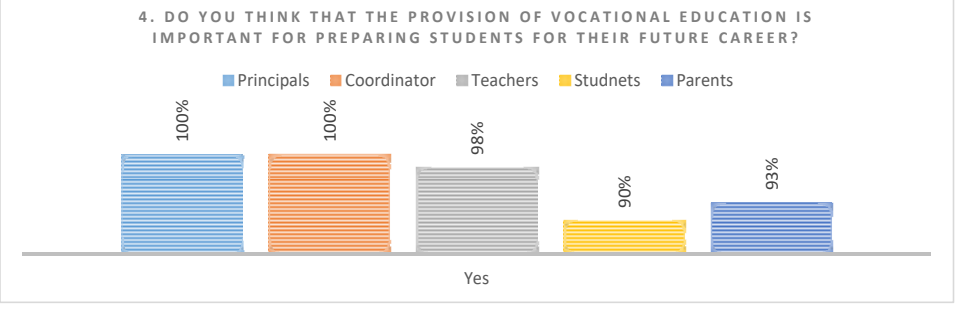


Figure 12 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'Do you think that the provision of vocational education is important for preparing students for their future careers?' It shows that most participants consider technology-based vocational education important for preparing students' future careers: coordinators and principals at 100%, teachers at 98.1%, students at 92.7%, and parents at 90%. Social interpretation: parents and students rated vocational education as slightly inferior in terms of its career preparation function. This distinction is due in part to societal perceptions that suggest that the academic

education path leads to better career pathways. Pedagogical interpretation: the findings illustrate that a disconnection exists between curriculum design and the requirements of the job market. Additionally, it emphasises the importance of aligning vocational programs with today's real-world technological needs and enhancing teachers' abilities to support these requirements.

Figure 13 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'How important do you think it is for vocational schools to keep up with the latest technology trends and developments? ' It shows that most participants consider technology-based vocational education important for preparing students' future careers: coordinators and principals at 100%, teachers at 98.1%, students at 92.7%, and parents at 90%. Social interpretation: Teachers and parents seemed to reach slightly lower levels of consensus. This finding might be connected to the challenge of keeping pace with the rapid pace of technological change stemming from a lack of resources or digital. Pedagogical interpretation: There is a need to cultivate a culture of ongoing professional development for teachers and awareness campaigns for parents about the importance of digital transformation in education.

Figure 13 Shows responses from 638 participants in seven vocational schools in Kosovo to the question, 'how important is it for vocational schools to keep up with the latest technology trends?' The majority consider it essential (see online version for colours)

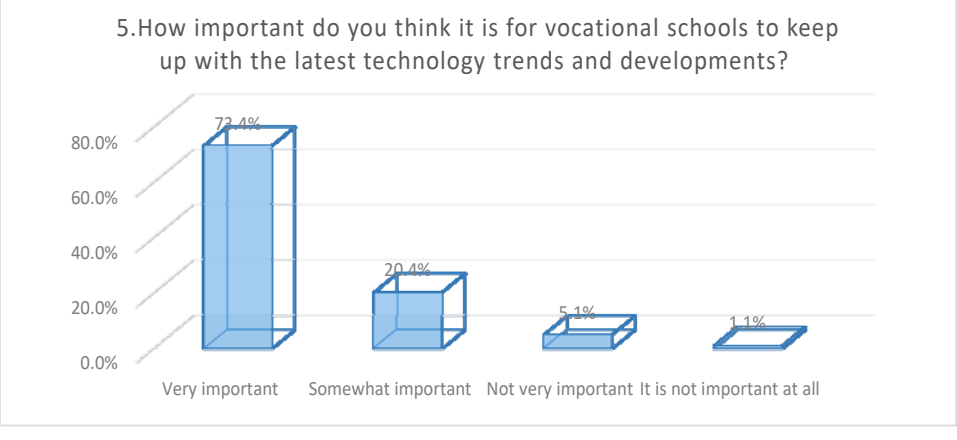
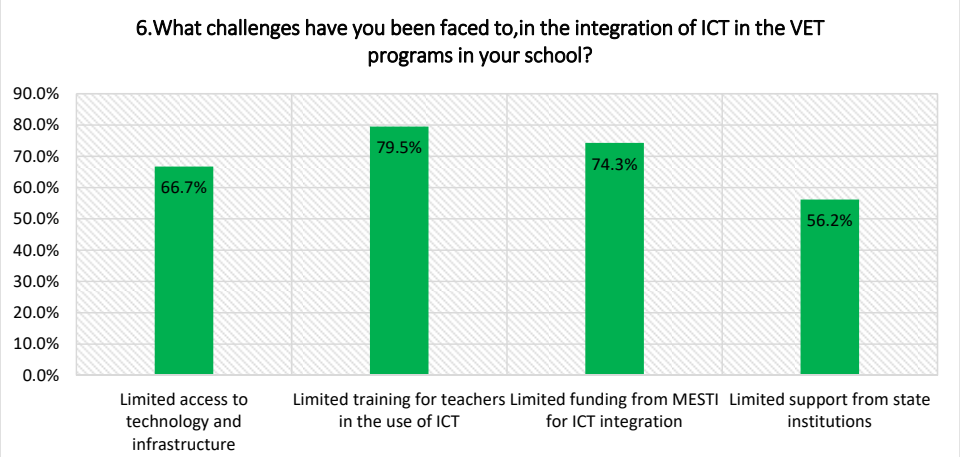


Figure 14 displays the responses from principals, coordinators, teachers, students, and parents in vocational schools to the question, 'What challenges have you faced in the integration of ICT in the VET programs in your school?' 73.4% are principals, coordinators, teachers, students, and parents who hold that it is important that vocational schools stay updated regarding issues of technological advancements. Only 6.2% of respondents believe that staying updated on technological advancements is not very important or not important at all, while 20.4% consider it somewhat important. Social interpretation: teachers and coordinators were more likely to name structural issues and training issues, whereas students and parents named a lack of equipment and a lack of access. This graph shows different roles and experiences with ICT. Pedagogical interpretation: successful ICT integration requires a strategic approach, not just from an ICT use perspective, but taking into account three areas: infrastructure, human capacity

(teacher training), and conjunction with families and schools so that all learners are able to benefit equally.

Figure 14 Shows responses from 638 participants in seven vocational schools in Kosovo to the question, 'what challenges have you faced in the integration of ICT in the vet programs in your school? Reported facing challenges in integrating ICT in vet programs (see online version for colours)



8 Conclusions

The study discusses the relevance of application programs to vocational school profiles, including IT, health, economics and law, professional trade, tourism, computer and electrical engineering, agriculture and technology, and music. This sets the stage to recognise how valuable application-based courses are in helping graduates appreciate subsequent fields, typically in the real world, and develop skills within the vocational pathways that would directly transfer to the workplace. The programming is tailored and fits the specific education profile of each student, allowing graduates to be fully prepared to meet the specific requirements in the area they have selected. As is clear, these application programs do more than just offer students sound success in their field of work; they also prepare them to have coping skills for the evolving landscape of technologies.

Application programs are flexible, enhance accuracy and originality, boost productivity, and positively contribute to education by providing students with new and innovative learning experiences, even as IT leverages these changes in education, teaching, and learning to broaden opportunities across a wide range of subjects. Application programs in vocational schools are very valuable for clarifying the mist that surrounds the knowledge.

Success in the social and economic domains of the Republic of Kosovo relies on professional education. Along with technology, vocational education provides a diverse multiplicity of programs that are tailored to supply students with key knowledge and transferable skills necessary for the best entry into the labour force while starting a career

in their chosen trade. It means an investment in not only Kosovo's general economic development, but it also means an investment in every individual student's future.

Students graduating from these diverse programs have a very relevant knowledge currency secured for the future labour market. They are the platform for the continuance of the economic expansion of a country that fosters efficiency, creativity, and advancement across industries. Professional education bridges the continuous gap in the labour force, transforming it into a flexible and competitive workforce. Kosovo's future will improve and thrive as it builds the skills and talents of its students.

In Kosovo, vocational education is not just a short course but a 3-year school program that leads to a diploma in a specific trade or occupation chosen by the students. It is a way for the country and its students to succeed, as they graduate with skills that match their field of study and acquire up-to-date knowledge of advancing technologies, aligning with the demands of the labour market in the Republic of Kosovo and the EU.

Introducing more application programs in vocational schools in Kosovo provided a sustainable future in Kosovo and beyond for young people entering the workforce, as today's labour market is focused on advanced technology industries.

9 Recommendations

9.1 Ministry of education, science, and technology

Here are a few recommendations to the Kosovo Ministry of Education regarding the use of IT in VET schools:

- Invest in infrastructure: provide vocational schools with high-speed internet, secure storage systems, and modern hardware such as laptops, printers, and servers.
- Provide training and support to staff: professional development on the use of equipment and software should be an ongoing process, and provide technical support when not training staff.
- Develop IT-supported curriculum: create programs that meet market demand and entrepreneurship opportunities using digital tools.
- Develop partnerships with industry: involve industries to provide workshops, internships, and co-designed projects. We must adequately train novice practitioners.
- Create a national IT strategy for VET by setting clear strategic directions that inform specific goals, actions, implementation steps, and methods for assessing performance in integrating ICT into VET.

9.2 For vocational school principals

There are several recommendations that can be provided to vocational school principals for the use of IT in vocational schools. Here are some of them:

- Evaluate institutional ICT requirements: identify your local technology gaps and strategically plan for integration.

- Guarantee connectivity: make fast and secure internet access a priority, as it supports everyday teaching.
- Select the right digital platforms: encourage effective digital platforms and tools that meet the subject area.
- Facilitate communication with stakeholders: use IT tools to support the dynamics of parent-teacher-student communication.
- Plan IT training for staff: offer routine sessions to develop teachers' digital capabilities.

9.3 For quality coordinators

There are several recommendations that can be provided to vocational school quality coordinators for the use of IT in vocational schools. Here are some of them:

- Assess user requirements: use student and teacher feedback in your decision-making.
- Manage ICT in pedagogy: foster and assess the use of ICT in lessons.
- Promote digital platforms: make sure educators use intriguing ways to improve access and interactivity.
- Develop digital assessment methodologies: help teachers develop fair and efficient technology-based assessments.

9.4 For teachers

These recommendations on how vocational teachers can exploit IT are:

- Increase digital skills: participate in ongoing IT training.
- Use interactive content: create engaging digital lessons and digital simulations.
- Use digital tools for assessments: gather learning outcomes using digital sites like Moodle.
- Encourage cooperation: create forums and collaborate in a sense of productive, meaningful online interaction.

These suggestions are intended to improve ICT preparedness within Kosovo's vocational education system and continue to align training practices with the ever-evolving requirements of the digital age.

10 Study limitations and future work

While this study contributed to raising awareness about the integration of ICT in vocational schools in Kosovo, there are some limitations:

- Geographic scope: the study was limited to some schools in the Republic of Kosovo, and so it may not represent others under such conditions.

- Descriptive nature: most findings are descriptive; that is, the statistics were used to explore ICT integration across schools.
- Temporal scope: this study is cross-sectional and, hence, does not indicate transformations that can happen in the utilisation of ICT over time.

As a way of really future research propositions:

- We need to conduct cross-comparative evaluations across municipalities or countries to identify differences in ICT integration in vocational education.
- We need longitudinal studies to comprehend the evolution and changes in ICT usage over time.
- Design and analyse a visual architecture illustrating ICT integration across three profiles: learning content, interaction, and engagement.
- Experimentally examine the causal pathways between ICT use and student outcomes.

These contributions will help in expanding one's knowledge of digital transformation in vocational education and will straightaway serve as guidance for refining national policies and institutional practices.

11 Comparative perspective: learning from the scandinavian model

Scandinavian countries, including Finland, Sweden, and Norway, have a reputation for advanced thinking in how they integrate ICT into VET. They do this by combining significant government support, strong pedagogical innovation, and industry partnerships to promote active learning.

For example, Finland implements a national digital strategy that supports equal ICT infrastructure access across vocational schools.

Finland combines these efforts with teacher agency and competence in digital pedagogies. Sweden promotes student-centred digital learning by using adaptive technologies and simulation-based training, in which ICT plays a crucial role in vocational education.

Norway is further integrating IT tools into apprenticeship approaches and providing immediate exposure to industrial tools and technologies.

There is much for Kosovo to learn from these models by

- Establish a national strategy for ICT in vocational education
- Encourage public-private partnerships that link education to the labour market
- Support teacher training in learning-focused digital pedagogies
- Provide infrastructure equity across cities and rural areas.

A comparative approach may help position Kosovo to adopt global best practices and enable country contexts to establish priorities for enhancing ICT uptake in VET settings.

References

Acta Didactica Napocensia (2017) 'The use of ICT as a teaching method in vocational education and training in tourism', Vol. 10, No. 3, pp.1–8, Cluj-Napoca, Romania.

Al-Odeh, M. (2020) 'What universities in the Middle East can learn from the American online education system', *International Journal of Informatics and Communication Technology*, Vol. 9, No. 1, pp.31–39.

Avdyli, B. and Beqiri, D. (2021) 'Perceptions of teachers and students on the use of ICT in vocational schools in Kosovo', *International Journal of Educational Technology*, Vol. 14, No. 2, pp.56–73.

Cartelli, A. and Palma, M. (2009) *Encyclopedia of Information Communication Technology*, Vol. 2, IGI Global, Hershey, PA, USA.

Cedefop (2015) *Vocational Education and Training in Europe: Short Description*, Publications Office of the European Union, Luxembourg [online] https://www.cedefop.europa.eu/publications/9133 (accessed 3 October 2023).

Cedefop (2020) *Digitalization and Future Skill Needs*, Cedefop, Thessaloniki [online] https://www.cedefop.europa.eu/publications/3074 (accessed 20 June 2021).

Delič, N. (2008) *Informaciono-Komunikacione Tehnologije U Obrazovanju*, Pedagoški fakultet Univerziteta, Banja Luka.

ETF (2023) *Pilot Smart-Classrooms in Vocational Schools: Western Balkans Pilot Report*, European Training Foundation, Brussels.

European Commission (2013) *ICT, Information and Communication Technologies: Work Program 2013*, Directorate-General for the Information Society and Media, Publications Office [online] https://data.europa.eu/doi/10.2759/86401 (accessed 20 December 2022).

European Commission (2020) *A Digital Education Action Plan 2021–2027 — Resetting Education and Training for the Digital Age*, European Commission, Brussels [online] https://ec.europa.eu/education/publications/digital-education-action-plan-2021-2027_en (accessed 18 November 2024).

European Commission, Directorate-General for the Information Society and Media (2012) *ICT, Information and Communication Technologies: Work Program 2013*, Publications Office [online] https://data.europa.eu/doi/10.2759/86401 (accessed 5 December 2023).

GIZ (2022) *Integration of ICT in Vocational Training: Challenges and Prospects in the Western Balkans*, Deutsche Gesellschaft für Internationale Zusammenarbeit, Eschborn.

Jonathan, A. (2010) *ICT Transforming Education: A Regional Guide*, UNESCO, Bangkok.

Marku, A. (2022) *Challenges of Digital Transformation in Vocational Schools in Albania and Kosovo*, Education for Development, Tirana.

MEST (2010) *Korniza Kurrikulumit*, MASHT, Prishtina [online] https://masht.rks-gov.net/korniza-kurrikulare-e-arsimit-parauniversitar-te-republikes-se-kosoves (accessed 30 May 2022).

Ministry of Education, Science, and Technology (MEST) (2022a) *Strategic Plan for Education* (2022–2026) [online] https://konsultimet.rksgov.net/viewConsult.php?ConsultationID=41439 (accessed 30 May 2022).

Ministry of Education, Science, and Technology (MEST) (2022b) *TiDA 2030: Digital Transformation Agenda for Kosovo*, MEST, Pristina.

OECD (2019) *OECD Digital Education Outlook 2019*, OECD Publishing, Paris [online] https://www.oecd-ilibrary.org/education/oecd-digital-education-outlook-2019_9789264901692-en (accessed 3 October 2022).

Peci, E., Gashi, A. and Morina, L. (2023) 'ICT infrastructure readiness in VET Schools in Kosovo: a regional comparison', *Journal of Vocational Education Policy*, Vol. 9, No. 1, pp.41–58.

Pedersen, G., Nipper, S., Allan, J. and Christensen, C. (2006) *E-learning Nordic 2006*, Ramboll Management, Copenhagen.

Shala, B. and Krasniqi, F. (2021) *Digital Literacy and ICT Usage in Kosovo's Public Schools: Status and Gaps*, Kosovo Education Research Institute, Prishtina.

Shrestha, S. and Pokharel, N. (2021) 'Educational data mining in Moodle data', *International Journal of Informatics and Communication Technology*, Vol. 10, No. 1, pp.9–18.

Sime, D. and Priestley, M. (2005) 'Student teachers' first reflections on information and communications technology and classroom learning: implications for initial teacher education', *Journal of Computer Assisted Learning*, Vol. 21, No. 2, pp.130–142, https://doi.org/10.1111/j.1365-2729.2005.00120.x.

Smith, J. (2018) 'Review of 'digital citizenship in schools' by Mike Ribble and Gerald Bailey', *Open Journal of Leadership*, Vol. 7, No. 3, pp.45–47.

UNESCO (2009) *Guide to Measuring Information and Communication Technologies (ICT) in Education*, Canada, ISBN 978-92-9189-078-1.

UNESCO (2015) *Information and Communication Technology in Technical and Vocational Education and Training*, UNESCO, Paris [online] https://unesco.unesco.org/ict-tvet (accessed 23 July 2023).

UNEVOC (2017) *Greening TVET and Skills Development: A Policy Discussion Paper*, UNESCO-UNEVOC, Bonn [online] https://unevoc.unesco.org/pub/greening_tvet_policy_discussion_paper.pdf (accessed 7 March 2022).

World Bank (2021) *Recover, Rebuild, Resilience: The Future of Jobs and TVET*, World Bank, Washington, D.C. [online] https://openknowledge.worldbank.org/handle/10986/35304 (accessed 23 June 2024).

World Economic Forum (2020) *The Future of Jobs Report 2020*, World Economic Forum, Geneva [online] http://www.weforum.org/future-of-jobs (accessed 3 July 2022).