Revista de Științe Politice. Revue des Sciences Politiques • No. 86 • 2025: 203 – 213

ORIGINAL PAPER

Teachers' perspectives on the digitalization of education

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Abstract:
Education has faced significant challenges in its digitization process, as the integration of technology in classrooms is often hampered by limited funding and the need for at least basic digital literacy among teachers. The aim of this research is to identify the challenges a teacher faces in a digitized classroom during the teaching-learning process. The question at the center of this study is: How do teachers perceive classroom digital integration, and what obstacles do they face? This study is relevant as it provides valuable insights into the obstacles that teachers face in adapting to digital environments, thus laying the foundation for the development of effective strategies to improve digitized teaching practices. This research used a structured questionnaire consisting of 20 questions. Given the small sample size (19 teachers), the study does not aim to make a statistical generalization. Instead, it focuses on identifying general trends, providing a predominantly descriptive perspective. The research explores the divide between teachers who support the integration of technology in the educational process and those who remain skeptical. The results indicate that most teachers prefer a mixed model, combining traditional methods with technology. Although a majority of teachers identified themselves with an intermediate level of digital competences, they expressed a strong need for additional training and institutional support. Increased student engagement was the benefit most frequently mentioned in the responses, although technical issues (e.g. poor connectivity or faulty devices) were reported as the main barriers. Teachers generally agreed that technology can improve student performance, but only in certain contexts.

Keywords: *education, integration of technology, teacher-pupil, challenges, opportunities.*

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1. Introduction

The 21st century has brought many technological changes in the field of education (Liu et al., 2021: 57-71). The digitalization of education represents the segment of human activity that focuses on the connection between technology and the achievement of pedagogical objectives (Robert, 2002). Research indicates that the retention rate of information in an online environment range between 25% and 60%, while in a traditional classroom setting, students retain between 8% and 10%.

These results can be attributed to the fact that in the online environment, students benefit from self-paced learning, allowing them to focus on topics of personal interest (World Economic Forum, 2020).

A series of European and international documents support the inclusion of digitalization in the educational field. "The Digital Education Action Plan (2021–2027)" contributes to fulfilling the priorities set by the European Commission, specifically the goal of creating a digital European continent. The "European Green Deal" aims to increase the use of digital technologies and enhance climate neutrality by 2050 (European Commission, 2020). The "2030 Agenda", signed by 193 countries, also emphasizes guaranteeing quality education, among other objectives (Mihăilă, 2020). Thus, technology has become integrated worldwide across all fields, albeit with different development paces for each country. Some countries have advanced rapidly in this regard, while others have progressed more slowly. As a result, disparities emerge between countries, with some possessing more modern educational institutions, while others lag behind technologically (Salehi & Largani, 2020).

The "Organization for Economic Co-operation and Development" program has highlighted that education outcomes can vary significantly from one country to another. One of the promises that technology has made to countries is to enhance the quality of the teaching and learning process for everyone (Vincent-Lancrin, 2022). The evolution of technology has permeated all sectors of society; however, this has not led to equal progress for all countries worldwide (Salehi & Largani, 2020: 9-21). M. Yu and Y. Liao argued that smart teaching is achieved through the use of instructional tools and well-defined objectives. Therefore, smart teaching encompasses the following elements: smart technology, smart teaching practices, and the cultivation of smart talents (Yu & Liao, 2021: 607-612). This statement is consistent with the research conducted by K. Sarnok (Sarnok et al., 2019: 21-26). There are authors who argue that a teaching style may not be effective for some students, or even for the majority, and for this reason, it is recommended that a teacher combine multiple teaching styles, adopting a multifaceted approach (Moazeni & Pourmohammadi, 2019:1-7).

This paper is relevant as it provides valuable insights into the obstacles that teachers face in adapting to digital environments, thus laying the foundations for the development of effective educational and policy strategies to improve digitized teaching practices.

The question the study answers throughout is: How do teachers perceive classroom digital integration, and what obstacles do they face? In order to answer this research question, a 20-question structured questionnaire was administered to a group of 19 secondary school teachers in a single rural school in Romania, equipped with modern technological tools such as interactive whiteboards, smart TVs, laptops, tablets and printers. The questionnaire consisted mainly of closed-ended questions (most of them with a multiple-choice option), some of them offering the option for respondents to add

additional comments. Given the small sample size of 19 teachers, the study does not seek statistical generalizations. It focuses on identifying general patterns and recurring themes in the responses, providing a predominantly qualitative perspective.

The survey results indicate that the majority of teachers prefer a blended learning model, combining traditional methods with digital tools. Increased student engagement is perceived as the main advantage of using technology in the classroom. However, technical difficulties and lack of adequate training remain significant barriers. While teachers acknowledge that technology can improve student performance, they also stress that the impact of digitization depends on the context of its use. There is also a clear need for additional professional development and access to high-performance digital equipment.

2. Material and Method

The present study was conducted using a structured questionnaire composed of 20 questions (Table 1), addressed to teachers from a secondary educational institution located in a rural area of Romania. Over the past two years, the school has been significantly equipped with technological tools, including printers, interactive whiteboards, smart TVs, laptops, and tablets.

The questionnaire consisted primarily of closed-ended (multiple-choice) questions, with some items allowing participants to provide additional responses. Its purpose was to investigate teachers' perceptions of digitalization, their use of digital tools, perceived benefits and challenges, as well as their preferences regarding the integration of technology into teaching practices.

The questionnaire was distributed in physical format, on paper, directly within the school, and was completed by a total of 19 middle school teachers from various subject areas. Data collection took place in January 2025. Participation was voluntary and anonymous. Given the small sample size and the exploratory nature of the study, the results are not intended to be statistically generalizable but instead aim to provide insight into general trends and recurring themes observed among the participants.

3. Adservio: A Digital Gradebook Example

The schools also benefit from the services of the Adservio electronic gradebook, which considerably eases the work of teachers, as grades and absences can be recorded easily, the attendance sheet can be signed from any location at the end of the day, and there is a clear record of students' strengths and weaknesses. Parents can view their child's status in real time, and teachers can communicate in real time with parents about any situation involving the student (such as a disciplinary issue or an uncompleted assignment) by sending a message via the mobile application. In the first month of 2025, the school was awarded a Certificate of Excellence by Adservio for choosing to use the electronic gradebook.

4. Results

Table 1. Questionnaire

Questionnaire Questions	Teachers' Preferences
1. What subject do you teach?	a) French b) English; c) Romanian Language and Literature; d) Mathematics; e) Art;

	f) ICT; g) Physical Education; h) Chemistry; i) Biology; j) Music; k) History; l) Other subject (please specify): _____
2. What level of technological competence do you consider you have?	a) Beginner; b) Intermediate; c) Advanced;
3. How often do you use technology in the teaching process?	a) Daily; b) Several times a week; c) Occasionally; d) Very rarely;
4. What online applications do you use most frequently during your classes? (Multiple responses allowed)	a) PowerPoint, Google Slides, Prezi, Canva; b) Storyjumper, Little Bird Tales, Storybird, Mystorybook, Storyboard That; c) Google Docs; d) MindMeister, Coggle, LucidChart, Bubbl.us; e) WordArt, Wordle; f) ClassTools, Kubbu; g) Edpuzzle, Voki, WeVideo, MakeBeliefsComics, Pixton; h) Mentimeter, Kahoot, Google Forms, Socrative, SurveyMonkey; i) Padlet, Symbaloo, Webjets; j) Google Classroom, Microsoft Teams, Zoom; k) Solpfy and Perfect Piano;
5. What types of digital materials do you create or use most frequently? (Multiple responses allowed)	a) Presentations (e.g., PowerPoint); b) Educational videos; c) Online tests; d) Interactive games;
6. What do you consider to be the greatest advantage of using technology in teaching? (Multiple responses allowed)	a) Increased student interest; b) Ability to personalize lessons; c) Access to modern resources; d) Other advantages (please specify): _____
7. What are the main challenges you encounter in using technology? (Multiple responses allowed)	a) Technical issues (connection, devices, etc.); b) Lack of students' skills in using technology; c) Lack of personal training in using technology; d) Other challenges (please specify): _____
8. Do you consider that the use of technology improves students' performance?	a) Yes, significantly; b) Yes, but only in certain contexts; c) No, traditional methods are more effective;
9. Do you believe that the integration of digitalization should be expanded to all subjects?	a) Yes, it is important for all subjects; b) No, only for certain subjects (please specify which ones):
10. What kind of support would be helpful for you to use technology more effectively in teaching? (Multiple responses allowed)	a) Additional training courses; b) Access to more advanced devices and software; c) Clear guidelines and resources for digital teaching; d) Other types of support (please specify): _____

11. Do you believe that students have equal opportunities to benefit from digital education?	a) Yes, all have the same opportunities; b) No, there are significant differences in access to technology; c) I do not have a clear opinion;
12. How do you think the digitalization of education could be improved? (Multiple responses allowed)	a) By developing more user-friendly platforms; b) By providing high-performance equipment for everyone; c) By implementing more extensive training programs for teachers; d) Other ideas (please specify):
13. Have you noticed any changes in students' engagement since you started using technology?	a) Yes, they are much more engaged; b) Yes, but only in certain specific activities; c) No, I have not noticed any significant changes;
14. What is the main difference you notice between traditional teaching and digital teaching?	a) Increased interactivity; b) Greater workload for teachers; c) Other differences (please specify): _____
15. If you had to choose, which type of teaching do you consider more effective?	a) Digital teaching; b) Traditional teaching; c) A combination of both;
16. What impact do you think digitalization has on the teacher-student relationship?	a) It improves it, through easier communication; b) It maintains it at the same level; c) It negatively affects it, creating distance;
17. How much time do you dedicate to preparing digital materials for lessons?	a) Less than 1 hour per week; b) 1-3 hours per week; c) More than 3 hours per week;
18. What types of digital activities do you consider most effective in the teaching process? (Multiple responses allowed)	a) Interactive presentations; b) Online tests and automated assessments; c) Collaborative projects on digital platforms; d) Other activities (please specify): _____
19. Do you believe that the digitalization of education should also include training students for the responsible use of technology?	a) Yes, it is essential; b) Maybe, in certain cases; c) It is not necessary;
20. How do you assess the support provided by the school for the integration of digitalization?	a) Very good (adequate resources and training); b) Good, but with some shortcomings; c) Satisfactory, but insufficient for real needs; d) Poor, almost non-existent;

Source: Author own work

The results of this questionnaire, administered to a group of 19 secondary school teachers, provide important insights into the integration of digital technology in education. With regard to the first question, a balanced distribution among the subjects taught can be noted: 7 teachers belong to the foreign languages (french, romanian, english), 6 teachers to the exact sciences (mathematics, physics, chemistry, biology), 5 teachers to the humanities and arts (history, geography, visual arts, music) and one teacher belongs to the sports field (physical education and sport). This balance shows that the interest in digitization is not limited to certain specializations, but is present across a wide and diversified range of disciplines.

In terms of self-reported technological skills (question 2), 14 teachers state that they have an intermediate level, 4 state that they have an advanced level and only one has a beginner level. These results show a solid foundation in technological competences, but also emphasize the need for continuous professional development.

Regarding the use of technology in teaching (question 3), the majority of teachers (14) claim that they use technology on a daily basis, 4 teachers claim that they use it

several times a week and only one teacher opts for the occasional option, which shows the deep integration of technology in education.

Among the most frequently used applications (question 4) are Google Slides, PowerPoint, and Canva (15 teachers), followed by Google Docs and the educational platforms Microsoft Teams, Google Classroom, Zoom (10 teachers). A preference for visual and interactive tools is identified. The most frequently used digital materials (question 5) include interactive games (14 teachers), educational videos (12 teachers) and presentations (11 teachers), emphasizing the importance of dynamic methods to capture students' attention. The main advantage of the use of technology in education (question 6) is the increased interest of students (15 teachers), access to modern resources (7 teachers), and personalization of lessons (5 teachers). On the other hand, the main challenges identified (question 7) are technical (13 teachers), insufficient teacher training (5 teachers), and lack of digital skills among students (3 teachers).

As for the impact of technology on pupils' school performance (question 8), 13 teachers consider that it helps to improve performance only in certain contexts, 4 consider that it is significantly improved, and only one prefers traditional methods. A majority of teachers (18 teachers) support the idea of extending digitization to all school subjects (question 9). The support needed for more effective integration (question 10) includes additional courses (11 teachers), well developed guides (8 teachers) and the most advanced devices (7 teachers).

Teachers believe that there are significant inequalities in students' access to digital education (question 11), with the majority (15 teachers) pointing to the need for educational equity policies. In order to improve digitization (question 12), the main solutions identified include high quality equipment (12 teachers), intuitive platforms (7 teachers) and training programs (4 teachers). Regarding student engagement during class time (question 13), 8 teachers report a significant increase and 6 teachers report a limited increase in specific activities.

Digitalization has a positive influence on the teacher-pupil relationship (question 16), making communication easier for 14 teachers, while 4 consider it neutral and one negativ. Most teachers (14) devote between 1-3 hours per week to preparing digital materials, and 5 teachers devote more than 3 hours per week (question 17), reflecting a serious commitment to integrating technology in education. The most effective digital activities for a student (question 18) are interactive presentations (17 teachers), online quizzes (6 teachers), and collaborative projects (2 teachers). Teachers consider it very important to train students to use technology responsibly (16 teachers), and 3 of them say that this is only in certain cases (question 19).

The institutional support provided to the school for the integration of digitization (question 20) is rated as very good (13 teachers), and another 6 teachers see it as good, but with some shortcomings, suggesting the need for further improvements in this area.

4.1. Analysis of digitalization in education by curricular area - The Use of Technology and Teachers'

4.1.1. Language and Communication (French, Romanian, English)

Following the evaluation of the questionnaires distributed to teachers, those belonging to the Language and Communication curricular area (Romanian language and literature, French - first language, and English - second language), totaling seven teachers, chose the following options: intermediate level (5 teachers), beginner level (1 teacher), and advanced level (1 teacher).

Regarding the daily use of technology in the teaching process, five teachers selected the option indicating that they use technology in education on a daily basis, while two other teachers chose the option of using it several times a week. In terms of the use of applications in education, the most frequently chosen options, in ascending order, were: PowerPoint, Google Slides, Prezi, Canva, and Google Docs. One teacher opted for Edpuzzle, WeVideo, MakeBeliefsComics, Pixton, Mentimeter, Kahoot, Google Forms, Socrative, SurveyMonkey, as well as Padlet, Symbaloo, and Webjets. With regard to other types of digital materials used in class, interactive games and educational videos ranked first and second, respectively.

A classification of applications that students can use during lessons can be identified in the manner of Bloom's taxonomy, which includes levels such as creation, evaluation, analysis, application, understanding, and knowledge, according to Table 2.

Table 2. Correlation of Bloom's Taxonomy with Digital Tools

Levels of Bloom's Taxonomy	**Some Digital Tools**
Creation	Wevideo, Genially, 30hands, Bookcreator, Glogster, StoryboardThat
Evaluation	Socrative, Formative, Google forms, Wizerme, PollEverywhere, Testmoz, Proprofs, Kaizena, Liveworksheets
Analysis	Edmodo, Doctopus, Online Rubric, Citelighter, Hemingway
Application	Google Slides, Google MyMaps, Animoto, Bubbleus, Lucidchart
Understanding	Thinklink, Edublogs, Pixton
Knowledge	Padlet, Ideaboards, Diigo, Google Keep, SeeSaw.

Source: Curo, 2022

The teachers consider that the greatest advantage of teaching using technology is the increased interest of students, as well as access to modern resources, with one vote also noting the ability to personalize lessons. The main challenges faced by teachers when using technology are technical issues; however, there were also two votes for the option indicating a lack of personal training in using technology. The majority of the teachers surveyed agreed that the use of technology improves students' performance, but only in certain contexts.

Teachers in this curricular area frequently use digital presentations, such as PowerPoint, Google Slides, Prezi, and Canva (15 teachers), as well as Google Docs (10 teachers). This indicates a preference for applications that facilitate organization and collaborative writing. Regarding quiz-based applications, their usage appears to be slightly less prevalent but not entirely absent. Tools such as Mentimeter, Kahoot, and Google Forms are employed by seven teachers, suggesting that these applications are utilized to enhance classroom interaction.

Video materials are somewhat more widely used (12 teachers), reflecting an effort to adopt a multisensory approach to learning. Regarding the impact on student performance and preferred teaching methods, it is observed that the majority of teachers (13 teachers) believe that technology enhances student performance only in certain situations. While it is beneficial for increasing motivation, it cannot replace traditional teaching methods. All teachers unanimously prefer a blended approach to teaching, indicating that technology is valuable when integrated with traditional teaching and learning methods.

4.1.2. Mathematics and Natural Sciences (Mathematics, Physics, Chemistry, Biology)

These teachers frequently use interactive games (14 teachers), indicating that gamification is a popular approach in the field of exact sciences. Presentations (11 teachers) and video materials (12 teachers) are also considered powerful tools for enhancing the comprehension of complex concepts. However, a relatively low number of teachers opt for online tests (4 teachers), suggesting that challenges still exist in adapting to digital assessments. This highlights a strong preference for traditional testing methods. Regarding the benefits and challenges of digitalization in education within this curricular area, access to modern resources (7 teachers) is seen as a major advantage, particularly when conducting simulations and virtual experiments. However, technical issues, such as weak internet connectivity and inadequate equipment, often limit access to educational software. Concerning the impact on student performance and preferred teaching methods, the majority of teachers (13 teachers) consider technology useful in certain situations, emphasizing that visualization aids students in understanding concepts more effectively. However, traditional methods remain essential for problem-solving exercises. All teachers prefer a blended teaching and learning approach, integrating both digital and traditional methods.

4.1.3. Human and Society (History, Geography, Social Education)

These teachers use tools for document writing and sharing, such as Google Docs and Padlet (2 teachers). Additionally, interactive maps and applications like MindMeister, Coggle, and LucidChart are employed. For interactive assessment and review, quiz-based applications (Kahoot, Socrative – 7 teachers) are commonly utilized. Regarding the benefits and challenges of digitalization in education from the perspective of this curricular area, access to modern resources (7 teachers) and increased student engagement (15 teachers) are the primary benefits identified by teachers. However, institutional support is needed for the integration of digitalization into education. The main challenges faced by teachers in this field include technical issues (13 teachers) and a lack of training courses (5 teachers). Concerning the impact on student performance and preferred teaching methods, teachers generally consider technology useful in certain situations (13 teachers). This suggests that, in subjects such as history or social education, which rely heavily on critical analysis, traditional methods cannot be entirely replaced by technology. The preference for a blended teaching approach—combining modern and traditional methods—is also evident in this curricular area, as technology cannot fully replace debates or individual reading.

4.1.4. Arts (Visual Arts, Music)

In the field of music education, the music teacher utilizes specialized software during lessons, such as Solpfy and Perfect Piano. Interactive presentations are the most frequently used tools, highlighting a need for visualizing the creative process to enhance creativity.

Regarding the benefits and challenges of digitalization in education from the perspective of this curricular area, it can be inferred that technology provides valuable support and new creative opportunities. However, continuous additional training is necessary for successful integration into the artistic domain. On the other hand, a significant challenge is the lack of adequate equipment (7 teachers), which visibly impacts

the use of digital tools in artistic subjects such as visual arts and music. Concerning the impact on student performance and preferred teaching methods, all teachers in this curricular area, like their colleagues in other disciplines, prefer a blended teaching approach, as practical and sensory experiences are essential for fostering students' creative development.

Discussion

The research results show a noticeable inclination among teachers regarding the use of technology in education. It is evident that the majority of teachers prefer an educational mix, using both traditional education methods and modern education (technology integration). Out of 19 respondents, 15 indicated that they possess intermediate-level knowledge, which suggests that teachers still require training in using technology in the classroom. A total of 15 responses highlighted that the greatest advantage of using technology in teaching is the increased student interest. However, there are also several challenges faced by teachers when using digital tools in lessons, with technical issues (connection, devices) ranking first among the responses. The majority of teachers believe that students' performance is improved by technology, but only in certain contexts, meaning not universally.

Most of the of the selected options by teachers indicate a preference for additional training courses as support for using technology effectively in teaching, and the provision of high-performance equipment for all as a means of improving the digitalization of education.

Students are more engaged at school since the introduction of technology, but only in specific activities. There is a noticeable increase in student interactivity since the use of technology in classroom lessons. Among teachers, the most commonly used online applications are: at the top are PowerPoint, Google Slides, Prezi, and Canva, followed by Google Docs, Google Classroom, Microsoft Teams, and Zoom, with Mentimeter, Kahoot, Google Forms, Socrative, and SurveyMonkey ranking third.

Conclusions

The survey was carried out by 19 teachers in a rural secondary school, showing an openness towards the integration of technology in the educational process. Most respondents prefer a blended teaching model, combining traditional methods with digital tools. Technology is perceived as a factor that increases students' interest and involvement, but its effectiveness varies according to the context of application. The most common obstacles are technical difficulties and lack of training. Teachers are asking for practical support in the form of training courses and the provision of high-performance equipment. Teachers also stress the importance of training pupils to use technology responsibly.

` The unanimous preference for blended learning reflects a balanced and realistic approach to the digitization process, emphasizing both innovation and the value of traditional methods. The results indicate the need for educational policies that support digital equity and the development of digital competences in schools.

Authors' Contributions:

The authors contributed equally to this work.

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Article Info

Received: March 26 2025
Accepted: May 14 2025

How to cite this article:
Grosu, D. M., Stoica, V. (2025). Teachers' perspectives on the digitalization of education. *Revista de Științe Politice. Revue des Sciences Politiques,* no. 86, pp. 203 – 213.