

UNIVERSITY PROFESSORS' PERSPECTIVES ON THE RAPID TECHNOLOGIZATION OF EDUCATION: A QUANTITATIVE RESEARCH ON THE HIGHER EDUCATION IN ROMANIA

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Abstract:

The swift integration of digital technologies into higher education has reshaped pedagogical practices, demanding adaptive responses from educators. This research paper presents a quantitative study that investigated the perceptions of academic staff regarding the advantages and disadvantages of traditional versus digital education in the context of accelerated technological integration using closed-ended questions specific to quantitative research and scalar questions based on the Osgood semantic differential scale. Findings show that educators perceive digital education as offering superior flexibility, particularly in terms of time management and organizational aspects. However, traditional education was regarded as fostering more authentic and effective social interaction, emphasizing the pedagogical value of face-to-face contact. Concerns over increased rates of plagiarism in online education were substantiated, reflecting heightened awareness of academic integrity risks in virtual settings. Nonetheless, educators expressed confidence in current digital plagiarism detection tools, acknowledging their effectiveness in maintaining academic standards. Lastly, the research highlighted a significant increase in the sense of social isolation among faculty in online teaching contexts, underlining the emotional and relational costs of digital education.

Keywords: Technologization, Higher Education in Romania, Professor Perspective, Online Teaching

1. Introduction

The COVID-19 pandemic, first identified in late 2019 and officially declared a global pandemic by the World Health Organization in March 2020, precipitated an unprecedented disruption in global education systems. In an instant, what was once considered the future of learning—digital education—became an urgent necessity. Schools, colleges, and universities worldwide were compelled to close their doors and shift to online learning environments. This abrupt pivot to remote teaching marked a watershed moment, catalyzing digital transformation across all levels of education and setting the stage for a paradigmatic, and likely enduring, shift in how

education is delivered and experienced. As lockdowns spread and in-person instruction became impossible, educational institutions turned to digital platforms with remarkable speed. By April 2020, approximately half of the global population was under lockdown, prompting around 186 countries to switch from in-person instruction to emergency remote teaching (ERT) virtually overnight (Garcia et.al, 2023). While the adoption of online learning tools had been growing prior to the pandemic, this rapid shift represented a leap forward in both scale and urgency—what some have termed a “digital leap” rather than a gradual evolution (Renz & Hilbig, 2023).

Initially, the pivot to online learning was a reactive measure; however, it quickly drove deeper institutional introspection about the role of technology in education. Higher education institutions (HEIs) began to reconceptualize digital technology as an integral rather than auxiliary component of their operations. Post-pandemic, digital transformation became more intentional, purpose-driven, and central to mission delivery—what was once an auxiliary support mechanism became a strategic imperative (Chukwuere, 2024). This transformation was not limited to HEIs. At the primary and secondary education levels, particularly in developing regions, crisis management extended beyond remote learning to broader continuity planning. Emergency Remote Teaching (ERT) frameworks, supported by ICT4D strategies, played a vital role—highlighting not only technological needs but also infrastructural challenges such as electricity, digital literacy, and socio-political context (Akbari, 2021). Moreover, transformation has extended beyond technology to innovation in pedagogy and inclusiveness. In Latin America, HEIs began leveraging digital tools not only to replicate classrooms online but also to foster virtual environments that facilitate digital literacy, engagement, and innovation (Deroncele-Acosta et al., 2023).

2. Literature Review

Following the analysis of 79 scientific articles identified using the SCOPUS search engine, it can be observed that in less economically developed countries, the focus on the digitization of the education system is significant. A study conducted in Bangladesh examined the perceptions of teachers and students regarding online education and the challenges encountered. The study employed a convergent parallel mixed-methods design to investigate the challenges and solutions in online education in Bangladesh. In this approach, quantitative and qualitative data are collected simultaneously but analyzed separately. The results are only combined afterward, contributing to a more complete and balanced understanding of the research problem.

To investigate the relationship between students' level of engagement and the perceived usability of the educational platform, Pearson correlation analysis was applied. The statistical analysis revealed a statistically significant positive correlation between the two variables ($r = 0.47$; $p < 0.01$). These results indicate that a higher perceived ease of use of the platform is associated with a greater level of student engagement. Regarding the main issues of online education, 70% of students from rural areas reported internet connectivity problems. Furthermore, the study showed that over 60% of teachers lacked the necessary training to use digital learning platforms before the pandemic.

This mixed-methods study highlights significant challenges in the online education system in Bangladesh through an integrated analysis of data collected via questionnaires ($N = 130$) and in-depth qualitative interviews ($N = 25$). The results reveal major discrepancies in technological infrastructure, pedagogical adaptation, and institutional support, all contributing to the limitation of the digital education process's effectiveness. Students reported a moderate level of satisfaction regarding the ease of use of the educational platform ($M = 3.40$; $SD = 1.12$).

However, the interview responses signaled serious difficulties. For example, an urban student stated: "The learning management system frequently crashes during live sessions, causing us to miss essential parts of the lesson." (Karim et al., 2025)

Another study focused on teacher perceptions and preparedness for the digital transformation of the education system was conducted in Vietnam, using the same methodology. The findings indicate that Vietnamese teachers display a moderate level of preparedness for integrating digital transformation into teaching, as well as a similar level of acceptance of the process (means = 3.67 and 3.65). Questionnaire data revealed favorable perceptions of digital transformation in education (mean score: 3.28), and also of the ease of use of digital tools (mean score: 3.42). Factors such as training level, perceived usefulness, and ease of use explain approximately 86.1% of the variability in teachers' acceptance of digital transformation. These results suggest a clear intention among Vietnamese teachers to adopt digital transformation in the educational process. In conclusion, the research emphasizes the importance of targeted interventions and sustained support to facilitate teachers' transition in Vietnam towards a digitized education system. (Anh & Phong, 2023)

Another study conducted in Bangladesh on a sample of 392 students found that the likelihood of students using a digital higher education system significantly increases when teachers are open, students show interest, and the economic context is stable. For students who had negative experiences during online learning, the need for an effective virtual assessment system becomes evident—one that ensures objectivity and reliability. Additionally, students' willingness to adopt technology is an essential factor in their decision to participate in online courses. The research argues that the integration of traditional and digital learning provides a sustainable solution for developing a resilient and adaptable education system in response to future challenges. (Masud et al., 2023)

Regarding the learning experience, a study conducted in Malaysia involving 328 participants (180 international students – 54.9% and 148 local students – 45.1%) focused on student experiences during the pandemic. It found that students expressed a high level of dissatisfaction with the inability to ask questions or interact during lessons, reflecting significant barriers in teacher-student interaction in the online environment. Moreover, limited internet access was a major difficulty for students in rural areas, negatively affecting participation and the efficiency of distance learning (Selvanathan & Hussin, 2023)—a shared issue also identified in the Vietnam study by Anh and Phong.

A separate study on the perception of digital platforms was conducted on a sample of 494 students in Pakistan. The results show that performance expectations, perceived effort, support conditions, and social influence are key determinants in students' preference for using the Blackboard Learning System (BLS). In contrast, hedonic motivation and social isolation had no direct significant effect on this choice. These findings suggest that students' behavioral intention plays a crucial role in the adoption of BLS as a tool for accessing educational content,

particularly in the context of remote learning imposed by the COVID-19 pandemic. (Raza et al., 2022)

Another study conducted in Portugal, involving 221 students and 60 teachers, presented the perceived advantages of online education. When asked about their reasons for being satisfied with online learning environments, teachers most frequently cited "flexibility", with a mean of 3.97, followed by "usefulness" and "diversity of available tools," which had similar mean scores of 3.90 and 3.83, respectively. Regarding "ease of use," it was consistently rated by most teachers, showing the lowest variation around the mean, indicating strong consensus on this aspect. (Lopes et al., 2022)

Thus, internationally, there is a growing interest in adopting digital platforms as a learning medium, with the main advantages identified in the studies being flexibility and accessibility, while technical issues and difficulty of use are the most common disadvantages.

Regarding the use of social media technologies for educational purposes, the study conducted by Mangundu provides an exploratory analysis of this phenomenon based on a sample of 20 trainee teachers through qualitative research. The future teachers expressed mixed perceptions about using social media in teaching and learning. Some showed reluctance toward integrating these platforms into their teaching activities, suggesting a degree of aversion to mediating education through social networks. In contrast, other respondents recognized the usefulness of these tools for delivering educational content. The main issue identified was the lack of authentic social distancing in the online environment, raising concerns about the efficiency and nature of educational relationships developed through such platforms. (Mangundu, 2022) Thus, another common disadvantage of digital education is identified from the teachers' perspective—social isolation.

Among the research conducted on student samples from Romanian universities regarding digitization in the context of the COVID-19 pandemic, one study presents how the hybrid education model significantly impacts the development of digital skills and the integration of digital technology in educational institutions. Furthermore, the existence of a resilient education system during the pandemic directly influences the ability to adapt to the demands of a knowledge-based economy, as well as the quality of communication between teachers and students, between students and teachers, and between students and educational institutions. (David et al., 2022)

Another study of 139 teachers aimed to evaluate the main challenges and methods of applying artificial intelligence technologies in the educational systems of Romania and Serbia, based on developments as of 2022. It showed that teachers generally believe AI can significantly contribute to professional success, save time in lesson planning, improve student performance and engagement, and personalize the learning process by identifying the most effective teaching methods (audio materials, videos, e-books), all of which have a considerable impact on increasing the quality of education. (Burcea-Manea-Țoniș et al., 2022)

None of the scientific articles specifically addresses the niche proposed for analysis in this article. Therefore, we can confirm the need for further research to identify the perceptions of university professors in the field of economic sciences regarding the online technologies used in education systems, as well as the opportunities for integrating technologies into educational marketing.

3. Research objectives

The objectives of this research are to identify the perceived advantages and disadvantages of traditional and digital education from the perspective of university teaching staff, to evaluate professors' opinions concerning the risks of plagiarism within digital learning environments, to analyze teachers' perceptions of the methods used to assess students in online as compared to physical classroom settings, and to assess the impact of accelerated digitalization on teaching quality and the social interaction between teachers and students.

3.1 Methodology of research

Quantitative research involves measuring the investigated aspects using numerical indicators and aims to answer questions such as "how much?", "how often?", or "to what extent?". This approach focuses on quantifying the collected information and extrapolating the conclusions obtained from a sample to a broader population. The process involves rigorous stages of data collection, analysis, and interpretation of numerical data, in order to validate or invalidate the hypotheses formulated in the study. (Ghanad, 2023)

"Conclusive research aims to help the decision-maker choose the most appropriate course of action in a given situation. These are also known as confirmation studies." (Cătoi, 2002)

The goal of such research is to test hypotheses and examine the relationship between marketing variables. Conclusive research includes the quantitative analysis of data to determine the validity of the proposed hypotheses.

Surveys represent a primary data collection technique, involving the use of a questionnaire applied to a sample selected in such a way as to reflect the characteristics of the studied population. One of the most significant advantages of online surveys is the speed with which responses can be collected. This type of instrument allows for the immediate distribution of questionnaires to respondents, regardless of their geographical location, thus eliminating spatial and temporal barriers. Similarly, the time required to obtain responses is considerably reduced compared to traditional methods (postal, face-to-face, or telephone), facilitating the acceleration of the entire research process. This time efficiency enables researchers to quickly obtain relevant data and to react in real time to potential methodological issues or the need to adjust the instrument used. (Baron et al., 2002)

The research conducted to test the hypotheses derived in the previous subsection is conclusive in nature, using the online questionnaire as the main instrument. It includes closed-ended questions specific to quantitative research and scalar questions using Osgood's semantic differential scale. To analyze the meaning attributed to a concept, the semantic differential method involves using a rating scale, usually composed of five or seven points. This is structured on pairs of bipolar terms (with opposite meanings), selected to reflect contrasting perceptions. Participants are invited to indicate on the scale the point that best reflects how they perceive or evaluate a certain construct. The values on the scale are associated with degrees of intensity, and the center of the scale represents a neutral position, indicating the absence of a clear orientation toward either extreme. (Ciabuca, 2015)

This research aims to understand the advantages and challenges of the shift to digital education and to investigate in-depth the opinions of university professors regarding the rapid transition to digital education, focusing on their perceptions of the advantages and disadvantages of physical versus digital educational systems. It

also analyzes concerns related to plagiarism, the assessment of student performance, and the overall impact of the pandemic-induced transition on teaching quality and academic engagement.

The research hypotheses are:

1. Professors consider that digital education offers more flexibility than physical education.
2. Professors believe that traditional education offers better social interaction than digital education.
3. Plagiarism rates are perceived as higher in digital environments compared to physical ones.
4. Student assessment results in digital environments are considered less reliable than those conducted in physical classrooms.
5. The level of student engagement in digital education is perceived as lower than in physical education.
6. Professors believe plagiarism detection methods are effective.
7. Professors felt a greater degree of social isolation in online education compared to in-person teaching.

The target population consists of university professors teaching economic sciences at bachelor's and master's programs in Romania. The sample includes a population of 71 professors. The duration of the study was 10 days, and respondent recruitment was carried out via email and digital platforms. The questionnaire was distributed using Google Forms.

To select participants, a screening questionnaire was used that also collected demographic data, composed of 10 questions. The survey itself contained 16 questions.

The obtained results reflect university professors' perceptions of the advantages and disadvantages of traditional versus digital education. Additionally, the study evaluated professors' views on plagiarism risks in online environments, analyzed their perceptions of student assessment methods in digital vs. physical contexts, and assessed the impact of accelerated technological adoption on the quality of teaching and social interaction between educators and students.

3.2 Research question

RQ1: Perceived advantages and disadvantages of educational formats

RQ1.1: To what extent do university professors perceive digital education as more flexible than traditional, in-person education?

RQ1.2: How do professors evaluate the efficiency of digital education compared to traditional education?

RQ1.3: What challenges did professors encounter in adapting to digital teaching methods?

RQ2: Social interaction and engagement in digital versus physical education

RQ2.1: How do professors perceive the quality and frequency of social interaction in traditional education compared to digital education?

RQ2.2: To what extent do professors consider that student engagement differs between digital and physical learning environments?

RQ2.3: How has the transition to online education affected professors' sense of social connection and interaction with students?

RQ3: Plagiarism risks and academic integrity in digital environments

RQ3.1: How do professors perceive the risk of plagiarism in digital education compared to traditional education?

RQ3.2: To what extent have professors identified an increase in plagiarism cases during online teaching?

RQ3.3: How effective do professors consider digital plagiarism detection tools (e.g., Turnitin, StrikePlagiarism) in identifying and preventing plagiarism?

RQ3.4: How confident are professors that plagiarism can be effectively prevented in digital education environments?

RQ4: Assessment reliability and evaluation methods

RQ4.1: How do professors perceive the reliability of online student assessment compared to physical assessment formats?

RQ4.2: What evaluation methods do professors consider most appropriate for assessing students in digital versus traditional settings?

RQ5: Impact of accelerated digitalization on teaching quality and social interaction

RQ5.1: How do professors assess the overall quality of teaching in digital education compared to physical education?

RQ5.2: To what extent has the accelerated digitalization of higher education influenced professors' teaching effectiveness and interaction with students?

4. Results and discussion

From a demographic perspective, the participants belong to diverse age groups, which are meaningfully structured, showing a direct correlation between age and the level of professional experience accumulated. The largest age group is composed of professors aged 30 to 39, representing 38 % of the sample, followed by the 40–49 age group with 25.5 %. The 50–59 age group accounts for 15.5 %, followed by 20–29-year-olds (14.1 %). The smallest group is over 60, with only 7 % of the analyzed population.

Regarding gender, 52.1 % of the total participants are female, and 47.9 % are male.

In terms of the type of university institution where participants teach economic sciences: 56.3 % work in private universities, while 43.7 % are affiliated with public universities.

Regarding teaching experience in higher education, the largest category is those with 11–15 years of experience (28.2 %). The next largest is those with 16–20 years of experience (23.9 %), followed by those with more than 20 years in higher education (21.1 %). The 5–10 years of experience group represents 18.3 %, and the smallest category consists of professors with less than 5 years of experience (8.5 %).

All participants confirmed in the final selection question that they are active at universities in Romania.

The responses to question number 1, "Do you consider digital education to be more flexible than traditional education?" show a majority supporting the flexibility of digital education compared to that conducted in a physical setting, with 73.2 % giving a positive answer to the question and only 25.4 % expressing disagreement. 1.4% abstained from answering; however, the relevance of the result was not affected by this abstention, confirming the first hypothesis, H1: Teachers believe that digital education offers more flexibility than physical education.

Question number 2, "Do you consider that traditional education offers better social interaction than digital education?" aims to test the second hypothesis of the research: H2: Teachers believe that traditional education offers better social

interaction than digital education. This hypothesis is confirmed by a majority of 69 % of respondents, with only 29.6 % selecting the negative option, and a single abstention (1.4%), which does not influence the result.

Question number 3, "How efficient do you consider digital education compared to traditional education?" aims to gather data regarding the perceived efficiency of digital education in comparison to education conducted in a physical environment. It can be noted that 38 respondents, representing 53.6% of the total subjects, stated that digital education is more efficient than physical education, compared to 18 respondents, or 25.4 % of the total subjects, who believe that digital education is less efficient than education conducted in a physical environment. Additionally, 15 respondents, representing 21.1 %, consider both to be equally efficient. Thus, using the semantic scale, it is observed that expert opinion leans towards digital education being more efficient, with an average score of 3.43 points.

Question number 4, "How would you evaluate the level of student engagement in the digital environment compared to the physical one?" aims to analyze the perceptions of university professors in the economic field regarding the level of student engagement in the digital environment compared to the physical one. Thus, 33 respondents, representing 46.5 % of the total sample, observe lower student engagement in the digital environment compared to the physical environment; 15 respondents, or 21.1 %, notice no difference; and 23 respondents observe higher engagement in the digital environment. The average score is 2.72, indicating that expert opinion leans towards lower engagement in digital education compared to physical education, confirming hypothesis number 5, H5: the level of student engagement in the digital environment is lower than in the physical environment.

Question number 5, "How difficult was it for you to adapt to digital teaching methods?" aims to determine the level of difficulty experienced by university professors in the field of economic sciences regarding the process of adapting to digital teaching methods. Thirty-three respondents stated that adapting to digital teaching methods was not difficult (46.5 %), 11 respondents neither considered the adaptation process easy nor difficult, and 27 respondents found adapting to digital teaching methods challenging. The average score is 2.78, indicating that expert opinion does not perceive adaptation to digital teaching as particularly difficult.

Question number 6, "Do you believe that the risk of plagiarism is higher in digital education than in traditional education?" aims to test the third hypothesis, H3: plagiarism rates are perceived to be higher in digital education environments compared to physical ones. Thus, 66.2 % of respondents confirm that the risk of plagiarism is higher in digital education than in traditional education, only 31% deny this, and 2.8 % did not respond. Therefore, hypothesis number 3 is confirmed.

Question number 7, "Have you identified plagiarism cases more frequently during online teaching?" serves to verify hypothesis number 3, with responses confirming its validity: 56.3 % reported identifying plagiarism cases more frequently during online teaching, compared to 40.8 % who did not, while 2.8 % did not respond.

Question number 8, "How effective do you consider digital tools (e.g., Turnitin, StrikePlagiarism, etc.) for detecting plagiarism?" aims to test hypothesis number 6, H6: Teachers consider plagiarism detection methods to be effective. Thus, the majority of respondents, 57.7 %, consider digital plagiarism detection tools effective, 16.9 % view them as neither effective nor ineffective, and 25.4 % consider them ineffective. The average score is 3.54, confirming hypothesis number 6, with expert opinion considering digital tools effective for plagiarism detection.

Question number 9, "How confident are you that plagiarism can be prevented in the digital environment?" serves to support the testing of hypothesis number 6, which is also confirmed by these responses. Expert opinion considers that plagiarism can be prevented in the digital environment, with 69 % of respondents expressing confidence that plagiarism can be prevented digitally, while 16.9 % are not confident. The average score is 3.78.

Question number 10, "Do you consider that student assessment results online are as reliable as those in physical format?" aims to test hypothesis number 6, H6: student assessment results in digital environments are considered less reliable than those conducted in physical classrooms. The results show that hypothesis H6 is invalid, as the majority of respondents, 64.8 %, believe that online assessment results are just as reliable as those in physical settings.

Question number 11, "How do you assess the quality of teaching in the digital environment compared to that in the classroom?" aims to analyze teachers' perceptions regarding the quality of online teaching, with 40.9 % stating that it is lower than in the physical environment.

Question number 12, "To what extent do you feel that interaction with students was affected by the transition to online teaching?" aims to analyze expert opinion on how the shift to online teaching impacted student interaction. The majority of respondents, 71.2 %, stated that this transition affected their interaction with students.

5. Conclusions

The research fully achieved its formulated objectives by successfully testing the hypotheses regarding the perceived advantages and disadvantages of traditional education compared to digital education from the perspective of teaching staff, evaluating teachers' opinions on plagiarism risks in online educational environments, analyzing their perceptions of student assessment methods in digital versus physical contexts, as well as assessing the impact of accelerated technologization on teaching quality and social interaction within the educational process.

The first hypothesis, according to which teachers consider digital education to offer a higher degree of flexibility compared to education conducted in a physical format, was confirmed. The results highlighted a general appreciation of the organizational and time-related advantages provided by the online environment. The second hypothesis, relating to the belief that traditional education fosters more authentic and effective social interaction than digital education, was also confirmed. Respondents emphasized the importance of direct contact in the teaching process. The third hypothesis, which postulated the perception of higher rates of plagiarism in digital education compared to traditional education, was supported by the data obtained. Teaching staff showed an increased level of concern regarding this issue in the online context.

In contrast, the fourth hypothesis, which suggested that student assessment results in digital environments are considered less reliable than those conducted in physical classrooms, was disproved, indicating a relatively balanced confidence in the validity of assessments carried out in both formats.

The fifth hypothesis, which assumed that the level of student engagement in online activities is lower than in the traditional environment, was confirmed, with teachers noting a decrease in active participation in the virtual space.

The sixth hypothesis, stating that teaching staff consider current plagiarism detection methods effective, was confirmed, suggesting increased trust in the digital tools used to ensure academic integrity.

Finally, the seventh hypothesis, according to which teachers experienced a higher level of social isolation in the context of online education compared to physical education, was also confirmed, highlighting the negative impact of technological distancing on human connections within the educational process.

Limitations of the research include the relatively small sample size, which, although representative of the population, is numerically limited.

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