Digital Technology Integration in the Educational Practice - An Exploratory Study

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ABSTRACT

In the context of the accelerated digitization of the education system, the teaching process is facing a major transformation, marked by multiple opportunities as well as challenges that require continuous teacher training, adaptability, investment in infrastructure, and coherent educational policies. The contemporary teaching approach requires teachers to reconfigure traditional pedagogical paradigms to create relevant learning contexts focused on the specific educational needs of digitally native students. The main objective of this research is to analyze how the ease of integrating digital technology into the classroom and its perceived usefulness influence its effective use in teaching. The results show that both perceived ease of use and usefulness are important factors that determine the effective use of technology in the teaching process.

Keywords

Digital technologies in education, technology acceptance, Continuous Professional Development Program, and online teaching.

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INTRODUCTION

The accelerated transformations of contemporary society, largely driven by technological progress, have also generated significant changes in the field of education, necessitating the reconfiguration of the teaching process towards a pedagogy adapted to the new digital realities.

In this context, digital pedagogy is emerging as a paradigm that involves the conscious and reflective integration of digital technologies into teaching, learning, and assessment activities. This approach involves not only the use of digital tools but also the development of a pedagogical culture centered on flexibility, collaboration, autonomy, and personalized learning. Following the stipulations of the *European Framework for the Digital Competence of Educators - DigCompEdu*, teachers' profiles must include digital skills and the ability to use them pedagogically in their professional activity, in the context of the major impact of technology on everyday life [14, 15].

Through the *National Recovery and Resilience Program - PNRR* (https://www.edu.ro/PNRR), funds have been allocated for digital equipment in schools, smart laboratories, IT equipment and connectivity, the acquisition of digital technologies, applications, and online learning platforms [16].

Teachers play an essential role in applying digital pedagogical theories into classroom practices, directly influencing the quality of the educational process. Faced with generations of digitally native students, teachers are called upon to rethink their professional role, adopt interactive methods, and harness the potential of technology to support the educational process.

Nowadays, Continuous Professional Development (CPD) programs undoubtedly represent effective foundations and starting points to introduce teachers to *DigCompEdu* and to provide them with a solid knowledge base on digital pedagogy. However, for those skills to take root, evolve, and translate into innovative pedagogical practice, the best approach is an integrated and continuous context that includes, near professional development, collaboration, peer support, mentoring, and ongoing opportunities for hands-on learning and self-reflection.

In this respect, the core objective of the present research is to analyze the influence of the ease of integrating digital technology in the classroom and its perceived usefulness on the actual use. A model has been tested on a sample of 174 teachers enrolled in the CPD program, entitled: *Digital Pedagogy and Innovation in the Contemporary School*, organized by Valahia University of Târgoviște, and started effectively in April 2025.

RELATED WORK

In recent years, educational practices have increasingly integrated digital elements, leading to a paradigm shift in teaching methods and a reconceptualization of the role of the teacher. The pedagogical use of digital technologies, or *digital pedagogy*, is defined by Kivunja as the ability to integrate digital technologies into the teaching process in such a way that they improve learning, teaching, assessment, and the school curriculum [9].

Digital pedagogy involves a deep understanding of the potential of technology and how it can be integrated into specific educational contexts. At present, it promotes a fundamental transformation in education, shifting the focus from the simple use of digital tools in the classroom to an intentional and strategic approach in which technology becomes a catalyst for deeper, more relevant, and effective learning [7]. Moreover, the experience gained during the pandemic has shown that only certain aspects of the use of digital technologies in the educational process add genuine value and new pedagogical meanings [8].

To understand the factors that influence teachers' intention to integrate technology into the educational process, Mishra and Koehler [11] developed the TPACK (Technological Pedagogical Content Knowledge) theoretical framework. According to this model, three essential components contribute to the use of technology in teaching: technological knowledge (TK), which refers to the ability to effectively use digital technologies such as computers, applications, and educational platforms; pedagogical knowledge (PK), which includes teaching methods and strategies; and content knowledge (CK), which refers to expertise in the subjects taught [10,11].

According to Gerick et al. [5], teaching staff self-efficacy plays a key role in the use of technology in lessons, and an analysis of 39 studies from 2015-2024 conducted by Feng et al. [3], shows that the adoption of educational technology in higher education is influenced by four variables: performance expectancy - the level of confidence users have that technology will improve teaching performance; effort expectancy - perceived ease of use; social influence - the influence of colleagues, leaders, and institutional norms; facilitating conditions - infrastructure, resources, and technical support provided by the institution.

METHOD

Research model and hypotheses

A research model has been tested that relates the ease of integrating digital technologies in classrooms, their perceived usefulness, and their actual use. The research model, taking the form of a technology acceptance model [D89], is presented in Figure 1.

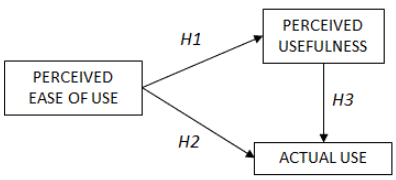

Figure 1. The research model

Perceived ease of use (PEU) refers to familiarity with digital technologies, ease of learning new technologies, and ease of integrating these into the classroom. Perceived usefulness (PU) refers to the usefulness for monitoring students' performance and improving learning. It is expected that perceived ease of use has a positive influence on the perceived usefulness [1,2].

H1 Perceived ease of use has a positive influence on perceived usefulness (PEU → PU)

Actual use (USE) refers to the use and integration of digital technologies in the teaching process. It is expected that both perceived ease of use and perceived usefulness positively influence actual use [1,2,3,17]

H2 Perceived ease of use has a positive influence on actual use (PEU → USE)

H3 Perceived usefulness has a positive influence on actual use (PU → USE)

Model validation

The validation of the model is done in two steps: (1) analyzing construct validity in the measurement model, and (2) validating hypotheses in the structural model.

Convergent validity has been assessed according to the recommended thresholds from the literature [4, 6] for loadings, composite reliability, and average variance extracted. Discriminant validity has been checked through the squared correlation test [4].

The model fit with the data is assessed by analyzing the goodness of fit (GOF) indices, as recommended in the literature [6]: chi-square (χ^2), degrees of freedom (*df*), χ^2/df, comparative fit index (*CFI*), non-normed fit index *(NNFI*), goodness of fit index (*GFI*), root mean square error of approximation (*RMSEA*), and standardized root mean square residual (*SRMR*).

EMPIRICAL STUDY

Sample

To collect data, a questionnaire was administered in April 2025, to 174 teachers (from all educational levels: pre-primary, primary, lower secondary and upper secondary) enrolled in the CPD program, entitled: *Digital Pedagogy and Innovation in the Contemporary School*, organized by Valahia University of Târgoviște, in full online format.

A total of 196 questionnaires have been received. After checking the responses, 22 have been eliminated for incomplete data, thus resulting in a working sample of 174 observations, with a massive presence of women, 95% (9 M/ 165 F). Most of the respondents (44%) have 16-25 years' experience in school, 20% of them have over 26 years' experience, and the rest of 36% have under 15 years' experience in school. Participant teachers were asked to answer questions concerning the use of digital technology in their practice, the items being introduced on a 5-point Likert scale.

Questionnaire

An exploratory factor analysis on 3 factors has been done, which highlighted 8 relevant items. An item has been eliminated for cross-loadings. The remaining items are presented in Table 1.

Table 1. Variables

Item	Question
PEU1	How familiar are you with digital tools?
PEU2	How easy do you find it to integrate technology into teaching?
PEU3	How easy do you find learning about new digital tools on your own?
PU1	How useful do you find digital tools to monitor student progress and performance?
PU2	How useful do you find technology to be in improving student learning?
USE1	How often do you use educational platforms in your teaching?
USE2	How often do you integrate digital assessments into the learning process?

Data has been analyzed for distribution and normality by checking the skewness and kurtosis. Since both range between -1 and 1, the distribution has minor deviations from normality and is adequate for structural equation modeling (SEM).

Model estimation results

The models were tested with LISREL 9.3 for Windows, using the maximum likelihood estimation method.

The goodness-of-fit indices (GOF) for the measurement model are above the cut-off values, indicating a good fit of the model with the data. The descriptive statistics and factor loadings for the four latent variables are presented in Table 2.

Table 2. Descriptives and factor loadings (N=174)

Item	Mean	SD	Loading
PEU1	3.70	0.72	0.80
PEU2	3.63	0.81	0.78
PEU3	3.45	0.89	0.62
PU1	4.18	0.77	0.83
PU2	4.25	0.72	0.70
USE1	3.09	0.91	0.79
USE2	3.09	0.92	0.68

All mean values are over the neutral value of 3.00, showing a positive perception of all factors. Perceived usefulness had the highest score, over 4.00. All latent variables are unidimensional since loadings are over the threshold of 0.6. The model validation results are presented in Table 3.

Table 3. Convergent and discriminant validity (N=174)

	CR	AVE	PU	PEU	USE
PU	0.740	0.589	**0.768**		
PEU	0.780	0.544	0.564	**0.738**	
USE	0.703	0.543	0.671	0.705	**0.737**

The composite reliability (CR) of each construct ranges between 0.70 and 0.78, above the cut-off value of 0.7. The average variance extracted (AVE) ranges from 0.54 to 0.58, above the cut-off value of 0.5, showing a good relationship between dimensions and measures.

Discriminant validity has been assessed with the squared correlation test [4] by comparing the square root of AVE (in bold) with construct intercorrelations. Since the square root of AVE is higher, the model has good discriminant validity.

The goodness of fit indices (GOF) showed a good fit of the structural model with the data: χ^2=22.12, DF=11, p=0.023, χ^2/DF=2.01, RMSEA=0.076, CFI=0.972, NNFI=0.946, GFI=0.965, SRMR=0.0397. The structural model estimation results are presented in Figure 2.

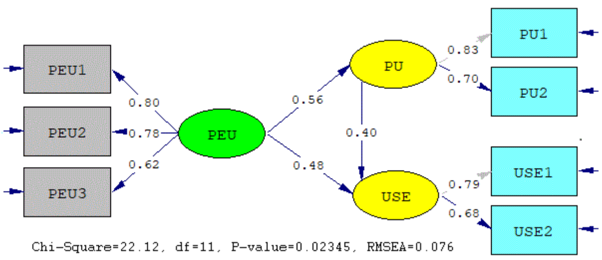

Figure 2. Structural model estimation results (N=174)

The paths from PEU to PU (β=0.56, p=0.000) and USE (β=0.48, p=0.001) are significant, so H1 and H2 are supported. The path from perceived usefulness to actual use (β=0.40, p=0.000) is significant, so H3 is also supported.

The variance explained by the model is 31.8% in perceived usefulness and 60.6% in actual use.

DISCUSSION

The main contribution of this study is a theoretically grounded and empirically validated model to assess the influence of the ease of integrating digital technology in the classroom and its perceived usefulness on actual use. The model accounts for more than 60% of the variance in the dependent variable, which proves that both perceived ease of use and usefulness are important predictors of actual use. This result is consistent with the Technology Acceptance Model [2], according to which perceived usefulness and perceived ease of use influence users' decision to accept it, as well as with other research [3].

The model also has practical implications for researchers, providing a broader perspective on the variables that play an important role in choosing the applications, tools, and platforms used in teaching; it can enable the anticipation of the degree of acceptance of a new educational technology and help identify barriers to technology adoption (e.g., if it is perceived as difficult to use or lacking in utility). It can also guide the development of empirical studies investigating the correlations between teachers' digital competencies, teaching styles, and the effectiveness of technology use in diverse educational contexts. In addition, the model can contribute to the development of educational policies by highlighting the real needs for training and support, adapted to the digital profile of teachers and the specificities of each level of education.

This is a cross-sectional exploratory study, so it has some inherent limitations. The sample can be considered not representative since it includes 95% women, but it seems that Romania has the highest proportion of female teachers in Europe (in primary education, over 90%, as well as in secondary and high school education, where it exceeds 72%) [12]. Second, the study focused on only three variables: perceived ease of use, perceived usefulness, and actual use.

Future work will extend the model with other variables to provide a clearer picture of how individual factors (such as motivation, digital self-efficacy, or teaching style) influence the adoption and effective use of technology in the educational process.

CONCLUSION AND FUTURE WORK

Today's education is profoundly different from that of a few decades ago, being directly influenced by the rapid evolution of technology. Its integration into the educational process has radically reconfigured teaching approaches, learning strategies, and assessment methods. New technologies are not just auxiliary tools, but have become essential components of the educational process. Digital technology enables teachers can improve the quality of teaching, stimulate students' interest and motivation, facilitate personalized and collaborative learning, and provide access to varied and up-to-date educational resources. Furthermore, the use of technology allows for faster feedback and more effective monitoring of each student's progress, thus promoting a more equitable education tailored to individual needs.

In this new educational landscape, the role of the teacher is changing: from a simple provider of information to a facilitator of learning, a guide and mediator between the student and knowledge, in an ever-changing environment. Given the powerful impact of technology in education, it is important to understand the variables that influence teachers' willingness to select and use a digital tool or application in their teaching. In the educational context, perceived usefulness and perceived ease of use are basic criteria that teachers apply when choosing a particular platform, application, or digital device. Those perceptions influence their beliefs regarding the effectiveness of their work, leading to practical adoption.

The decision to use an app or digital tool in teaching should enhance the pedagogical value of the teaching activity, contributing to improved learning, increased student engagement, and facilitating relevant, interactive educational experiences tailored to their needs. The choice of technology should not be dictated by trends or availability, but based on clear teaching criteria, such as compatibility with lesson objectives, accessibility for students, the possibility of customization, and support for a student-centered educational approach.

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