Implications of digital risks on teachers' motivation and intention to use digital tools: a PLS-POS perspective in Romanian preuniversity education system

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Abstract

Purpose – The study aims to analyze the different types of risks related to the use of technology and determine their positive or negative influence on teachers' motivation and behavioral intention to use digital tools.
Design/methodology/approach – The research is based on survey data from 200 teachers in the Romanian preuniversity education system. The data analysis followed a four-step approach, using a partial least squares structural equation modeling (PLS-SEM) model for hypothesized relationships among research concepts and a PLS prediction-oriented segmentation (POS) procedure.
Findings – This study showed that increased risk awareness influences both motivation and, consequently, the intention to adopt digital tools in the preuniversity education system.
Research limitations/implications – The scope of research remains constrained with regard to the examined population, considering the substantial number of teachers within the preuniversity education system. Another limit lies in the basic classification of identified risk types.
Practical implications – School managers should design a strategy to increase the level of motivation for integrating digital tools in the educational process.
Originality/value – Little scholarly attention has been devoted to investigating the risks associated with digitalization in the preuniversity education system. In addition, no prior research has been conducted to assess the influence of risk perception on people's motivation and intention to use digital tools in preuniversity education.

Keywords Digital education, Digital pedagogy, Risks of digitalization, Motivation, Intention of using digital tools

Paper type Research paper

1. Introduction

In contemporary society, the acquisition of digital citizenship has become essential for professional growth and future career prospects. The society fully recognizes the imperative to establish a strong digital educational environment to foster the development of human resources. Consequently, educational institutions have the responsibility of nurturing people who possess the requisite skills required for proficient use of digital tools. Vajen *et al.* (2023) posit that digital citizenship encompasses not only the mastery of digital skills and

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behavioral norms associated with the usage of digital technology, but also active social engagement through digital channels. To meet the evolving societal demands, educational institutions must adapt by providing digitally equipped classrooms that incorporate state-of-the-art technologies. A digital classroom entails using Internet-connected electronic devices and platforms to facilitate learning and instruction.

However, is digital pedagogy risk-free? The implementation of digitalization strategies in education involves both advantages and disadvantages (Agesilaou and Kyza, 2022; Baeva, 2021; Grand-Clement *et al.*, 2017; Moon, 2018; Moreno and Hoopes, 2020; Mukhtar *et al.*, 2020; Munir, 2022; Nicolescu and Tudorache, 2022; Ohler, 2011; Trust, 2018). The benefits of digitalization have been exposed over time in numerous research studies and projects, but few (Agesilaou and Kyza, 2022; Baeva, 2021; Moon, 2018; Moreno and Hoopes, 2020; Mukhtar *et al.*, 2020; Munir, 2022; Nicolescu and Tudorache, 2022; Ohler, 2011) have referred to the risks that come with digitalization. Given the limited amount of research dedicated to the analysis of digital risks in education, we identified an opportunity to write this article on the risk analysis of digital pedagogy. Likewise, the level of motivation of teaching staff in the implementation of digitalization strategies is essential, because they are responsible for training students' skills and competencies to use digital tools.

Considering all this, the purpose of this research is to determine to what extent the various types of risks have a positive or a negative influence on both motivation and intention to use digital tools for educational purposes from kindergarten through 12th grade schools.

Our paper is structured as follows: literature review that includes the profile and skills of the digital citizen in the preuniversity education system, the intention of integrating technology in teaching and learning, the benefits and risks posed by the increasing use of technology in schools, the development of hypotheses, materials and methods, results, discussions and conclusions.

2. Literature review

2.1 The profile and skills of the digital citizen in the preuniversity education system

Choi *et al.* (2018) believe that teachers' perspectives on digital citizen education exert a substantial influence on their instructional practices within the classroom. The researchers examine the extent of teachers' digital citizenship by assessing their technical competencies pertaining to Internet access and utilization. As such, teachers' attitudes toward digital technologies, their access to digital tools, and their technological proficiencies collectively shape the integration of digitalization within teaching and learning processes (Vajen *et al.*, 2023).

Regarding teachers' digital competencies of using technology in the classroom, these are vaguely defined in the literature. Antonietti *et al.* (2022) state that this concept integrates both technical skills related to the use of digital tools in an educational context, as well as the pedagogical dimension, awareness of the need and implementation strategies that lead to an increase in the efficiency of the educational process.

Connolly and Miller (2022) insist on the importance of using survey instruments to measure digital citizenship, the Digital Citizenship Scale (DCS), in all fields, including education. They discovered that the strongest predictor of online political engagement was a critical viewpoint and a willingness to actively use the internet beyond merely consuming content. Technological abilities themselves appeared to play little role in this prediction.

2.2 The intention of integrating technology in teaching and learning

Teo (2011) analyzed the effective integration of technology in teaching by examining teachers' intention to use technology. He identified five factors that influence the positive attitude towards the use of technology: perceived ease of use, perceived usefulness,

facilitating conditions, subjective norm, attitude toward use, as well as behavioral intentions to use technology. He stressed that school administrators play an important role in the successful digitalization of schools and should manage the learning environment so that teachers would feel supported in terms of technical and human resources to offer training and assistance with technology usage and troubleshooting. Additionally, Joo *et al.* (2016) supports the idea that organizations' support has significant effects on technostress and, consecutively, on teachers' intentions to use technology.

Besides that, according to Anderson and Maninger's (2007) theory, both intrinsic motivation, like personal opinions and goals, pleasure of using technology and extrinsic factors like access to computers, technical assistance, or time, could affect preservice teachers' inclination to use technology. Regarding students, the literature suggests that digital tools contribute to the development of critical thinking skills and help increase students' motivation to learn (Meirbekov *et al.*, 2022).

2.3 The benefits of using technology in schools

Trust (2018) believes that technology is essential in education because it allows students to choose technology – infused careers like 3D printing specialist or information technology (IT) programmer – on the one hand and to learn in a fun, engaging way, on the other. In addition to that, the author considers that technology should transform and redefine education by breaking down the traditional classroom setting and empowering students to interact with peers around the world, facilitating instant access to information and knowledge.

Grand-Clement *et al.* (2017) state that although digital technology is an integral part of everyday life, applications facilitate opportunities and people must constantly develop new skills and acquire new knowledge to keep up with technology. The accelerated pace in development of the digital world generates an urgent need for lifelong learning. He also states that technology makes education more efficient, scalable and effective because education providers can customize content according to the needs of students and teaching can take place regardless of distance. Another benefit of using technology in educational systems involves the processing of a large amount of data, but also the collaboration between users in order to support innovation. However, concerning social equity, Grand-Clement *et al.* (2017) state that although digital education can be a very important tool for inclusion, there are several things that prevent this: access to technology, lack of digital skills, especially among people with low literacy levels who lack confidence to access digital tools, the lack of clarity in the instructional use of digital resources, the infrastructure, or the price of digital education.

Mukhtar *et al.* (2020) concluded that the advantages of remote learning are the possibility of learning remotely in a comfortable and accessible way in addition to easily manageable student-centered type learning. Moreover, they mentioned that expenses such as traveling and rent were drastically reduced. Besides that, from an administrative point of view, both teachers and students could benefit from the use of technology for video conferencing, asynchronously teaching and learning, for recording the lectures, marking attendance, assigning and submitting tasks.

Munir (2022) conducted interviews among students using snowball sampling and following qualitative data analysis, the findings indicating that taking classes online had a number of advantages for students, including better time management, increased attendance at lectures, flexibility and academic discipline, but also economic benefits because students didn't need to commute to go to universities which saved them time for studying.

2.4 Risks posed by the increasing use of technology in schools

In addition to the obvious benefits of integrating technology into teaching-learning processes, there are also numerous risks that should be taken into account. Recent research has

identified a series of risks associated with digital learning such as social isolation, mental disorders, physical illness, physical health and safety issues.

Ohler (2011) believes that it is essential for society to help students understand issues of digital responsibility in schools in an attempt to ensure the digital health initiative. Most importantly, it is vital to help digital kids balance the individual empowerment of digital technology with a sense of personal use, as well as personal and community responsibility. He stresses the importance of talking to students about their digital health and digital citizenship while encouraging them to develop and take advantage of the opportunities provided by the digital world.

Moon (2018) mentions the fact that school districts in the USA strive to keep up with technology and innovation, but the adoption of a technology-based learning environment should be doubled by clear programs of training and instruction for the appropriate use of devices and data. Therefore, schools should be embedding digital citizenship curriculum at all grade levels in order to give users of all ages more practice and reinforce knowledge about operating systems, security practices, rights and responsibilities, policies and laws, as well as using techniques to identify and analyze risks associated by the use of large volumes of data (Simion *et al.*, 2018).

Agesilaou and Kyza (2022) state that the proliferation of information technology has raised new risks concerning privacy through all digitally enhanced toys and self-tracking devices. They conducted a study among fifth- and sixth-grade students investigating their awareness of their tracked data and their understanding of data ownership. The study revealed that students are aware of the self-tracked data but ignore the ownership with other parties, which makes them vulnerable before the commercial exploitation of their personal digital data by others. The authors of the study suggested that students should be taught how to manage their data with complete security and be more informed about the impact of online data on themselves. Similarly, Nicolescu and Tudorache (2022) highlight that users' perception of privacy issues has a strong influence on the experience felt while using technology. Therefore, privacy assurance can lead to positive effects, whereas when the use of technology is associated with increased privacy risks, the effect felt by users is negative.

Baeva (2021) stresses that once society decided to follow the path of digitalization, they embarked on an irreversible process that is growing at an uncontrollably fast rate, but without setting ground rules meant to ensure the functioning and stability of a totally new type of society. Therefore, it is necessary to study its possible social consequences and the nature of its impact on a person.

Moreno and Hoopes (2020) state that the digital media, which includes video games, streaming, social media and augmented reality provide instant gratification that leads to increased levels of dopamine which have a tremendous influence on teen identity, self-esteem, socialization, learning and development and most importantly, behavior. The risks which are associated with media use and overuse include the collection of personal data and personal information which can have negative consequences on three levels: data collection for profitable advertising, sexual predation and cyberbullying and negative mental health outcomes. According to Moreno and Hoopes (2020), the use of effects of the digital media in the Z Generation physical and mental health of the Z Generation are both positive, such as instant communication, schoolwork, entertainment and negative due to the lack of exercise and real interactions, which eventually affects their overall wellness and health.

Mustafaoğlu *et al.* (2018) mention that both traditional and modern devices such as television, computers, tablets, smartphones may pose a variety of health risks (HER) such as musculoskeletal problems, physical inactivity, obesity, developmental problems, or sleep quality. He therefore stresses the importance of monitoring screen time and content viewed while encouraging healthy habits like eating, sleeping, exercising and socializing. The author also stresses the importance of the role played by parents whose responsibility is to ensure

that their children use technology in a healthy, positive way that allows them to explore the numerous opportunities offered by the digital instruments while staying healthy, both physically and mentally. Baeva (2021) identifies five clusters of risks associated with digital learning: (1) Information threats in the cyber world, cognitive risks, vital risks and threats, the cluster of social risks (SOR) and the risks of addictions forming. In this research, we have analyzed four categories of risks: security risks (SER), risks of using outdated technology (OBR), SOR and HER. We chose these four types of risks because we grouped the various types of risks that were commonly found in the literature in four main categories of risks that play a substantial role in integrating technology in education as follows:

(1) *SER:* data confidentiality, cyberattacks, malware/viruses/threats, cyber bullying.

(2) *OBR:* high end technology, Internet connection, good operation and proper maintenance of digital devices.

(3) *SOR:* quality communication, socialization, level of empathy, social equity.

(4) *HER*: physical functions, cognitive functions, behavioral functions, emotional functions.

More research is in progress to provide an in-depth analysis of the multiple types of risks related to the use of technology in education.

3. Research hypotheses

3.1 Risks associated with digitalization and motivation to use digital tools

Considering the risks involved in the digitalization of the preuniversity education system, it is essential to analyze the motivation and intention to integrate technology in the teaching process. Therefore, the first hypothesis will be:

H1. Motivation to use digital tools is influenced, both positively and negatively by the existence of the different types of risks related to the use of technology.

3.2 Risks associated with digitalization and the behavioral intention to use digital tools

The technology acceptance model (TAM) states that technology use is determined by behavioral intention (Davis, 1989). There are, however, numerous aspects that influence behavior intention, especially regarding the educational system.

The intention of using digital tools has increased in the context of the COVID-19 pandemic. In this situation, the working environment of the teachers became difficult to control due to the appearance of unknown variables; the diversity of emotions in such a situation and the degree of uncertainty are factors that had a significant impact on the intention to continue using digital tools (Panisoara *et al.*, 2020). Recent studies have analyzed the motivation and continuation of teachers' intention to use digital tools (Toto and Limone, 2021; Panisoara *et al.*, 2020), but no article analyzes the impact of the risks that appear with the digitalization of the educational system on these concepts. Thus, one of our hypotheses is the following:

H2. The behavioral intention to use digital tools is influenced, both positively and negatively, by the existence of different types of risks related to the use of technology.

Panisoara *et al.* (2020) state that motivation has a direct and positive influence on the intention to continue the online teaching process; thus, the use of digital tools is in a high proportion. Another recent study (Beardsley *et al.*, 2021) shows that teachers' motivation to use digital tools has changed as a result of the COVID-19 pandemic, teachers' digital skills have

improved and teachers' confidence to integrate technology into educational activities (classroom teaching, lesson preparation, assessment and communication) increased.

In this sense, we aim to identify the relationship between teachers' motivation and their intention to use digital tools in the future, but also the position of risks in relation to the two mentioned variables. The third and fourth hypotheses are as follows:

H3. Motivation influences the intention to use digital tools.

H4. Motivation mediates the relationship between risk perception and the intention of using digital tools.

4. Materials and methods

4.1 Scales

The research tool used was a questionnaire based on the TAM (Davis, 1989) which included scales that measured users' motivation for using technology (MUDT) (Venkatesh, 2000), the perception of the risks posed by the integration of digital tools in schools (Li and Huang, 2009) and the intention to use digital tools (Teo *et al.*, 2011) in the future for both personal and professional purposes (IUDT).

In the specialized literature, risks are found under various dimensions, but for our research, we considered four categories as essential in digital pedagogy. The most relevant risks for our analysis are as follows: SER (Di Gioia *et al.*, 2019; Baeva, 2021; Crepax *et al.*, 2022), *SOR* (Kuznetsova and Azhmukhamedov, 2020; Sorokoumova *et al.*, 2021), *OBR* (Bencsik *et al.*, 2022) and *HER* (Kuznetsova and Azhmukhamedov, 2020; Mąkosa, 2013) (see Appendix).

The questions were designed on Likert scale (Joshi *et al.*, 2015) of 1 (strongly disagree) to 5 (strongly agree). At the beginning of the questionnaire, two filter questions were used, one in which the respondents expressed their agreement to participate in the research and the other in which they confirm whether they are teachers in the preuniversity education system. This is followed by three sections that consider the level of motivation to use digital tools, the risks associated with digitalization and the behavioral intention to use digital tools. The last section of the questionnaire collects the demographic data of the respondents.

4.2 Research population and data collection procedure

The questionnaire was built with the help of the Google Forms platform and was shared to respondents through the WhatsApp groups of the institutions, institutional email addresses, trade unions and teachers' associations. The research population consists of kindergarten through 12th grade teachers who are active in the education system at the time of completing the questionnaire. The questionnaire was completed between March 6 and 17, 2023.

We collected 200 responses but excluded non-teaching respondents and therefore obtained 195 valid responses of which 84.8% were women and 15.2% were men. Regarding the age of the respondents, we identify that 6.6% are under 25 years old, 16.2% are between 25–35 years old, 35.5% fall within the range 35–45 years old, 32% are between 45–55 years old and 9.6% are over 55 years old. Regarding the experience of the teaching staff, we noticed that 14.2% have less than 3 years of work experience, 6.6% have between 3–5 years of work experience, 13.2% fall within the range 5–10 years, 17.8% have between 10–15 years and 48.3% have more than 15 years of work experience.

Also, our sample has the following structure: 3% are kindergarten teachers, 18.3% are primary school teachers, 51.8% are secondary school teachers and 26.9% are high school teachers. Of them, 10.7% have a leadership position and 69.5% are teachers in urban areas.

4.3 Data analysis

Data analysis followed a four-step approach (Serrano-Malebrán and Arenas-Gaitán, 2021). (1) In the first step, a PLS-SEM model was estimated to account for the hypothesized relationships among research concepts. In this step, established guidelines were applied to evaluate the validity and reliability of the measurement model and also the predictive power and the estimated path of the structural model (see section 5.1). (2) Since we assumed differences in teachers' perception of risks associated with digital tools and behavior towards motivation and adoption intention, in the second step we identified specific groups, with specific behavior in the model previously analyzed by means of PLS prediction-oriented segmentation (POS) procedure (section 5.2). According to Backer *et al.* (2013), PLS-POS overcomes unobserved heterogeneity in the PLS model by seeking to form homogenous groups of observations with higher predictive power compared with the overall sample by means of distance measure clustering approach. (3) Furthermore, differences in specific groups determined by PLS-POS procedure were explored in terms of risk perceptions and their effect on behavior toward digital technology adoption by means of *t*-tests/ANOVA analysis of variance, respectively PLS multigroup analysis (MGA), in the ex-post analysis, described in section 5.3. (4) Finally, in the last step, each determined segment (group of teachers) was characterized in terms of risk perception and its effect on digital technology adoption, in the discussion and conclusion sections of the paper.

Data analysis was performed using IBM SPSS Statistics, v29.0 (IBM, 2022)for descriptive statistics and *t*-tests and SmartPLS 4 (Ringle *et al.*, 2022) to evaluate the measurement and structural model, highlight the relationships between the risks associated with the use of digital tools in preuniversity education and the motivation and behavioral intention to use these tools, as well as to carry out the PLS-POS procedure and MGA.

5. Results

5.1 Model evaluation and research hypothesis testing

The PLS-SEM model was specified to include four exogenous constructs, representing the four categories of risks associated with the use of digital tools (HER, SER, OBR and SOR) and two endogenous constructs, namely the motivation to use (MUDT) and the behavioral intention to adopt these tools (IUDT), as well as the structural relationships determined by the hypotheses previously formulated. In terms of the measurement model, reliability and validity were evaluated based on recommendations in the case of reflective constructs (Hair *et al.*, 2019; Guenther *et al.*, 2023): external loadings, Cronbach's alpha coefficients and composite reliability (rho_a) greater than 0.708 and 0.7 respectively, supported indicator and construct reliability (Table 1). Furthermore, convergent validity was supported by average values extracted (AVE) values higher than 0.7 (Table 1) and the heterotrait-monotrait (HTMT) ratio of correlations (Henseler *et al.*, 2015) (Table 1) lower than 0.85. Therefore, considering the above analyses, the measurement model was found to be valid and reliable.

Constructs	Loadings	Cronbach's alpha	rho_a	AVE	(1)	(2)	(3)	(4)	(5)
IUDT	0.844–0.877	0.932	0.932	0.745					
HER	0.889–0.955	0.951	0.958	0.872	0.267				
MUDT	0.758–0.948	0.913	0.939	0.797	0.750	0.207			
OBR	0.851–0.962	0.935	0.977	0.837	0.122	0.454	0.078		
SER	0.728–0.970	0.918	1.082	0.764	0.112	0.378	0.074	0.350	
SOR	0.896–0.959	0.947	0.964	0.861	0.249	0.701	0.225	0.498	0.460

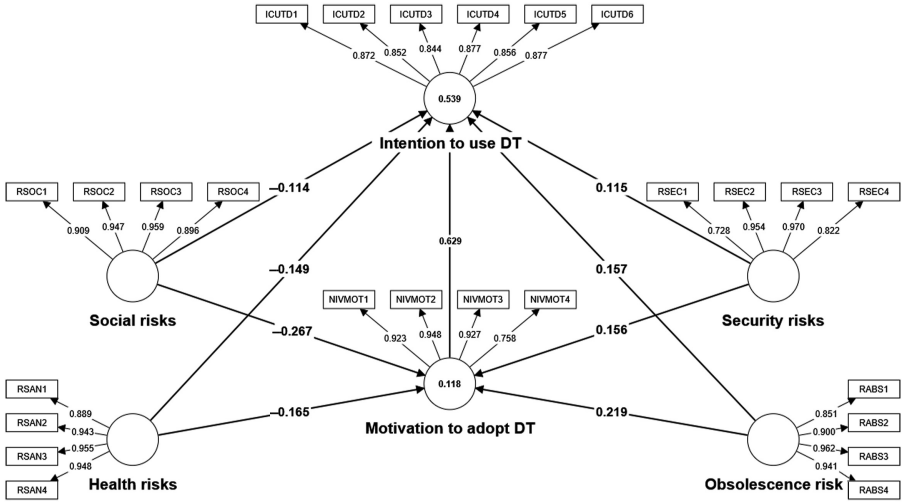
Source(s): AVE – average variance extracted. Source: authors with SmartPLS 4 (Ringle *et al.*, 2022)

Table 1. Measurement model reliability and validity

To evaluate the structural model, the variance inflation factor (VIF) values, the variance of the endogenous constructs explained by the model (R^2) and the significance of the path coefficients were considered (Hair *et al.*, 2019) (see Figure 1 and Table 2). In terms of R^2 teachers' perceptions of risk factors may explain 11.8% of variance of their motivation to adopt digital tools (DT) ($R^2 = 0.118$) and together, 53.8% of variance in intention to use DT ($R^2 = 0.538$). Moreover, without one exception, all path coefficients are statistically significant.

In terms of research hypotheses, OBR and SER have positive direct effects on MUDT and IUDT, while HER and SOR have negative effects (Table 2). Except for the SOR → IUDT relationship, all the path coefficients were statistically significant. Therefore, H1 and H2 were supported, such as perception of risks, depending on their type, having a positive or negative influence on motivation to use digital tools and the behavioral intention to use them. Furthermore, it was also determined that MUDT positively influences IUDT, which supports H3. Therefore, motivation influences the intention to use digital tools, such as the more motivated teachers will be to use digital tools, the more they will intend to use them.

Furthermore, examining the indirect effects using the bootstrapping technique with 5,000 subsamples (Table 3), it was found that OBR and SER also have positive indirect effects on



Source(s): Authors with SmartPLS 4 (Ringle, Wende and Becker, 2022)

Figure 1.
Research structural model

Hypotheses	Relationships	Path coeff.	St. dev.	*p*-values
H1	Health risks → Motivation to adopt DT	−0.165	0.078	0.018
	Obsolescence risk → Motivation to adopt DT	0.219	0.081	0.004
	Security risks → Motivation to adopt DT	0.157	0.096	0.050
	Social risks → Motivation to adopt DT	−0.267	0.078	0.000
H2	Health risks → Intention to use DT	−0.147	0.074	0.023
	Obsolescence risk → Intention to use DT	0.158	0.057	0.003
	Security risks → Intention to use DT	0.115	0.069	0.046
	Social risks → Intention to use DT	−0.115	0.071	0.052
H3	Motivation to adopt DT → Intention to use DT	0.629	0.052	0.000

Source(s): Authors with SmartPLS 4 (Ringle *et al.*, 2022)

Table 2.
Direct effects

MUDT and IUDT, while HER and SOR have negative effects (Table 2). Except for the SER → IUDT relationship, all the effects were statistically significant. Therefore, H4 was supported, and it can be concluded that motivation mediates the relationship between perception of risks and intention to use digital tools.

5.2 Prediction-oriented segmentation (PLS-POS) and multigroup analysis (PLS-MGA)

In the second step of data analysis, the PLS-POS procedure (Becker *et al.*, 2013; Hair *et al.*, 2017) was run to account for the unobserved heterogeneity in the PLS-SEM model. Since we wanted to identify specific group behavior towards the adoption of digital tools with maximum explanatory power, the sum of all Construct Weighted R^2 was selected as the Optimization Criterion. Furthermore, in determining the number of segments to be retained, in addition to the average R^2, the size of the clusters was also considered. Following the above procedure, two segments were determined with considerably higher R^2 than the initial partition and relatively balanced in size. As can be seen in Table 4, with only three exceptions, the direct and indirect effects of risk factors were significantly different between the two segments, supporting the assumption of different behavior towards the adoption of DT.

5.3 Ex-post analysis

To explain the latent structure of the two segments in terms of meaningful characteristics, an ex-post analysis was carried out, by means of *T*-test comparisons of the perception of risk

Hypothesis	Relationships	Beta	*t*-statistic	*p*-value	BCCI LCI	BCCI UCI
H4	Health risks → Intention to use DT	−0.104	2.034	0.021	−0.193	−0.023
	Obsolescence risk → Intention to use DT	0.138	2.627	0.004	0.043	0.216
	Security risks → Intention to use DT	0.099	1.621	0.053	−0.041	0.165
	Social risks → Intention to use DT	−0.168	3.305	0.000	−0.259	−0.092

Source(s): Authors with SmartPLS 4 (Ringle *et al.*, 2022)

Table 3.
Indirect effects

Relationships	β (segment 1)	β (segment 2)	Δβ (segment 1 – segment 2)
Direct effects			
Health risks → motivation to adopt DT	−0.022	−0.196*	0.174
Obsolescence risk → motivation to adopt DT	0.327***	−0.104	0.431***
Security risks → motivation to adopt DT	0.490***	−0.375***	0.864***
Social risks → motivation to adopt DT	−0.226**	−0.320**	0.094
Health risks → intention to use DT	0.228**	−0.585***	0.813***
Obsolescence risk → intention to use DT	0.344***	0.214***	0.130
Security risks → intention to use DT	0.317***	0.106*	0.211*
Social risks → intention to use DT	−0.336***	0.005	−0.341**
Motivation to adopt DT → intention to use DT	0.317***	0.628***	−0.311**
Indirect effects			
Health risks → intention to use DT	−0.007	−0.123*	0.116*
Obsolescence risk → intention to use DT	0.104**	−0.065	0.169**
Security risks → intention to use DT	0.155**	−0.235***	0.391***
Social risks → intention to use DT	−0.072*	−0.201**	0.129*

Source(s): Authors with SmartPLS 4 (Ringle *et al.*, 2022)

Table 4.
Multigroup analysis – bootstrap MGA

variables. As can be seen in Table 5, for three of the four risk factors, the perception of the two groups was found to be different, delimitating a group more aware (Segment 1) and another less aware of risks associated with DT (Segment 2).

The two segments are not statistically associated with any of the demographic characteristics, such as age, seniority, managerial position or urban/rural areas where the school is located. Also considering the difference in the path coefficient presented above, it was provided ground to characterize the two determined groups of teachers in terms of perception of risk related to DT, but also in terms of its effects towards the future use of DT.

6. Discussions

We consider our research to be relevant in the current context because, based on our literature review, we noticed that not much research has been dedicated to the analysis of risks of digitalization in the preuniversity education system and, most importantly, no other research aimed at evaluating the impact of the perception of risks on motivation and intention to use digital tools in the preuniversity education system.

In order to get a broader view of the carried-out research, we will compare the results of our research to other available results related to the use of digital technologies in education, from the perspective of risks and benefits.

Concerning the risks of Using the Digital Educational Environment, Kuznetsova and Azhmukhamedov (2020) analyze the stages of secondary and higher education's digitization in the Russian Federation and conclude that disorders of the musculoskeletal system, decreased brain development, nervous exhaustion and sleep issues, skin and respiratory ailments are just a few of the health dangers that are directly related to the use of digital tools in schools. In addition to this, Kuznetsova and Azhmukhamedov (2020) also concluded that the health and SOR are the highest ones, a result which perfectly aligns to the results of our research.

Timmis *et al.* (2016) examined the role of technology-enhanced assessment (TEA) and reached the conclusion that despite the numerous opportunities provided by the use technology for assessment purposes, a few risks should be seriously taken into account like social exclusion, Big Data security, ethics or learning analytics. These results come to support our own results in the sense where SER should be carefully addressed before unleashing the enormous potential of integrating digital technologies in education.

Demchenko *et al.* (2021) stresses the importance of optimizing the educational standards, developing state programs for digital education and innovation by implementing organizational, economic and legal measures. We consider their research to support our theory that obsolescence risks should be carefully handled in the process of digital transformation.

Following our own research and considering the obtained results, we concluded that the educational management should ensure training programs aiming at raising awareness about the risks of digitalization among teachers, learners, administrative personnel and

Table 5.
Perception of risks of digital tools for the two segments

Variables	Segment 1 (N = 120) Mean	St. dev.	Segment 2 (N = 76) Mean	St. dev.	t-statistic
Health risks	3.185	1.197	2.968	1.345	1.177
Obsolescence risk	3.768	0.973	3.348	1.100	2.797**
Security risks	4.081	1.017	3.658	1.266	2.458*
Social risks	3.383	1.167	2.944	1.212	2.527*

Source(s): Authors with SmartPLS 4 (Ringle *et al.*, 2022)

parents in order to establish a healthy educational digital environment for a new type of citizen, the digital citizen. In addition to this, it is crucial to design and implement a strategy that aims to increase the levels of motivation for teachers to use digital tools with confidence and regularly.

7. Conclusions

The purpose of this research was to determine to what extent the perception of various types of risks: *SER, SOR*, *OBR* and *HER* might influence the motivation and the behavioral intention to use technology in educational systems. The research aimed at analyzing the relationships between the digital risks, the motivation and behavioral intention to use these digital tools in the preuniversity education system.

Among the four categories of risks that we included in the analysis, SER, OBR, SOR and HER, we noticed that OBR and SER have positive direct effects on motivation and intention to use digital tools, while HER and SOR have negative effects. We assume that the respondents perceive security and obsolescence risks as less risky due to the fact that there is a permanent update and wider offer on the market of more affordable and high-performance technology, whereas, in the case of SER there is a constant technological race for providing services and tools that ensure the digital security like antivirus software, firewalls and other encryption tools. Therefore, its influence is perceived as positive one in the integration of digitalization within the educational system.

However, the respondents perceive health and SOR to a greater extent, leading to a decreased level of motivation. Therefore, we assume that these two categories of risks affect them personally, both physically and mentally: their vision, body position, interpersonal communication, dependence on social networks and even depression.

It has been shown that MUDT positively influences IUDT because the more motivated teachers are to use digital tools, the more they intend to use them; thus, our third hypothesis is supported. A motivated teacher who enjoys using digital tools today will be equally, or perhaps even more, motivated to use digital tools in the future. In addition, motivation mediates the relationship between the perception of risks and the intention to use digital tools (the fourth hypothesis is supported).

In the second step of data analysis, the PLS-POS, the sample was divided into two segments regarding the perception of risks of digital tools. The first segment ($N = 120$) includes teachers who are more aware of the risks of digitalization than the others and the second segment ($N = 76$) who perceive the risks of digitalization to a lesser extent. The two segments were not statistically associated with any of the demographic characteristics. This suggest that, even the behavior on TD is greatly influenced by risks perception, there are not any predetermined conditions, such age, seniority, managerial position or urban/rural areas where the school is located. This result does not support previous approach that suggests that the most obvious gap in the digital world is the one between those who were born "digital" and those who were born "analogue" (Guşe and Mangiuc, 2022) and in case of teachers, this gap may be overcome.

Considering those two groups, the direct and indirect effects of the risk factors were significantly different between the two segments with meaningful characteristics, supporting the assumption of different behavior towards the adoption of DT. Regarding the direct effects on motivation and intention to use digital tools, in the first segment, SER and OBR have a positive influence in the sense where they contribute to increased levels of both motivation and intention to use digital tools, while HER and SOR have a negative influence on motivation to use digital tools, being responsible for their decrease. In the case of the second segment, it can be observed that the more the respondents become aware of the risks of digitalization, the more the influence of risks on motivation records higher values, which means that the level of

motivation decreases. On the other hand, regarding the direct effects on intention to use digital tools, the second segment perceives a positive impact of SER, OBR and SOR and a negative influence of HER on IUDT. Furthermore, it can be observed that motivation has a positive influence on intention to use digital tools for both segments, but the latest perceives a greater influence than the first one. As with direct effects, indirect effects follow the same direction. Therefore, we can conclude that the intention to use digital tools is influenced by the perception of risk.

8. Research implications

In conclusion, the research results shed light on the direct relationship between the perception of risks related to technology utilization as well as the motivation and the behavioral intention to use digital tools. This study showed that increased risk awareness influences both motivation and consequently the intention to adopt digital tools in the preuniversity education system.

This research will contribute to implementing solid strategies of digitalization in schools by considering the various types of risks that may hamper the full potential of the educational process enhanced by digital technologies. Moreover, the acquisition of digital citizenship has become imperative for the modern society and the educational institutions hold the responsibility of rendering people able to use digital tools while raising awareness about the existing risks posed by the use of technology in all walks of life.

Finally, the results of this study will be conducive to the consolidation of organizational culture by determining the adoption of digitalization-oriented behaviors. Improving the level of motivation will lead to the teacher's behavioral intention to use digital tools in the future.

9. Limitations and future research

The research is limited to a number of 200 respondents within a context where the number of teachers from the preuniversity education system is much higher. In addition to that, more types of risks could be related to the use of digital tools such as cognitive risks, addiction risks, etc. Although the paper has certain limitations, at least two future directions of research can be identified. One direction could involve a more in-depth classification of the types of risk related to the use of digital tools and their effects on motivation and intention. Another direction of research could be extending the analysis of the DT risks to higher education in order to highlight the differences between the preuniversity and university system.

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Appendix Research scales

Motivation to adopt DT

Please indicate the degree of agreement or disagreement with the following statements on a scale of 1 to 5 (1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree).

From a personal point of view:

(1) I enjoy using digital devices (laptop, tablet, computer, video projector and smart board) to carry out my professional activity

(2) I am interested in the potential of digital pedagogy and am curious to discover as much information as possible in this field.

(3) I believe that digital technology helps me practice my work in a more complex and creative way

(4) I would use digital tools if there were appropriate equipment in the classrooms

Perception of the risks associated with the use of DT

Please indicate the degree of agreement or disagreement with the following statements on a scale of 1 to 5 (1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree).

I am concerned about the risks associated with security issues such as:

(1) Data Privacy

(2) Cyber attacks

(3) Malware/Viruses

(4) Cyberbullying

I am reluctant to use digital technologies in educational activities because of the social risks that affect:

(1) Quality communication

(2) Socialization level

(3) Empathy

(4) Social equity

I am concerned about the risks associated with rapid digital change and the difficulty of:

(1) Ensure a high-performance technology

(2) A good Internet connection

(3) Good operation and proper maintenance of digital devices

(4) Permanent technical support

I am reluctant to use digital technologies in educational activities due to health risks from the point of view of:

(1) Physical functions

(2) Cognitive functions

(3) Behavioral functions

(4) Emotional functions

Behavioral intention to use DT

Please indicate the degree of agreement or disagreement with the following statements on a scale of 1 to 5 (1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree).

In the near future:

(1) I will integrate technology into teaching activities in the near future

(2) I will use technology more to perform administrative tasks for good organization and communication at work

(3) I want to further develop my technical skills

(4) I will use technology more in my personal life

(5) I believe that the integration of digital tools should be achieved despite the possible associated risks

(6) I will recommend friends and close people to use technology in their personal or professional life

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