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Assessing the factors influencing the intention to use information and communication technology implementation and acceptance in China's education sector

Muhammad Farrukh Shahzad [1✉], Shuo Xu[1✉] & Rimsha Baheer[2]

Information and communication technology (ICT) has become increasingly important worldwide in education. This study aims to recognize the factors that influence the intention to use information and communication technology (ITUICT) and its acceptance in the education sector in China. A literature review was conducted to ascertain the potential factors such as perceived awareness, information acquisition, trustworthiness, social influence, and regulatory support that could affect the acceptance and ITUICT. For results, a survey was conducted on a sample of 381 university employees in China using a convenience sampling approach. The collected data were analyzed using partial least squares-structural equation modeling (PLS-SEM). The results show that individual factors such as perceived awareness, information acquisition, trustworthiness, social influence, and regulatory support significantly impact the ITUICT. Additionally, trustworthiness positively moderates the relationship among perceived awareness, information acquisition, social influence, regulatory support, and ITUICT. Policymakers and educators can use the findings of this study to enhance the adoption of ICT in China's education sector. The results of this study suggest that it is important to provide educational sector employees with training and support to increase their use of ICT technology. Furthermore, this paper offers theoretical progression to create a supportive organizational culture and provide the educational sector with the necessary technological resources to facilitate the use of ICT.

[1] College of Economics and Management, Beijing University of Technology, 100124 Beijing, People's Republic of China. [2] Institute of Business & Management, University of Engineering and Technology, Lahore 54000, Pakistan. ✉email: farrukhshahzad207@gmail.com; xushuo@bjut.edu.cn

Introduction

Information and communication technology (ICT) development and pervasive implementation have become significantly pretentious in many sectors, particularly the educational sector in the neoteric era (Sukanthan Rajendra et al., 2022), as attracting researcher attention. Intention to use information and communication technology (ITUICT) is a panoptic term comprising various electronic tools that help collect and store information (Sahut and Lissillour, 2023). ICT has become the center of attention for educational researchers because it assists researchers and teachers in perceiving education as entertaining and increases teaching efficacy. A past study by Buabeng-Andoh et al. (2019) claimed that users' intentions to use ICT have developed as a precarious constituent for the success or failure of different businesses. Hence, inadequate and incompetent technology adoption in the educational sector among students and teachers is still a problem for the advancement of the educational sector. Many factors can influence ITUICT implementation and acceptance in the education sector, including social factors (i.e., social influence), individual factors (i.e., trust), technological factors (i.e., information acquisition, perceived awareness), and other external factors (i.e., regulatory support), as supported by literature (Raza et al., 2018; Tarhini et al., 2015).

A researcher (Yang et al., 2023) focused on ICT adoption among teachers in an educational institution faces a challenge; besides, they show a positive bias concerning ICT applications for educational teaching and learning. Various studies have highlighted that insufficient implementation and usage of technology in higher educational institutions is associated with several hindrances, such as perceived attitudes towards technology adoption, poor social support, technology infrastructure, lack of information, and learner's adeptness and attitude towards the technology (B. Kim and Park, 2018; Teo, 2012). Hence, technology acceptance is considered a driving factor for accelerating technology usage intention among students, though the study is scarce in the context of teachers' technology usage intention (M. F. Shahzad et al., 2023). Technology acceptance is an individual's inclination to adopt technology for the jobs it supports (Marangunić and Granić, 2015). Past literature (J. Xu and Zhu, 2023; Zheng et al., 2023) highlighted that many theories had been extensively embraced to analyze factors influencing an individual's intention to use technology. Therefore, acceptance and implementation of any technology result from various factors, including social factors, trust in innovation, and perceived awareness among users to use technology and culture.

Many researchers (Irfan and Ahmad, 2022; Nayanajith et al., 2019; Tabassum and Shehzadi, 2018) highlighted that perceived awareness among individuals could increase the user's inclination towards adopting and implementing new technologies. Moreover, other factors, such as insufficient information acquisition, a lack of regulatory support, and a lack of trust, hinder ICT adoption (Raimi et al., 2021). Some non-users of ICT claim they cannot adopt it without having enough advanced technological information. Hence, such factors play a substantial role in influencing the user's intention to implement ICT from the perspective of an educational institution; teachers, employees, and faculty members working in such institutions state that their service, performance, productivity, and efficiency increase due to ICT adoption (Faqih and Jaradat, 2021). Therefore, social, individual, and technological factors such as information acquisition, perceived awareness, and regulatory support are critical in effectively implementing and adopting ICT in the educational sector, which requires the researcher's attention. The goal of the present research study is: (1) To examine the role of information acquisition, perceived awareness, social factors, and regulatory support towards the intention to use ICT among employees working in educational institutions in China. (2) To examine how trustworthiness moderates the relationship between a dependent variable (intention to use ICT) and independent variables (information acquisition, perceived awareness, social factors, and regulatory support). The current research study will add to the body of knowledge by integrating the UTAUT model (Attuquayefio and Addo, 2014; Birch and Irvine, 2009; Oye et al., 2014) as a significant research framework to forecast teachers' intention to use ICT in educational institutes.

The present research has some significant contributions: Firstly, the research would validate the ICT intention-based model devised in the current study in educational institutions. In the past, many studies have been conducted (Al-Qirim et al., 2018; Buabeng-Andoh et al., 2019) in non-educational settings, but these studies lack ICT intention-based models in educational settings. Secondly, many research studies (Buabeng-Andoh et al., 2019; Gupta et al., 2008; Radnan and Purba, 2018) have evaluated the applicability of other models (TRA, TAM). Still, none of the studies has exploited a model such as UTAUT to evaluate the user's intention to adopt ICT technology with factors (IA, SI, PA, RS, and TW) applied in a developing country like China. Hence, the current study would add to the existing theories in the following context, such as the adoption of ICT in the education sector of China. Lastly, the study would have practical consideration because it would provide empirical knowledge to prove users' trustworthiness towards their intention to use ICT. It significantly contributes to ICT adoption intentions among teachers for teaching, research, and other job-related activities. Hence, when university faculty gain efficient regulatory support and trust from associated bodies, their attitude towards ICT usage will increase, positively affecting the overall educational system. Furthermore, this paper is thoroughly organized into five sections. The "Introduction" section covers the introduction. The "Supporting theory and literature review" section illustrates the theoretical framework and literature. The section "Material and Methods" describes the material and method of study. Analysis assessment of variables presented in the section "Results and analysis". Lastly, the section "Discussion" provides a discussion, conclusion, implication, and limitation of the study.

Supporting theory and literature review

Unified theory of acceptance and use of technology (UTAUT). The UTAUT model was formulated by Venkatesh in 2003. It ascertains important factors to measure the user's intention to adopt new technology. Researchers (Gu et al., 2021; Oye et al., 2014) have integrated the UTAUT model due to its advantages. Furthermore, UTAUT has summarized 32 variables originating from the existing eight models. Four main effects and four moderating factors were determined from the following models: Theory of Reason Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Motivational Model (MM), combined theory of Planned Behavior (C-TPB), Technology Acceptance Model (TAM), Model of PC Utilization (MPCU), and Innovation Diffusion Theory (IDT) (Faqih and Jaradat, 2021; Gu et al., 2021). Hence, the primary four determinants for the acceptance of technology by users include performance expectancy, effort expectancy, social influence, and perceived facilitating conditions. This study used two determinants (SI and RS) of the UTAUT model to support our conceptual framework. Social influence is the extent to which individuals believe their friends, family, and colleagues perceive that a person should use technology (Arias-Oliva et al., 2019). At the same time, perceived facilitating conditions are how individuals perceive that their organization and technical infrastructure

would support them using new technology (Merhi et al., 2019). According to the current research study, we used the UTAUT model as evidence from past studies (Al-Nuaimi and Al-Emran, 2021; Koenig-Lewis et al., 2015; Merhi et al., 2019) to develop a conceptual framework and hypothesis. The model states that various aspects, such as social influence from social factors, regulatory support from facilitating conditions, information acquisition, and perceived awareness, significantly affect user intention towards ICT usage. At the same time, trustworthiness (moderator variable), ITUICT (dependent variable), and independent variables (information acquisition, perceived awareness, social factors, and regulatory support).

Social Influence and ITUICT. Social influence can play a significant role in shaping an individual's intention to use ICT. Understanding the impression of social influence, researchers and practitioners developed strategies to encourage embracing ITUICT (Kurniawan et al., 2022). Social influence refers to the influence of an individual's behavior, attitudes, and beliefs. In China, social influence is crucial in adopting new technologies, including ICT, in education (Razak et al., 2017). Teachers and researchers are influenced by their peers, colleagues, and social networks to use ICT in education. The ITUICT in education states an individual's motivation and inclination to adopt and use technology (Wang et al., 2017). In China, the ITUICT in education is influenced by various factors, such as the usefulness of ICT and social influence. It has transformed outdated teaching and learning approaches and provided new chances for teachers and students (Zhu and Chen, 2016). The use of ICT has made education more interactive, engaging, and personalized, enabling teachers to tailor their teaching approaches to the needs of individual students. However, adopting ITUICT in education also presents some challenges. For instance, not all teachers and students have access to the necessary technology and infrastructure, which can limit the effectiveness of ICT in education (K. Y. Lin and Lu, 2015). Moreover, some teachers may not have the essential skills and training to use ICT effectively, but their institutes provide them with the latest technology to use in the classroom and research (Baydas and Goktas, 2016). However, some challenges still need to be addressed to ensure that all professionals can benefit from using ICT in education (Inan et al., 2022).

Various research studies (Nicholas-Omoregbe et al., 2017; Yu et al., 2023) proved that social influence sermonizes progress among individuals working in different institutes, including colleagues, to adopt certain behaviors. In the context of ICT, social influence occurs through social norms, social pressure, and social support. If individuals perceive that their peers or colleagues are using a particular technology, they are more likely to adopt it to fit in or avoid social ostracism. Additionally, individuals receive social support and encouragement from their social network to adopt particular technologies in their personal and professional lives for progression. However, studies proved that social influence could be more influential than other factors, such as perceived usefulness and personal attitudes towards ITUICT. In adopting ICT, social influence can take various forms, including social norms, social support, and social comparison. Similarly, professionals receive social support or encouragement from others to use ICT; they may be more motivated to use ICT and overcome any barriers or challenges they encounter toward their personal and professional growth (Gani et al., 2023). Past research has shown that social influence can be a powerful predictor of ICT usage and adoption (Tiwari, 2020). Therefore, understanding the role of social influence in shaping ICT acceptance and adoption can be significant for organizations

and policymakers to promote the uptake of new technologies (Ye et al., 2023). Through the above discussion, we hypothesized,

Hypothesis 1: Social influence has a positive impact on the ITUICT.

Information acquisition and ITUICT. When individuals acquire more information about ICT, they are likely to have a superior understanding of reimbursements and features of the technology. This can increase their intention to use ICT as they become more aware of how it can improve their work or personal lives (Soysal et al., 2019). Acquiring information about ICT increases a person's confidence in their capability to use the technology (Kang et al., 2022). Information acquisition is directed towards an increase in the use of ICT as people feel more comfortable using it and believe they can use it effectively. The past study highlighted that people acquire more knowledge and develop a perception of using technology, increasing their intention to use it. Individuals with access to relevant and accurate information about a particular technology will develop a positive attitude towards it and consider using it daily. This information can be obtained through several channels, such as social media, websites, blogs, and other online forums. The quality of the information obtained also plays a crucial role in shaping the ITUICT. Accurate, reliable, and knowledgeable information can help individuals make informed decisions about the technology they intend to use (Murray, 1991). On the other hand, inaccurate or misleading information can lead to confusion and skepticism about the technology's value. Information acquisition changes the perception of people's use of technology. They possess the essential skills and knowledge to exert the technology and are more feasibly adopting it than those who lack the necessary skills (Zubair et al., 2019). Thus, promoting digital literacy and providing training and support for individuals to acquire ICT skills can increase their intention to use technology (Irfan and Ahmad, 2022; Wu and Zhou, 2021).

Information acquisition refers to obtaining knowledge and information about ICT and its potential benefits for the education sector (Valimont et al., 2002). ICT includes training programs for teachers and administrators, educational resources on ICT implementation, and successful ICT integration in universities (Kong and Saar-Tsechansky, 2014). The more information and knowledge individuals in the education sector acquire about ICT, the more likely they will have a positive attitude toward using it and a stronger intention to participate in their teaching and learning practices (Pan et al., 2020). Information acquisition refers to obtaining data and feedback on the usefulness of ICT implementation in the education sector (Yasin Kabir et al., 2020). Information acquisition includes data on student performance and engagement, teacher satisfaction and workload, and the cost-effectiveness of ICT implementation (Merolla and Zechmeister, 2018). The impact of information acquisition on the ITUICT in China's education sector can be influenced by various contextual factors such as funding, policy support, and cultural attitudes toward technology (Faqih and Jaradat, 2021). The government provides funding and policy support for ICT implementation in universities, creating a more favorable environment for information acquisition and increasing the intent to use ICT in the education sector (Capozza et al., 2021). Furthermore, information acquisition can play a critical role in shaping ITUICT in China's education sector (Zhang et al., 2024). The availability of knowledge and data on ICT, combined with supportive contextual factors, can help promote a more constructive attitude towards ICT and increase the purpose of integrating it into teaching and learning practices (Omogor, 2013). Based on the above discussion, we hypothesized,

Hypothesis 2: Information acquisition has a positive impact on the ITUICT.

Perceived awareness and ITUICT. Perceived awareness is a key factor influencing an individual's ITUICT. When individuals observe sufficient knowledge and understanding of a particular ICT, they are likelier to have an encouraging attitude toward using it. They are more expected to intend to use it (Ninaus et al., 2015). This is because when an individual feels that they are well-informed about a particular technology, they feel assured in their ability to use it and perceive it as useful (Bozdoğan and Özen, 2014). However, it is important to note that perceived awareness alone may not accurately forecast an individual's intention to use technology fully (S. Xu et al., 2021). Additionally, individuals may have different levels of perceived awareness for different types of ICTs, which can impact their intention to use different technologies differently (Deng et al., 2014). Overall, perceived awareness is a vital factor influencing an individual's ITUICT, and designers and developers need to consider strategies for increasing perceived awareness among potential users. Perceived awareness, or knowledge, refers to a person's perception of knowledge about a specific topic. The past study (Tabassum and Shehzadi, 2018) highlighted that perceived ease of use significantly influences an individual's ITUICT. A prior study (Hamid and Zeki, 2014) expressed that people's attitudes were key in turning them towards ITUICT. Several reasons, such as intention or likeness, agree that people should be aware of ICT and implement it in their professional field (Ajayi and Alabi, 2013).

People notice themselves as competent in using technological tools, leading to a sense of self-efficacy and sureness in their competencies (Morris, 2010). As a result, they are more likely to perceive ICT tools and applications as useful, easy to use, and enjoyable. Perceived awareness also impacts the integration of ICT in the education sector, especially in universities (Khan et al., 2017). Professors play a difficult role in integrating ICT into the classroom, as they are responsible for designing and delivering educational content. If they have a low perceived awareness of ICT, they may be less likely to use it in the classroom (Stamenkov and Zhaku-Hani, 2021). Therefore, these arguments support our literature, as increasing the perceived awareness of teachers is essential for successfully incorporating ICT. Additionally, teachers must be skilled in using ICT effectively in the classroom to maximize its impact on student learning (Dubey and Sahu, 2021). Perceived awareness in education plays an effective role in ICT-based teaching and learning. Teachers and students have a high perceived awareness of ICT and are more likely to use it effectively, which can lead to improved learning outcomes (Oke and Fernandes, 2020). ICT facilitates personalized learning and provides immediate feedback to students, enhancing their learning experience. Furthermore, communication technology is used to access educational resources and information, which can enhance students' knowledge and skills (Al-Rahmi et al., 2019). Perceived awareness is a critical factor in the approval and combination of ICT in China's education sector (Nayanajith et al., 2019). Increasing perceived awareness can endorse the acceptance of ICT in universities, enhance the amalgamation of ICT in the classroom, and improve the effectiveness of ICT-based teaching (Elkaseh et al., 2016). Through the above discussion, we hypothesized,

Hypothesis 3: Perceived awareness has a positive impact on the ITUICT.

Regulatory support and ITUICT. Regulatory support takes many forms, such as providing financial incentives or tax breaks for businesses that invest in ICT or implementing policies that invigorate the adoption of new technologies (Madan and Yadav, 2016). One of the main ways that regulatory support impacts the ITUICT is by reducing the perceived risks and uncertainties associated with new technologies (Balaskas et al., 2022). Regulations that address issues such as data privacy and security can increase the confidence of businesses and individuals in using new technologies, leading to increased adoption (Matias and Hernandez, 2021). In addition, regulatory support creates a more favorable environment for innovation and experimentation, which can increase the availability and accessibility of new technologies. These technologies encourage businesses and individuals to try new ICT solutions, increasing usage and adoption (Rahim et al., 2021). Moreover, regulatory support gives businesses the necessary possessions and support to invest in ICT. Regulatory support includes funding for research and development, training and education programs, and other forms of support that can help businesses better understand and leverage new technologies (Choi et al., 2022). Overall, regulatory support can play a crucial role in promoting the acceptance and usage of ICT. Reducing perceived risks and uncertainties creates a more favorable environment for innovation. Regulatory support provides businesses with the necessary resources (Farrukh et al., 2023). It supports regulatory policies to help businesses and individuals overcome barriers to ICT adoption and ultimately increase their desire to use new technologies.

Companies such as Tencent, Alibaba, and Huawei have developed educational apps and platforms widely used in Chinese schools and universities (Rho et al., 2014). With the proliferation of digital technologies, ICT has transformed how we work, communicate, and spend our lives (Van et al., 2019). However, despite the assistance of ICT, there are still barriers to adoption and usage, including concerns about data privacy and security, a lack of knowledge or training, and high implementation costs (F. Shahzad et al., 2020). In the European Union, general data protection is an instance of regulatory support that has substantially impacted ITUICT (Mensah, 2018). Regulatory support can impact ITUICT by reducing the perceived risks and uncertainties associated with new technologies. The education sector in China has realized significant advancements in recent years, and ICT has played a key role in this development (Lean et al., 2010). Regulatory support refers to the policies and regulations put in place to boost the implementation and use of technology in various sectors of the economy (Farrukh et al., 2023). In the education sector, regulatory support is provided through policies that promote ICT integration in teaching and learning (Saputra and Darma, 2022). The Chinese government has been instrumental in the development of these policies, and this has had a significant effect on the ITUICT in education (Ennew and Fujia, 2009). The Chinese government has launched a program called "Internet Plus Education," which aims to approve the integration of ICT in education at all stages (Xie et al., 2023). Regulatory support has also had a noteworthy impact on the development of educational technology in China, which has led to the creation of innovative products and facilities specifically customized to the needs of Chinese students and teachers (Albayati et al., 2020). Based on the above discussion, we hypothesized,

Hypothesis 4: Regulatory support has a positive impact on the ITUICT.

Moderation role of trustworthiness. When users distinguish that an ICT system is trustworthy, they are more likely to use it and rely on it for information and communication needs (Chan and Lau, 2000). Users who trust an ICT system are more likely to perceive it as easy to use, which can increase their intention to use

it (Ejdys, 2018). This is because trust in the system reduces uncertainty and perceived risk, making users more comfortable using the system. Trust in the system can increase users' confidence in the accuracy and worth of the information supplied by the system and in its ability to communicate effectively with other users (Wu and Zhou, 2021; Zeffane and Bani Melhem, 2017). Systems perceived as trustworthy can increase users' confidence in the system, which can lead to increased use and adoption of the technology (Gharaibeh and Gharaibeh, 2020). Past research (Wong, 2016) expressed that social influence, through the opinions of others, can influence a person's intention to use ICT in education, but trustworthiness moderates this relationship. Trustworthiness is critical in China's education sector as it builds strong relationships between teachers, students, and other stakeholders (Irfan and Ahmad, 2022; D. Lin et al., 2018; Merhi et al., 2019). Teachers' trustworthiness can influence students' observations of their credibility and competence, positively impacting their intention to use ICT in education. Students' trustworthiness can influence teachers' perceptions of their academic ability and cooperation, leading to positive teacher-student interactions. Past studies have shown that social influence can positively impact an individual's intention to use ICT in education (Ayasrah, 2020). Still, this relationship is stronger when the source of social influence is perceived as trustworthy.

Building trust among all stakeholders leads to positive perceptions of credibility, competence, and cooperation, leading to greater adoption of ICT in education (Alhamad et al., 2021). In education, acquiring trustworthy information is critical to effective decision-making and adopting new technologies (Hooda et al., 2022). Teachers, administrators, and students must trust the statistics they receive to make conversant decisions regarding the use of ICT in education. Individuals who have had positive experiences with ICT and perceive it as useful may be more likely to trust the information sources and have positive intentions to use ICT (Antoniadis et al., 2022). Trustworthy information sources can lead to positive perceptions of the quality and credibility of information, which can influence positive intentions to use ICT. Therefore, building trust among all collaborators in the education sector can promote the effective acceptance and use of ICT in education. In recent years, China has invested heavily in ICT in education, with the government promoting digital technologies to improve educational outcomes (M. F. Shahzad et al., 2023). Trustworthiness can be predisposed by system reliability, security, privacy, and user support (Burchielli, 2009). The system is reliable and secure, and users will be confident that their data is safe and can rely on it to perform its intended functions.

Additionally, users receive adequate support and guidance. They would feel more comfortable using the technology and be more prospective to incorporate it into their teaching and learning practices (Liu et al., 2021). Users observe the technology as trustworthy, and they are more convenient to have a positive attitude towards using it, which can lead to increased adoption and use of ICT in education. Regulatory bodies are perceived as trustworthy, and educational stakeholders may be more willing to test new ICT tools and platforms. This support can lead to greater innovation and creativity in the classroom and more opportunities for personalized and student-centered learning. Trustworthiness can also promote greater accountability among regulatory bodies and educational stakeholders (An et al., 2021). People in the education sector believe they are accountable for the quality of ICT use in education. Regulatory bodies are seen as trustworthy and reliable; this can help to enable the adoption and use of new technologies, which can ultimately improve educational outcomes in China (Chan and Lau, 2000). Through the above discussion, we hypothesized,
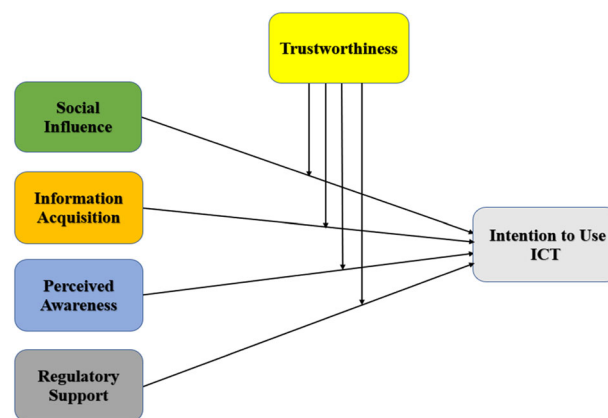

Fig. 1 Conceptual framework.

Hypothesis 5: Trustworthiness has a positive impact on the ITUICT.

Hypothesis 5a: Trustworthiness positively moderates the relationship between social influence and ITUICT.

Hypothesis 5b: Trustworthiness positively moderates the relationship between information acquisition and ITUICT.

Hypothesis 5c: Trustworthiness positively moderates the relationship between perceived awareness and ITUICT.

Hypothesis 5d: Trustworthiness positively moderates the relationship between regulatory support and ITUICT.

Figure 1 below presents a research model that explains the literature already described above.

Material and Methods

The study emphasizes factors such as social influence, information acquisition, perceived awareness, and regulatory support, with the moderating effect of trustworthiness influencing the ITUICT. ICT has transformed the education sector by making education more accessible, flexible, and engaging. It has also improved the quality of education and made it easier to evaluate students' progress. Both researchers and teachers can access online libraries, research materials, and educational resources, enabling them to expand their knowledge beyond the classroom (Al-Azawei and Alowayr, 2020). Overall, this study delivers insights into the complex factors that could influence an individual's decisions about ICT use and displays the importance of considering trustworthiness as a key factor in shaping these decisions. For data gathering, we randomly selected six top-ranking universities in Beijing, China, as listed by Times Higher Education. These universities were located in Beijing, the nation's capital and a major center for geographically concentrated enrollment. Employees at the universities completed a standardized survey that was used to collect the data. The choice of university employees as the unit of analysis is strategic, given their active engagement with the ICT technologies under scrutiny. The study will adopt a quantitative research design utilizing PLS-SEM to analyze the relationships among the factors influencing the ITUICT (J. M. Martins et al., 2023). The study will use a convenient sampling technique to select respondents from the education sector in China. To gather data for this study, we strategically dispersed questionnaires. Scales specifically adapted for refinement from earlier research were used to measure the constructs or variables under investigation. We used the Likert scale to elicit thoughtful replies and determine how strongly respondents agreed or disagreed with items. In particular, a five-point Likert scale was chosen to capture a wider range of attitudes and provide respondents with additional choices. We ensured

robust participation by disseminating the survey's in-person questionnaire on university campuses and online platforms.

Initially, 451 questionnaires were distributed among the selected participants through online platforms, and we received 381. All questionnaires returned underwent rigorous screening for missing values, multivariate outliers, and unengaged responses. 70 responses are missing values that were deleted. Hence, the total responses $n = 381$ are used for analysis. The response rate was 84%. The standard sample size was adopted from the research study of (Raza et al., 2020; F. Shahzad et al., 2022). However, the sample data contains 218 male (57%) and 163 female (43%) respondents. Table 1 demonstrates the study's demographic characteristics of respondents. The age of participants was described as 78 respondents (20%) between 20 and 26 years old. The maximum was 197 respondents (52%) who were 27–35 years old, while the remaining 106 (28%) were above 35 years. Moreover, the educational background of respondents consists of the following distribution: 66 respondents (17%) have bachelor's degrees, 188 (49%) have master's degrees, and 127 (34%) were Ph.D. doctors. The work background of participants

consists of the following circulation: 189 respondents (50%) were university faculty members. 71 participants (19%) were assistants of faculty labs. 63 participants (16%) were researchers using ICT applications. 50 respondents (15%) belonged to other fields. Furthermore, the experience of respondents consists of the following distribution: 131 respondents (34%) have 5 or less than 5 years of experience, 173 (46%) have experienced 6–10 years, and 77 (20%) have experienced 11–20 years. Demographic details are shown in Table 1 and Fig. 2.

All variables considered in this research have been ordinarily adapted from earlier studies (Al-Azawei and Alowayr, 2020; M. F. Shahzad et al., 2021) to satisfy the necessities of the literature on fact sharing. The survey questionnaire has two sections. The first phase contains respondents' demographic facts, including age, gender, qualification, and experience. Furthermore, the following phase accommodates questions regarding social influence, information acquisition, perceived awareness, regulatory support, trustworthiness, and intention to use ICT. A Likert scale with a maximum of five points, from 1 for "strongly disagree" to 5 for "strongly agree," was used to measure the items of all variables (J. M. Martins et al., 2023). Intention to use ICT: Five items were occupied from N. Kim et al. (2019). The five items of trustworthiness suggested by Fakhoury and Aubert, (2015). Social influence was calculated using five items taken from Martins et al.(2014). The five items of information acquisition were collected from M. Irfan and Ahmad (2022). Four items of perceived awareness adapted from (Bozdoğan and Özen, 2014). Regulatory support was assessed by four items taken from Chohan and Hu, (2020). Furthermore, detailed questions about measuring variables are provided in Table 2.

Results and analysis

SmartPLS 4 software was used to assess the surveyed data through the partial least squares-structural equation modeling (PLS-SEM) approach. Careful researchers recognize the potential for separating measurement models from structural models, specifically accounting for measurement error (F. Shahzad et al., 2022). These are the best approaches for looking into a conceptual model for a prediction that has been created and making sure that important target constructs

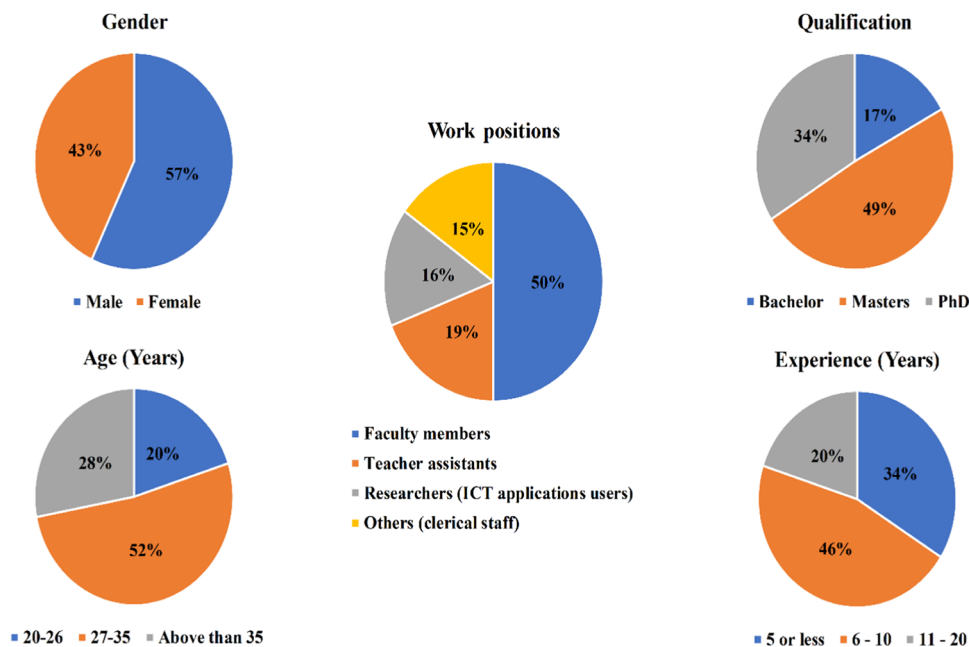| Table 1 Demographic details of respondents.		
Demographics	**Distribution**	**$n = 381$**
Gender	Male	218 (57%)
	Female	163 (43%)
Age	20–26 years	78 (20%)
	27–35 years	197 (52%)
	Above than 35 years	106 (28%)
Qualification	Bachelor	66 (17%)
	Masters	188 (49%)
	PhD	127 (34%)
Work positions	Faculty members	189 (50%)
	Teacher assistants	71 (19%)
	Researchers (ICT application users)	63 (16%)
	Others (clerical staff)	58 (15)
Experience	5 or less years	131 (34%)
	6–10 years	173 (46%)
	11–20 years	77 (20%)

Fig. 2 Demographic details of respondents.

Table 2 Factor analysis, validity, reliability, and collinearity statistics.

Construct	Item		FL	α	CR	AVE	Source
Intention to use ICT (ITUICT)				0.885	0.916	0.686	(N. Kim et al., 2019)
	ITUICT1	I will consider using ICT.	0.833				
	ITUICT2	I am planning to use ICT.	0.878				
	ITUICT3	I will continue to use ICT.	0.780				
	ITUICT4	I will inform others regarding the goodness of ICT.	0.821				
	ITUICT5	I will use the resources essential to use ICT.	0.823				
Social influence (SI)				0.893	0.919	0.695	(C. Martins et al., 2014)
	SI1	Individuals who have an impact on my behavior think I should use ICT.	0.844				
	SI2	Individuals who I consider to be important think I should use ICT.	0.861				
	SI3	Individuals in my workplace who use ICT have more prestige than those who do not.	0.812				
	SI4	Individuals in my workplace who use ICT have a high profile.	0.837				
	SI5	Using ICT is considered a status representation in my working environment.	0.811				
Information acquisition (IA)				0.876	0.910	0.669	(Irfan and Ahmad, 2022)
	IA1	I select and acquire ICT resources.	0.822				
	IA2	I acquire information resources and use communication technology.	0.831				
	IA3	I have gained information and marketing information products and services using ICT.	0.752				
	IA4	I learned the information resources and prepared for the digitization of different documents.	0.795				
	IA5	I store the information resources for awareness of new techniques in ICT.	0.858				
Perceived awareness (PA)				0.792	0.859	0.604	(Bozdoğan and Özen, 2014)
	PA1	My self-confidence increases using ICT, and I get more motivated.	0.830				
	PA2	My language skills (listening) have improved using ICT facilities/tools.	0.820				
	PA3	I have an awareness of the importance of ICT usage in teaching.	0.726				
	PA4	My interest and enjoyment increased due to the usage of ICT.	0.721				
Regulatory support (RS)				0.904	0.933	0.776	(Chohan and Hu, 2020)
	RS1	I think there are success characteristics that encourage citizens to use ICT to produce public benefit in smart government.	0.825				
	RS2	I believe IT individuals in the province have accessible support with system difficulty with regulatory support.	0.904				
	RS3	I know regulatory support provides books and documents to support me in learning more about ICT.	0.892				
	RS4	I consider using ICT fits well with how I work with Regulatory support.	0.900				
Trustworthiness (TW)				0.916	0.937	0.748	(Fakhoury and Aubert, 2015)
	TW1	I trust the security of using ICT.	0.810				
	TW2	I am sure technology and legal frameworks effectively shield me from online risks.	0.807				
	TW3	I believe that the government encourages the use of ICT.	0.808				
	TW4	I believe our government to be trustworthy; the government will respect my privacy.	0.847				
	TW5	I trust that ICT now has a safe environment, and we can perform ICT-related activities with our government.	0.787				

FL factor loadings, *CR* composite reliability, *AVE* average variance extracted, *α* Cronbach's alpha.

are included (Gye-Soo, 2016). We examine the measurement model to evaluate internal consistency and test the structural model in the following two subsections (Tenenhaus et al., 2005).

Measurement model. The measurement model confirms the constructs' validity and reliability and accepts the factor loadings for each item. The measurement evaluation model passes the evaluations for reliability, consistency, and validity (Sarstedt et al., 2014). First, statistical significance and a factor loading of at least 0.7 are required to evaluate the indicator's reliability (J. F. Hair et al., 2011). Outer loading for all items is greater than 0.7, showing evidence in Table 2 that lies in the range. Second, composite reliability, Cronbach's alpha, and AVE were used as

Table 3 Discriminant validity.

Constructs	Mean	STDEV	1	2	3	4	5	6
1. IA	3.611	0.785	**0.818**					
2. ITUICT	3.639	0.779	0.811	**0.828**				
3. PA	3.446	0.746	0.754	0.729	**0.777**			
4. RS	3.364	0.938	0.574	0.645	0.636	**0.881**		
5. SI	3.646	0.884	0.771	0.784	0.583	0.591	**0.834**	
6. TW	3.341	0.929	0.636	0.591	0.711	0.828	0.545	**0.865**

SI social influence, *IA* information acquisition, *PA* perceived awareness, *RS* regulatory support, *TW* trustworthiness, *ITUICT* intention to use ICT, *STDEV* standard deviation, The diagonal in bold values represented the square root of AVE values.

markers to evaluate the constructs' reliability. Cronbach's alpha is another internal consistency measure that measures the extent to which items in a set are interrelated (Hamdollah and Baghaei, 2016). Composite reliability measures the degree to which the items accurately reflect the fundamental constructs and each construct's reliability and internal consistency (Sarstedt et al., 2022). As can be seen in Table 2, each construct's CR and α are higher than the predicted cutoff point of 0.7, demonstrating internal consistency. Average variance Extracted (AVE) is a measure of convergent validity. According to (J. F. Hair et al., 2020), it represents the proportion of variance the construct of interest captures compared to the variance resulting from measurement error. AVE values of 0.5 or higher are generally considered to indicate good convergent validity, as shown in Table 2. Thirdly, VIF is used to measure the statistics to assess the degree of multicollinearity among the independent variables in a multiple-regression analysis. Our study constructs meet the threshold values of VIF are less than 5.

Discriminant validity. Discriminant validity provides that the square root of AVE should be larger than the correlations among the constructs (J. Hair et al., 2017). Discriminant validity is the ability to compare the correlations between the items or measures used to assess a particular construct with the correlations between those same items or measures and items or measures used to assess other constructs (Fornell and Bookstein, 1982). If the correlations within the construct are higher than those between the construct and other constructs, then the construct has discriminant validity. For all constructs presented in Table 3, we conclude that discrimination exists in all categories within the range. The discriminant validity results are evaluated using the Heterotrait-Monotrait (HTMT) correlation criteria with values below the cutoff of 0.90. The findings meet the HTMT criteria, indicating that discriminant validity has been established (Voorhees et al., 2016).

Structure model. The primary goal of using SmartPLS 4 to develop a structural model is to test the theoretical model and determine the strength and significance of the relationships among the latent variables (J. M. Martins et al., 2023; M. F. Shahzad et al., 2024). This involves estimating the path coefficients and assessing their significance using bootstrap resampling methods. Smart PLS also provides various measures of model fit, such as the R-squared, the goodness-of-fit (GoF) index, and the standardized root mean square residual (SRMR), which can be used to evaluate the overall fit of the model (Sarstedt et al., 2014). The estimated valid path showed the value of R square in the case of ITUICT = 0.861, which means that 86% of the change in the present model was due to independent and underlying variables (SI, IA, PA, RS, and TW). The values of GoF indicate that the model is a good fit overall. For representation, NFI = 0.811,

SRMR = 0.068, and Chi-Square = 2678.235. See Fig. 3, which explains the model's estimation.

Hypothesis testing. Before moving toward the discussion section, the evaluation of the structural model needs to be done appropriately. In order to generate the values for the mean and standard deviation, as well as the β-values, t-values, and p-values to validate the statistical importance and speculation judgment, the bootstrapping method is exploited with 5,000 resamples (J. Hair et al., 2017). These consequences screen the impact that the specific variable has a good or damaging impact on other variables. It validated independent constructs' strong direct and indirect impact on dependent constructs. Furthermore, Table 4 comprises the value of each measured statistic. According to the bootstrapping method in SmartPLS, all loadings are statistically significant at ($p < 0.05$). The hypothesis testing outcomes showed that social influence positively relates to the ITUICT with values ($\beta = 0.195$, $t = 5.909$, and $p < 0.05$). Findings from our study support H1. Similarly, information acquisition positively relates to the ITUICT with values ($\beta = 0.483$, $t = 8.473$, and $p < 0.05$. The results of our study supported H2. Successively, perceived awareness positively relates to ITUICT with values ($\beta = 0.134$, $t = 3.622$, and $p < 0.05$). The findings of our study supported H3. Similarly, regulatory support positively relates to the ITUICT with values ($\beta = 0.374$, $t = 6.697$, and $p < 0.05$). The results of our study supported H4. Furthermore, trustworthiness positively relates to the ITUICT with values ($\beta = 0.211$, $t = 4.489$, and $p < 0.05$). The findings of our study supported H5. Most significantly, trustworthiness fully moderates the association among social influence, information acquisition, perceived awareness, regulatory support, and ITUICT with values ($\beta = 0.125$, 0.171, 0.082, 0.163, $t = 2.508$, 3.563, 2.562, 7.409, and $p < 0.05$), respectively supported H5a, H5b, H5c, and H5d. Thus, H1, H2, H3, H4, H5a, H5b, H5c, and H5d were accepted.

Moderating graphs. We illustrated the graphs to illuminate the outcomes of moderating the role of trustworthiness. Figures 4–7 show that trustworthiness moderates the association among social influence, information acquisition, perceived awareness, regulatory support, and intention to use ICT, respectively. Figure 4 describes the moderating role of trustworthiness among social influence and ITUICT. The prominent point on the moderation graphs is where social influence and ITUICT are stronger under high trustworthiness. Figure 5 elucidates the moderating role of trustworthiness between information acquisition and ITUICT. The prominent point on the moderation graphs is where information acquisition and ITUICT are stronger under high trustworthiness. Figure 6 enlightens the moderating role of trustworthiness between perceived awareness and ITUICT. The distinguished point on the moderation graphs is where perceived awareness and ITUICT are stronger under high trustworthiness.
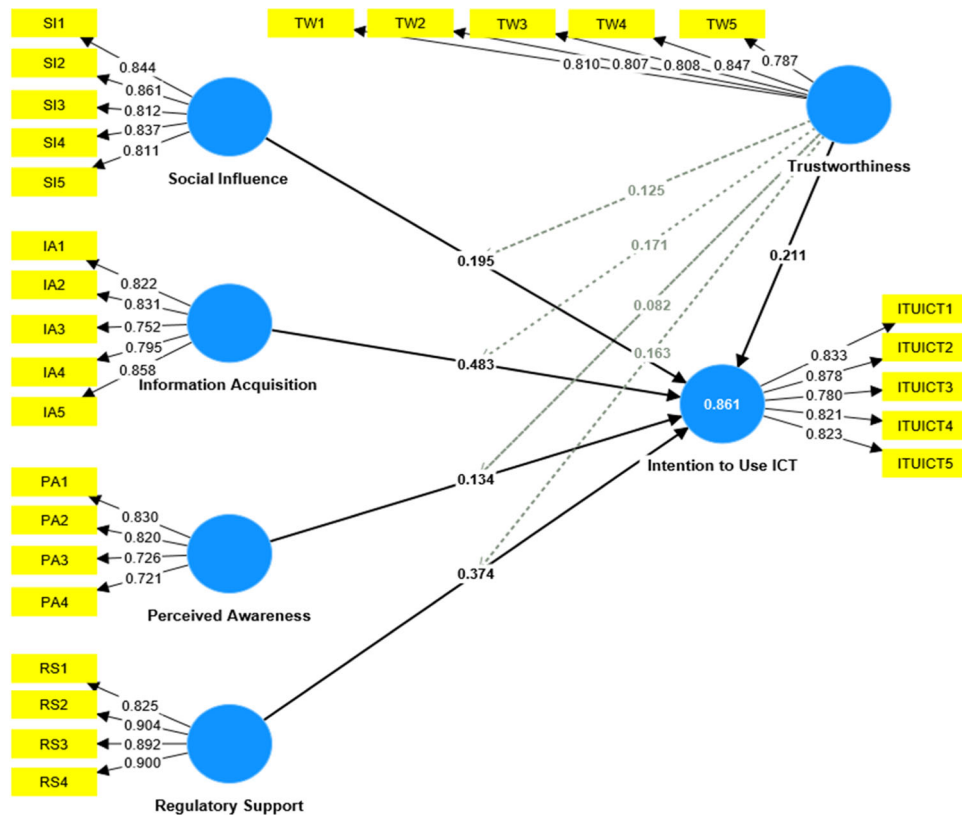
Fig. 3 Valid estimated model (PLS algorithm diagram).

Table 4 Hypothesis testing.

Path	β-values	STDEV	t-values	p-values	Decisions
Direct effect					
H1: SI → ITUICT	0.195	0.033	5.909	0.000	Accepted
H2: IA → ITUICT	0.483	0.057	8.473	0.000	Accepted
H3: PA → ITUICT	0.134	0.037	3.622	0.001	Accepted
H4: RS → ITUICT	0.374	0.056	6.697	0.000	Accepted
H5: TW → ITUICT	0.211	0.047	4.489	0.000	Accepted
Moderation effect					
H5a: SI*TW → ITUICT	0.125	0.050	2.508	0.013	Accepted
H5b: IA*TW → ITUICT	0.171	0.048	3.563	0.002	Accepted
H5c: PA*TW → ITUICT	0.082	0.032	2.562	0.011	Accepted
H5d: RS*TW → ITUICT	0.163	0.022	7.409	0.000	Accepted

Note: Significant at $p < 0.05$, SI social influence, IA information acquisition, PA perceived awareness, RS regulatory support, TW trustworthiness, ITUICT intention to use ICT, STDEV standard deviation.

Figure 7 clarifies the moderating role of trustworthiness between regulatory support and ITUICT. The noteworthy point on the moderation graphs is where regulatory support and ITUICT are stronger under high trustworthiness. Hence, it also supported H5a, H5b, H5c, and H5d.

Discussion
The ICT unties new contingencies for individuals working in different service sectors to gain various services. It includes government, healthcare, market, and security services, particularly boosting infrastructure knowledge exchange (Yu et al., 2023). The current research study examines the factors, such as social influence, perceived awareness, information acquisition, and regulatory support, that influence ITUICT and its acceptance. It further investigates the moderating role of

trustworthiness among the indirect relationships of social influence, perceived awareness, information acquisition, regulatory support, and intention to use ICT. The conceptual framework is evaluated by surveying a sample size of 381 respondents from employees of the educational sector of China. Five important research findings are presented in the study. Firstly, the findings state that social influence positively influences ITUICT. Prior studies confirmed that social influence positively impacts the adoption of new technology, which supported our study's arguments. Moreover, another study (Gupta et al., 2008) also proved that social influence positively affects the intention to use any technology without any difference between genders. It states that individuals will be more inclined to accept and exploit ICT when they perceive that it would facilitate their job performance and adaptability and that their friends and families want them to use ICT.
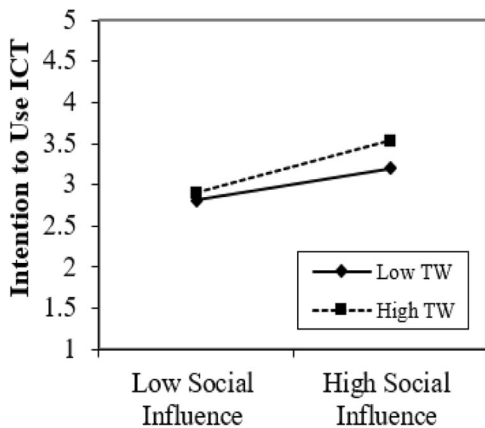
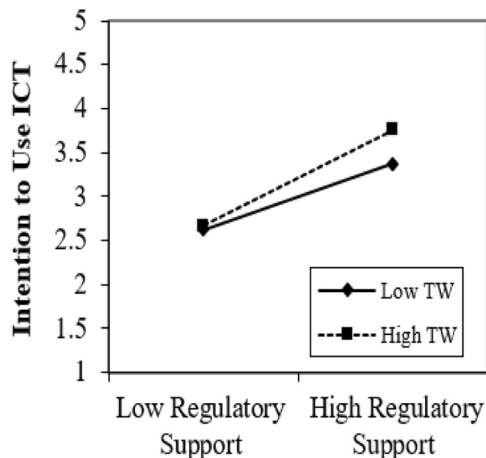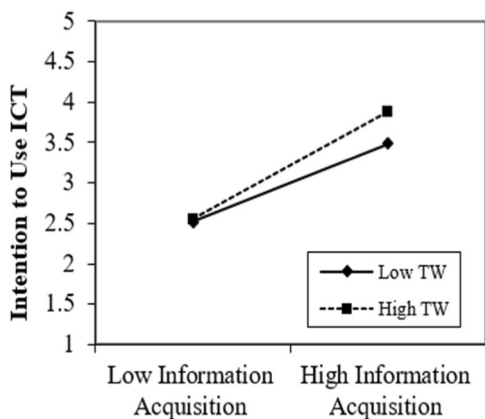**Fig. 4 Moderating graph of TW with SI and ITUICT.**

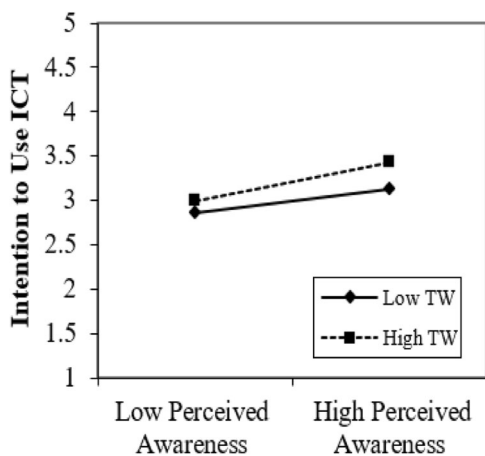**Fig. 5 Moderating graph of TW with IA and ITUICT.**

Fig. 6 Moderating graph of TW with PA and ITUICT.

Secondly, this research study has investigated the association between information acquisition and ITUICT. A prior study M. Irfan and Ahmad (2022) highlighted that factor information acquisition and proved that it significantly affects technology adoption. Further, it states that information acquisition is associated with high conscientiousness, consequently impacting the ITUICT. Moreover, the research findings are in harmony with a study by Fu and Hou (2020) that supported the fact that

Fig. 7 Moderating graph of TW with RS and ITUICT.

information acquisition is significantly and positively associated with the use of ICT. Thirdly, our research analysis proved that perceived awareness positively impacts ITUICT. The past study of Sharma (2020) also supported our devised hypothesis by highlighting that teachers' perceived awareness significantly affects ICT acceptance in the educational sector. In the same study, Alharbi and Drew (2014) also argued that in educational institutions, different factors that directly affect the application of ICT are perceived adaptability, perceived awareness, job attitude, job relevance, and relevant experience. Whereas Tochukwu and TansuHocanın (2017) studies have done a gender-based comparison that investigated the association between perceived awareness and ITUICT. The study has ascertained the degree of perceived awareness about the applications of ICT tools among students. Hence, it states that perceived awareness plays a significant role in ICT acceptance and implementation, which is effective in effective learning.

Fourthly, our studies hypothesized that regulatory support positively impacts the ITUICT. Hence, the analysis showed a positive relationship between regulatory support and ITUICT. Many other past studies also supported the result, as (Adam et al., 2020) showed that regulatory support and public policies influence ICT diffusion in different sectors. A prior study highlighted that ICT acceptance and regulation are positively and significantly accompanied by the political and regulatory settings supporting ICT usage (Billon et al., 2009). Furthermore, it was argued that past studies showed that public strategies and protocols are precarious for advancing ICT diffusion (Chueh and Huang, 2023). Different studies on the aspect of telecommunication policies suggest that ICT adoption and implementation could be improved by infrastructure development. A study by Aleke et al. (2011) confirmed the positive relationship between regulatory support and the intention to use and accept ICT.

Lastly, the research finding that makes our study interesting is that trustworthiness positively moderates the relationship between social influence, perceived awareness, information acquisition, regulatory support, and ITUICT. Prior research by Kurniawan et al. (2022) also confirmed the results, as social influence was associated with trust, and people change their perception and attitude regarding any technology when they are influenced by social pressure and interact with others. Similarly, the researcher Lafraxo et al. (2018) claimed that trustworthiness substantially influences ICT acceptance and implementation. At the same time, perceived trust is considered an integral constituent of technology adoption because trustworthiness

moderates the association between social influence and ITUICT. It means higher trust caused by more social influence will consequently increase the ITUICT. In the context of information acquisition, studies by Weber and Maurer (2023) supported the idea that trustworthiness positively moderates the association between information acquisition and the intention to use ICT. The study supported that trustworthiness influences the association between perceived awareness and ICT. Furthermore, studies (Bélanger and Carter, 2005; Carter and Weerakkody, 2008; Warkentin et al., 2002) confirmed that trust significantly mediates the association between regulatory support and ICT. In the following study, researchers claimed that government support is one of the significant determinants influencing the trustworthiness of online technologies. The moderating graph shows that social influence, perceived awareness, information acquisition, regulatory support, and ITUICT are stronger under high trustworthiness.

Strengths and implications. The study has developed and validated a multifaceted model with a moderating role of trustworthiness among different factors. Hence, the empirical analysis of this study has suggested several theoretical implications. The study has introduced a new conceptual model supported by UTAUT specifically designed to analyze the acceptance and implementation of ICT in China's educational sector. Unlike previous studies that relied on TAM and TPB models, this research utilized the UTAUT model, incorporating two essential factors: social influence and perceived facilitating conditions to support communication technology in the education sector. The study's results can provide valuable insights and practical implications for educational institutions and the government. It can help devise training programs that enhance technological awareness and ICT applications. Promoting the use of technology in teaching, learning, and research can lead to improved organizational performance and effectiveness. The research can benefit organizational policymakers and service providers who can leverage the dominant variables of social influence and trustworthiness to influence the intention to use ICT. Organizations can enhance individual and team performance in the workplace by adopting suitable ICT applications and systems (Irfan and Ahmad, 2022). The study emphasizes the role of perceived pedagogical benefits in the intention to use ICT in the classroom. This can inspire further research on innovative teaching methods, the impact of personalized learning, and the role of technology in enhancing learning outcomes.

This study has some practical implications. The study acknowledges lecturers' major ICT challenges, such as learning management systems and e-learning software. By providing insights into the factors influencing ICT acceptance, the research can help lecturers and professors in educational institutions adopt technology more efficiently and effectively (Otiso and Chweya, 2015). Ensuring adequate technological infrastructure and internet access in schools is crucial for successful ICT implementation. Practical recommendations may include providing better hardware, software, and high-speed internet connectivity, especially in rural and underprivileged areas. The research findings indicate that a lack of awareness and preparedness, often due to the absence of training and professional advancements for university employees, hinders the acceptance of ICT. This study focuses on awareness through target teacher training programs and improving ICT adoption in education sectors. Its implications extend to educational institutions, government policymakers, and organizational managers, providing valuable insights for enhancing ICT acceptance and implementation in the educational sector. Collaboration between the government, educational institutions, and technology

companies can lead to innovative ICT solutions and funding opportunities. Public-private partnerships can accelerate the adoption of cutting-edge technologies in education. Overall, the findings from this research article can serve as a foundation for policymakers and educators to effectively promote the adoption and acceptance of ICT in China's education sector, ultimately fostering an enriched learning environment.

Conclusion. ICT adoption and implementation are considered imperative areas due to technological growth. In this context, different ICT adoption frameworks have been applied in different fields to examine factors that impact users' intentions toward ICT. The current research study has examined the different elements that impact the ITUICT of employees between educational institutions in China. It further investigated the moderating role of trustworthiness among factors such as social influence, information acquisition, perceived awareness, regulatory support, and user ITUICT. The study outcomes have five different findings: Firstly, it confirmed that social influence has a positive relationship with the ITUICT. Secondly, information acquisition has a positive relationship with the ITUICT. Thirdly, perceived awareness has a positive relationship with the ITUICT. Fourthly, regulatory support positively correlates with the intention to use ICT. Lastly, trustworthiness positively moderates the relationship between perceived awareness, information acquisition, social influence, regulatory support, and ITUICT. This study would impart significant information regarding ICT usage in the current literature and among policymakers. It presents the significance of diverse aspects stimulating users' intentions toward adopting and implementing ICT. Moreover, findings would be useful for policy implications and different organizational sectors by divulging how regulatory support and other factors can play a role in better individual performance.

Limitations and future directions. The current study has some limitations that are in addition to these strengths. First, this study explores the impact of information acquisition, perceived awareness, regulatory support, and social influence on the ITUICT in educational settings. However, further investigations are recommended to expand and integrate multifaceted theories and supplementary factors that could influence the ITUICT to achieve a comprehensive understanding. Second, the data collection process in this study relied solely on survey questionnaires to gauge ICT adoption. It is suggested that future researchers incorporate interviews to allow respondents to express more meaningful opinions regarding ICT adoption and implementation specific to their fields. Future studies will conduct interviews to gather deeper insights into technology adoption. Third, this study's scope was limited to the population of China, which may restrict the generalizability of the findings. To enhance the external validity of research outcomes, future investigations should address a more extensive and diverse population to permit broader generalization in different countries' contexts. Fourth, this study looked at participants from the education sectors (faculty members and researchers) who might not be particularly representative of the sector, occurrences of adoption of ICT, and related results. For future research, it is advised to consider different educational backgrounds and categories, such as students. Fifth, this study used trustworthiness as a moderator with other variables to check individuals' influence toward ICT adoption. For future studies, it is recommended that different variables such as technology self-efficacy or attitude are used to adopt ICT. Lastly, this study analysis would provide valuable insights into ICT implementation's potential advantages and disadvantages, thus contributing to the current literature. For future perspectives

to enrich the existing body of knowledge on ICT adoption, it is recommended to implement a cost-benefit analysis of using ICT in different sectors of education.

Data availability

The data used in this study can be made available by the corresponding author(s) upon reasonable request.

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Acknowledgements

Author contributions

MFS: conceptualization of study, original draft preparation, reviewing and editing, data analysis, methodology, and discussion. SX: supervision, reviewing, and editing, project administration, and funding. RB: preparation of data file, interpretation, results, and discussion. All authors have read and agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The Ethics Committee of Beijing University of Technology, China, approved this study under B20221105W. This study was conducted according to the 1964 Helsinki Declaration and guidelines.

Informed consent

Informed implied consent was obtained from all participants involved in the study. In compliance with national regulations and institutional standards, this research did not necessitate written informed consent. Instead, participants were required to complete an online informed consent process. During this process, participants were clearly informed about the following key aspects: (i) confidentiality, wherein personal information provided by the participants would remain confidential and would not be published or disclosed, and (ii) use of data, wherein the data collected from the participants would be exclusively used for academic research purposes and not for any commercial activities. To proceed with their participation in the study, participants had to explicitly acknowledge their understanding and agreement by clicking the "agree and continue" button. This action served as their consent to participate and allowed them to enter and complete the questionnaires.

Additional information

Correspondence and requests for materials should be addressed to Muhammad Farrukh Shahzad or Shuo Xu.

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