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Relationship between teachers' age, education, work experience, and teacher ability to use ICT effectively in their teaching practices

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Abstract
Information and Communication Technology (ICT) pervades all aspects of life, including education. Educators are constantly encouraged to incorporate ICT into their teaching practices, with technology evolving rapidly. The significance of this study lies in the fact that ICT has become an indispensable tool in education, applied from early childhood to university-level education. Its use has facilitated changes and reforms in the field. The impact of ICT on education is significant, causing changes to the very structure of the educational process and the roles of its key players, namely students and teachers. Given the need to adapt to a changing reality in secondary education, particularly among elderly educators, the importance of specific requirements for ICT use cannot be overstated. This is critical for the school administration in terms of the professional development of teachers. Our study aims to examine teachers' perceptions of the use of ICT in secondary school education and the relationship between teachers' age, education, work experience, and ability to use ICT effectively in their teaching practices. We will use an exploratory-descriptive research approach, employing qualitative and quantitative methods to gather information from secondary school teachers through surveys and on-site observations. Our study's findings demonstrate that technology in education enhances teachers' professional competence, increases student motivation, produces valuable results in teaching, and improves the overall quality of education. However, it also presents specific challenges for teachers and school administrators. Based on our research data, we offer potential solutions to enhance the use of ICT in education and provide insights into effective teaching practices using technology in secondary schools.

Keywords: ICT, age, work experience, teaching practice, education

Introduction

Information and Communication Technology (ICT) is an essential worldwide component of the education system. The integration of ICT in teaching is linked to the process of informatization, which is vital in updating the education system to meet the needs of modern society (Nazarova, 2016). ICT has a rich history and has revolutionized traditional learning methods, prompting educational reforms. As far back as 1924, Sidney L. Pressey, an Ohio University professor, introduced an early learning machine based on rote and drill exercises, which was later experimented with by Skinner in 1954 (Spulber, 2021). Advances in technology and

science have since led to the development of various tools and resources that facilitate teaching and learning through ICT. Consequently, almost all educational institutions now employ highly effective ICT tools for teachers and students (Davis & Ellison, 2003; Tadeu et al., 2019) to enhance their digital literacy across all levels of education (Chigisheva et al., 2021; Soltovets et al., 2020).

ICT in education uses computer technology, software, methodological support, and communication educational environment to achieve specific, anticipated outcomes in the organization and management of students' educational process and cognitive activity. This approach is viewed in the context of the educational process and its unique goals and objectives. It is closely linked to the development of "information epochs," as described by Manako and Voronkin in 2014.

From the standpoint of quality and efficiency, technology has made remarkable advancements. Information and Communication Technology (ICT) holds tremendous potential for educational reforms and changes (Davis & Ellison, 2003). Teachers are increasingly urged to incorporate ICT into their classrooms, and the available applications continue to evolve for enhanced effectiveness (Badaru & Adu, 2022; Hartoyo, 2008).

The technology significantly impacts learning, particularly in circumstances of forced isolation (Kuzembayeva et al., 2022; Soltovets et al., 2021) or geographical distance. Technology is regarded as a tool and medium that facilitates learning, but its users determine its effectiveness (Hartoyo, 2008). Consequently, one of the primary aims of incorporating ICT in education is to enhance learners' motivation to acquire knowledge (Shoimqulova, 2020).

The profitable use of technology in teaching is influenced by three factors, two of which are directly connected with the teachers' feelings about ICT use: Teachers' pedagogical approach plays a crucial role in determining the appropriate use of ICT. With the multitude of online tools and resources available, teachers must assess the technical characteristics, accessibility, and relevance of these tools in the context of the established didactic path. By adopting a pedagogical approach that aligns with the diverse learning needs of students, teachers can effectively incorporate ICT in their teaching; Knowledge of technology and skills in its use is essential for successful ICT integration in teaching. As ICT devices and web programs are continually evolving, teachers must keep their skills updated and be proficient in using them to avoid facing challenges during teaching. School administrations must provide advanced training in ICT use during teaching to support teachers in this area; the third factor is related to student motivation and competencies. Students' motivation can be enhanced by establishing a trusting relationship with their teacher and offering varied content that aligns with their interests. Similarly, learners' competencies can be increased by activating their cognitive processes through enjoyable stimuli, including content, methodologies, materials, and environments presented through ICT.

According to educational experts and practitioners, utilizing ICT in secondary school education can enhance learning effectiveness and elevate the quality of comprehension and assimilation of the subject matter. ICT can foster interaction and enhance communicative competence by providing novel materials for the class or facilitating self-education (Hartoyo, 2008). Mashbitz (1986) suggests that secondary school lessons should be aimed at practical results.

ICT offers a variety of tools for teaching, learning, research, information, and interaction for both pupils and educators (Cener et al., 2015). One distinctive feature of modern ICT-assisted lessons is that students are at the center of the activity, while teachers serve as motivators by activating their participation (Bogdanova, 2015). Students widely recognize that using ICT in the classroom changes the atmosphere and promotes learning. It diversifies the learning process and presents educational material in a visual and accessible manner (Mashbitz, 1986).

Moreover, ICT offers diverse options for encompassing, processing information, making sense of ideas, and expressing learning for students with different learning styles. Over 87% of students learn best through visual and tactile modalities, and ICT can help them "experience" the information rather than just reading and listening to it (Kenney, 2011; Tileston, 2003). Any diagram, illustration, animation, or sound recording used in organizing the educational process goes beyond decoration and enhances the lesson's meaning.

According to modern standards, one of the most crucial factors in equipping students for work and life is ensuring their computer literacy and information culture through informatization in school education (Zagainov & Blinova, 2014). For this reason, integrating ICT into the curriculum can significantly affect student learning, provided that teachers possess digital literacy and understand how to use it effectively (Information, 2021). To ensure high levels of motivation and achievement, Bogdanova (2015) emphasizes the importance of specific ICT requirements and support from school administrators, including professional development opportunities.

Studies have examined the impact of technology on learners' motivation, performance, and engagement in response to the increasing growth of ICT in education (Christopoulos et al., 2018). Furthermore, the need to assist school principals and teachers coordinate available digital learning resources has been emphasized (Mayer, 2019; Zhu & Urhahne, 2018). The integration of ICT into the classroom presents challenges, such as the inadequacy of technical knowledge and skills among teacher education programs (Fishman & Davis, 2006), insufficient funding and resources (Nikolopoulou & Gialamas, 2015), a lack of direction in e-course design and delivery (Vongkulluksn et al., 2018), and little motivational incentives (Scherer et al., 2019).

The adoption of ICT in education has led to significant changes in the educational process and the roles of teachers and students (Yamaletdinova, 2016). The theory of generations suggests that individuals aged up to 25 perceive the digitization of education as a natural process due to their exposure to gadgets during their upbringing (Papadakis, 2018). However, the emergence of new technologies requires continuous professional development for teachers to adapt and adjust their methodologies to the new learning paradigms (Bates & Bates, 2015). Past studies have reported discrepancies between teachers' age, experience, and effectiveness (ul Haq & Akhtar, 2013; Moalosi, 2013).

As noted by Kalimullina et al. (2020), the increasing adoption of digital educational environments and e-learning has raised concerns about the use of ICT in secondary school education and how teachers perceive its integration into the teaching process based on factors such as age, level of education, and work experience. This study aims to analyze teachers' perspectives

regarding the use of ICT in secondary school teaching practice, providing insights into effective practices for incorporating technology in the classroom.

The objective of this study is to investigate the following research inquiries:

How do secondary school teachers perceive the impact of utilizing ICT in the classroom on their students' learning process?

What is the relationship between the age, educational background, and experience of teachers and their proficiency in employing ICT during their lessons?

Hypothesis

A statistically significant relationship could not be found between the age, level of education, and work experience of secondary school teachers and their ICT skills, integration of ICT into their teaching practice, or their barriers to using ICT.

Research Method

The research employed an exploratory-descriptive approach to address the research problem and inquiries. The study design encompassed data collection, measurement, and analysis, with data collected via an online questionnaire and a snowball sampling technique Using the Markovian chain approach was employed to construct the sample based on social ties. Research has shown that many social networks contain a significant component encompassing most of the population. The generalization of findings was limited to the giant component while avoiding significant distortion (Vitalini, 2010). In this study, the giant component was centered on secondary school teaching. The sample was recruited through the WhatsApp social media platform, consisting of 104 teachers from 40 secondary schools in Aktobe city, the Republic of Kazakhstan. An online survey using Google Forms was utilized to administer the questionnaire. The questionnaire was designed to gather data on the participants' demographics, such as gender, place of work, work experience, and education. It also included questions related to the benefits and barriers of using Information and Communication Technology (ICT) in schools and the participants' opinions on integrating ICT into secondary school education, including any specific perspectives they might have. The reliability of the research instrument was assessed through Cronbach's Alpha in SPSS Statistics. The questionnaire's overall Cronbach's Alpha coefficient was .722, indicating that this study's ICT usage perspective scale is a dependable measurement for secondary school teachers. , the criterion type of evidence was utilized to determine the degree to which a measure's results align with other valid measures of the same concept To assess the validity of the measurement. The high criterion validity of the research instrument was confirmed by the survey findings, which were consistent with the results of on-site observation. The Kaiser-Meyer-Olkin test was employed to determine the proportion of variance in the variables underlying factors might cause, and the results indicated a good value of 0.752 (Cerny & Kaiser, 1977; Gravetter & Wallnau, 2008). Additionally, all coefficient values exceeded 0.722, demonstrating that the items possess relatively high internal consistency. the survey invitation and Google Forms questionnaire link were sent to secondary school teachers via the WhatsApp social media platform To obtain

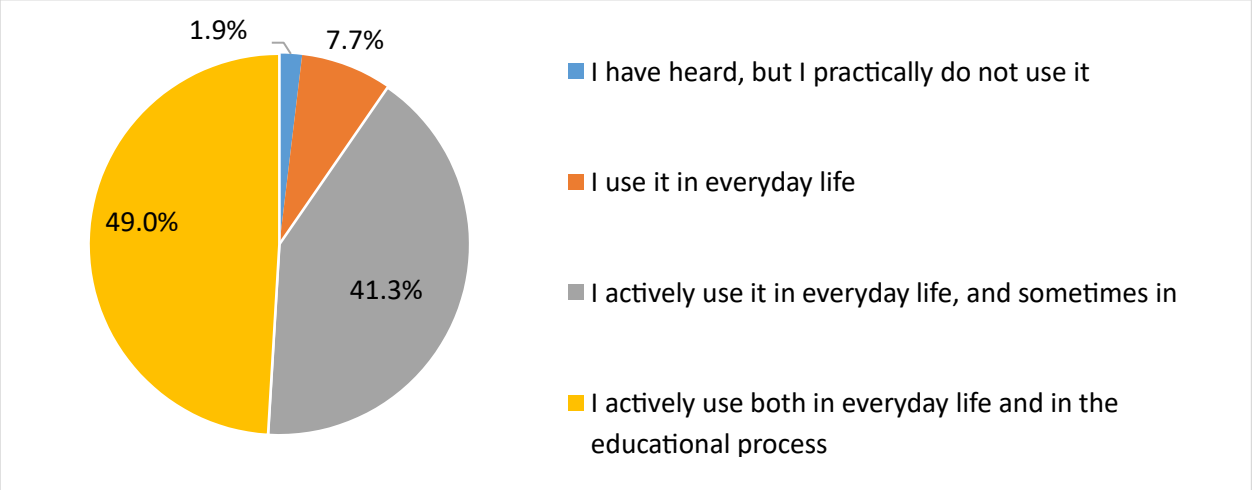
quantitative data. Both descriptive and inferential data are crucial for providing a comprehensive description of the setting and atmosphere.

The survey data were analyzed using version 25 of the Statistical Package for Social Sciences (SPSS), with descriptive statistics and correlation analysis employed. The significant variables under study were displayed in tables and figures using descriptive statistics to illustrate their frequencies and percentages, thus answering RQ 1. Spearman's Rank Correlation Coefficient was used to investigate any possible relationships between secondary school teachers' age, level of education, work experience, ICT skills, ICT integration into their teaching practice, and any barriers they faced when using ICT, answering RQ 2.

Result and Discussion

Research Question 1: How do secondary school teachers perceive the impact of utilizing ICT in the classroom on their students' learning process?

Figure 1: Utilization of ICT by Teachers



According to the study findings, an overwhelming majority of teachers (92.3%) believe incorporating Information and Communication Technology (ICT) in secondary school education can promote critical thinking among students and enhance their interest in the subject matter. Regarding the frequency of ICT usage in classrooms, a small percentage of teachers (5.77%) reported using technology only when introducing a new topic due to inadequate computer resources or a lack of internet connectivity. Additionally, some teachers (0.96%) indicated that technology usage depends on the lesson plan and the subject matter. Nonetheless, such cases are infrequent. ICT is used daily by over 90% of the respondents, with 49% stating that they use technology in their educational process. However, elderly teachers face challenges in integrating technology into their lessons due to their health status, as the rapid development of modern technology poses a challenge.

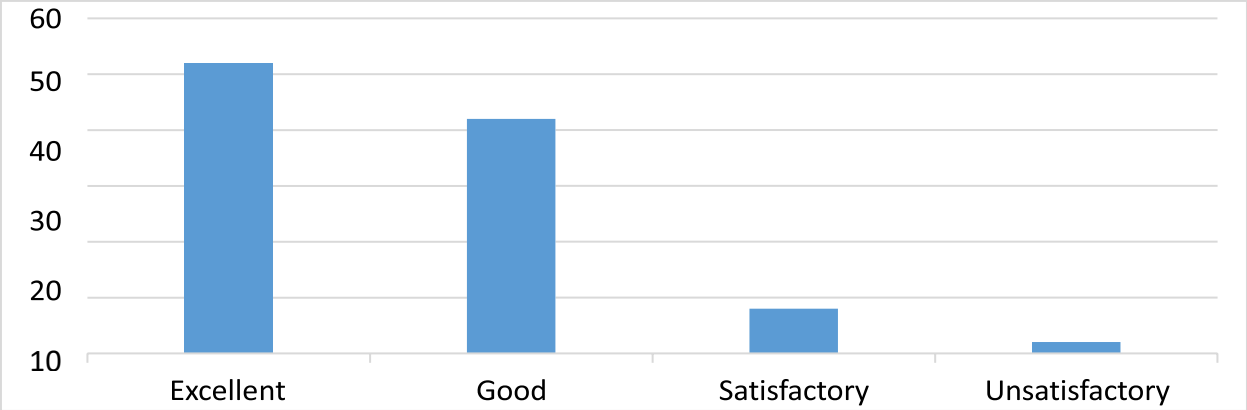
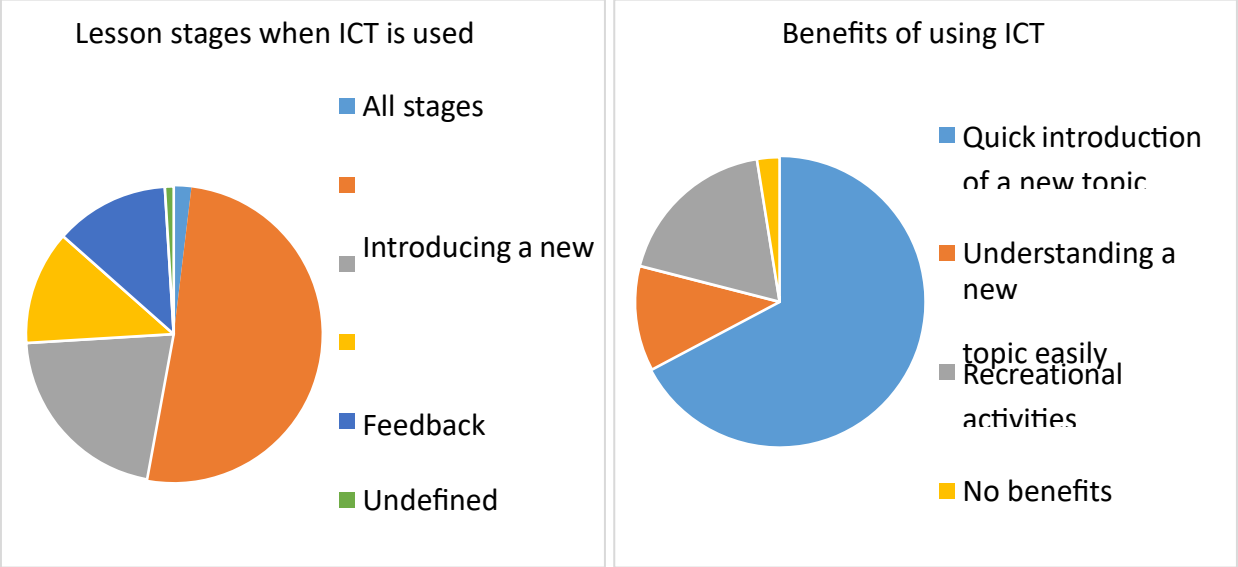


Figure 2: the ICT skills of teachers

Over 90% of the teachers who were surveyed rated their ICT skills as either excellent or good, while less than 2% reported inadequate proficiency in utilizing technology.

Figure 3. Benefits of Using ICT



Based on teacher feedback, ICT is predominantly utilized (51%) for introducing new topics due to its ability to expedite the process (76.9%) and simplify it (13.5%).

Table 1: Barriers to ICT Integration at School

Item	Mean	Min	Max	Std. Dev.
ICT in the learning process is not a priority.	2.538462	1.000000	4.000000	0.869361
My school does not have enough computer equipment.	2.384615	1.000000	4.000000	0.839645

Not enough electronic educational resources exist in myschool.	2.394231	1.000000	4.00000 0.885901 0
My school has limited internet access (slow or unstableconnection).	2.307692	1.000000	4.00000 0.893090 0
In our school, the computer equipment is outdated.	2.221154	1.000000	4.00000 0.847117 0
Not enough time exists to prepare for technology-integrated classes.	2.259615	1.000000	4.00000 0.870166 0
I do not have enough opportunities/conditions to develop professional skills in the use of ICT.	2.125000	1.000000	4.00000 0.771929 0
It is not enough to provide technical assistance to ensurethe means of ICT in the working environment.	2.307692	1.000000	4.00000 0.871077 0

Table 1 highlights the impediments that prevent the incorporation of ICT into classroom instruction. Responses were measured using a four-point Likert scale, ranging from strongly disagree (1) to agree (4) strongly. According to these findings, insufficient electronic educational resources, computer equipment, and slow or unstable Internet connection are identified as the primary barriers to integrating ICT into secondary school teachers' classroom practices. Additionally, the rapid pace of technological innovation means that some teachers need higher functional literacy in ICT, which results in ICT being deprioritized in the learning process. During the lesson, the teacher utilized the WordWall platform for practice exercises and received feedback through the Mentimeter.com platform. Data analysis revealed a high level of student engagement, suggesting that integrating ICT into the educational process can enhance student motivation. Many teachers view using ICT in secondary school education as promoting critical thinking and increasing student interest in the lesson. As such, this observation provides strong evidence of the research design's high criterion validity.

Research Question 2: What is the relationship between the age, educational background, and experience of teachers and their proficiency in employing ICT during their lessons?

Table 2: The relationship between teachers' age, level of education, work experience, and their proficiency in utilizing ICT during the teaching process

Items	Age		Level of Education		Work experience	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
Need for ICT integration into the teaching practice	-.1363	.168	-.1086	.272	-.0856	.388
ICT skills	-.0389	.695	-.0665	.502	.0187	.850
Barriers to Using ICT	-.049	.621	-.157	.110	**-.184**	**.050**

Based on the correlation analysis, there is no significant correlation between the age, level of education, work experience, and ICT skills of secondary school teachers, and their need for integrating ICT into their teaching practices. However, a slight association was found between teachers' work experience and the obstacles they face in using ICT for secondary school education. This weak negative correlation suggests that more experienced teachers encounter fewer barriers when integrating ICT into their teaching practices.

Table 3: relationship between the age, level of education, and work experience of teachers and the barriers they face when using ICT in their teaching practice

Items	Age		Level of Education		Work experience	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
ICT in the learning process is not a priority.	-.048	.632	.065	.512	.025	.803
My school does not have enough computer equipment.	-.029	.772	-.087	.380	**-.203**	**.038**
Not enough electronic educational resources exist in my school.	-.052	.598	-.151	.126	**-.226**	**.021**
My school has limited internetaccess (slow or unstable connection).	-.003	.978	-.130	.187	-.166	.093
In our school, the computer equipment is outdated.	-.055	.582	-.171	.083	**-.201**	**.041**

Not enough time exists to prepare for technology-integrated classes.	-.150	.128	-.138	.161	-.143	.148
I do not have enough opportunities/conditions to develop professional skills in the use of ICT.	-.079	.428	-.184	.061	-.157	.111
It is not enough to provide technical assistance to ensure the means of ICT in the working environment.	-.120	.225	-.116	.241	-.187	.058

Correlation is significant at $p < 0.05$ level (2-tailed)

According to the results of Spearman's rank correlation test (as shown in Table 6), a weak negative association exists between the work experience of secondary school teachers and factors such as the lack of computer equipment, outdated computer equipment, and insufficient electronic educational resources at school. This suggests that experienced teachers do not view these obstacles as hindrances to integrating ICT into their teaching practices. The primary objective of this research was to explore the perceptions of secondary school teachers regarding incorporating ICT in education. It is essential to acknowledge that, like any study, this research has limitations. Due to the predominantly female demographic of secondary school teachers, our sample only included five male participants. This gender gap may limit our understanding of potential differences in perceptions or technological proficiency between male and female teachers (Baytak, 2022). However, the originality of this research lies in its investigation of the relationship between secondary school teachers' age, education, work experience, ICT skills, integration of ICT into their teaching practice, and the barriers they face while utilizing ICT.

The results of this research demonstrate that integrating ICT in secondary school education significantly enhances the quality of education, thereby addressing the main objective of educational policy. However, it was also revealed that Kazakhstani secondary school teachers need to prioritize using ICT. This finding contradicts previous studies that indicate teachers view technology as a primary tool for pedagogy (Evans-Amalu & Claravall, 2021; Kabel et al., 2021; Kim et al., 2021; Oguilve et al., 2021). In contrast to the findings of ul Haq & Akhtar (2013) and Maolosi (2013), which suggest that years of teaching experience can diminish teacher effectiveness due to fatigue and a decrease in motivation, this study found no association between teachers' age, education level, work experience, ICT skills, and their interest in integrating ICT into education. Moreover, the correlation analysis indicated that teaching experience is associated with fewer barriers to using ICT in teaching practice.

The results of this study offer potential approaches for enhancing the use of information and communication technology (ICT) in education and offer valuable perspectives on the efficient use of technology in teaching at secondary schools. To enhance the classroom atmosphere across all levels, we urge educators to foster the integration of ICT into the educational process, ensuring that its use boosts learners' technological pedagogical content knowledge, as highlighted in previous research by Erbilgin and Şahin (2021).

Conclusion

The investigation into how secondary school educators perceive the use of ICT in class revealed that it enables them to execute their lesson plans and maintain up-to-date lessons. Incorporating technology into the educational experience promotes the development of teachers' professional abilities. Despite some difficulties for teachers and school administrators, it boosts student motivation, leading to better teaching outcomes and improved education quality. While most teachers employ ICT frequently during classes and in their personal lives, older teachers may need help integrating it into their teaching due to health concerns and the fast-paced evolution of technology.

Several obstacles prevent schoolteachers from integrating ICT into their practices. These obstacles include limited computer-equipped classrooms, outdated equipment, and poor internet connectivity. In addition, most schools need more practical educational technology resources. Although there was no significant correlation between teachers' age, level of education, work experience, and aptitude for using ICT during class, the study found that experienced teachers are less likely to encounter barriers to using ICT in teaching. These barriers include outdated computer equipment, lack of computer equipment, and insufficient electronic educational resources. In summary, experienced teachers have more opportunities to leverage the benefits of ICT in secondary school education.

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