Lived Experiences of Seasoned Elementary Teachers in Utilization of Information and Communication Technology in their Profession

April V. Jamilano

Laguna State Polytechnic University-Siniloan

ABSTRACT

This study explores the experiences of seasoned teachers in integrating Information and Communication Technology (ICT) into their teaching practices. With the rapid advancement of digital tools in education, the research aims to understand how experienced teachers adapt to and utilize ICT in the classroom, the challenges they encounter, and the strategies they use to get beyond these obstacles. Using a qualitative research design, data were collected through in-depth interviews with selected seasoned teachers from various schools. The findings revealed that while many seasoned teachers initially faced difficulties due to limited exposure to modern technology, most have developed adaptive strategies and a positive mindset toward continuous learning. The key challenges that were identified include lack of training, resistance to change, and infrastructural limitations. Despite these, participants recognized the benefits of ICT in enhancing student engagement, improving lesson delivery, and supporting professional growth. This study highlights the importance of targeted support, ongoing professional development, and a collaborative environment in helping seasoned educators effectively embrace ICT in their teaching profession.

Keywords: lived experiences, elementary teachers. Information and communication technology

INTRODUCTION

ICT in education refers to the strategic integration of digital tools and resources to enhance teaching, learning, and overall educational administration. It involves integrating various technologies to enhance the learning process. It uses a lot of techniques and devices, especially computers, the internet, whiteboards with interactive components, and e-learning platforms. In other words, ICT education incorporates methods of learning that utilize technology with education.

According to UNESCO (2002), ICT involves numerous tools such as computer systems, the internet, programming technologies (television and radio), and telecommunications that are used to improve access to communication and information in education. These technologies play a crucial part in the present learning environments by enhancing the delivery of content, promoting interactive instruction, and allowing students to utilize instructional resources outside of class. ICT promotes the quality and performance of learning and teaching procedures. As stated by Haddad and Draxler (2002), ICT provides immediate form access to facts, specific classroom instruction, and the improvement of information technology skills, making it an essential component in modern educational settings. Many seasoned teachers express feeling afraid or nervous when first exposed to ICT. They may lack expertise or feel comfortable as compared to their younger, "digital native" colleagues.

With inadequate professional development and an age gap regarding technological abilities, the majority of seasoned teachers are hesitant and lack confidence in using ICT in their classroom instruction. Ertmer (1999) refers to these concerns as "second-order barriers," including instructors' attitudes, beliefs, and self-efficacy in utilizing technology in the classroom. Seasoned educators may need more time or guidance for successfully using modern technological resources than younger, more technologically equipped colleagues. Most teachers have noted that ICT renewed their practice. Technology integration enabled them to explore new ways, revive their creativity, and relate to contemporary learners more effectively.

Several teachers have noted that the integration of ICT in their classrooms has motivated their teaching strategies by providing plenty of opportunities to experiment with new ways to instruction and become more interactive with students. Voogt and Knezek (2008) emphasize that technology use regularly refreshes teachers' creativity and desire to embrace digitally inclined pupils and successfully deal with changing educational requirements.

Seasoned teachers tend to adopt a realistic approach to ICT, implementing tools that actually enhance their teaching instead of using them for the sake of technology. They often combine established practice with ICT, establishing a balance between innovation and tried-and-true teaching methods. Seasoned teachers are likely to embrace a practical and selective use of ICT, emphasizing instruments that truly facilitate teaching and learning and not merely for the sake of novelty. As the OECD (2015) finds, seasoned teachers commonly integrate conventional pedagogical techniques with technological means, attempting to find a balance between innovation and practices that have been successful in their classrooms.

While a recent study has shown seasoned teachers struggle to integrate ICT into their profession, there is still a lack of awareness about the complicated procedures required among these teachers. Specifically, prior studies have focused on challenges in the form of a lack of digital skills, fear of change, and insufficient support. Still, no in-depth research studies are looking into how experienced teachers perceive the growing importance of ICT in education, how they adjust their teaching methods by incorporating technology, and how their application of ICT affects student learning outcomes Additionally, current research often emphasizes the effect on organizational facilitation, training opportunities, and relationships of collaboration on the ICT acceptance procedure among seasoned teachers. Closing these gaps is vital to establishing targeted interventions and support systems that enable effective ICT integration in classrooms under the guidance of experienced teachers.
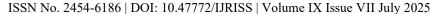
Moreover, most research involves using cross-sectional data, which limits our awareness of how seasoned teachers' ICT practices change over a period. Voogt and Knezek (2008) highlighted the relevance of ongoing investigations that monitor changes in teachers' TPACK to better inform professional development programs. In addition, while the perspectives of teachers and self-efficacy are often investigated (Ertmer, 1999; OECD, 2015), less research has been conducted on the psychological effects of technology adoption, such as technological anxiety and motivation among seasoned teachers.

Furthermore, the impact of experienced teachers' use of ICT on student learning outcomes is little unknown. According to the OECD (2015), while modest usage of technology is associated with better outcomes, the specific effect of teacher experience and ICT integration strategies requires further examination.

Analyzing how seasoned educators utilize ICT in the classroom is essential because they have an important impact on learner academic achievement and school culture. Despite their significant pedagogical comprehension, many seasoned instructors face specific challenges when incorporating technology, such as coping with sudden technological developments and overcoming initial hesitation. In addition, experienced teachers regularly act as mentors and leaders in their schools. Examining how they embrace and use ICT can provide opportunities for them to drive positive technical change while mentoring less experienced teachers. As ICT has become an integral aspect of modern education, study into this topic ensures that no group of instructors falls behind in the development of digital literacy.

Lastly, learning from this study can help bridge the gaps in prior literature by examining how institutional elements, professional growth, and psychological considerations affect experienced teachers' use of ICT. Policymakers, school administrators, and educational trainers need to know this to be able to promote effective, inclusive, and sustainable integration of technology in classrooms.

The use of ICT in education has revolutionized teaching and learning procedures globally. But experienced teachers normally encounter unique barriers to embracing such technologies, depending on factors ranging from low-level training to resistance to innovation, and levels of confidence (Ertmer, 1999). It is imperative to understand how seasoned ICT practitioners use ICT since they wield high levels of influence on both instructional practices and learner performance (Voogt & Knezek, 2008). In addition, experienced teachers can serve as mentors and leaders in technology integration, and thus their successful integration of ICT is crucial for education innovation sustainability (Anderson, 2010). Nevertheless, research gaps persist in fully examining

their experiences, adjustments, and support requirements, necessitating additional study to guide effective professional development and policy action (Pelgrum & Law, 2003; OECD, 2015).

Research Questions

This study aims to find out the lived experiences of seasoned teachers in the utilization of Information and Communication Technology in the delivery of learning in the new normal educational setting. The study specifically aims to answer this important question. First, what are the lived experiences of elementary seasoned teachers in utilization of Information Communication Technology in their profession? Second, what is the importance of ICT in seasoned elementary teachers in their profession? Next, what are the challenges and barriers of seasoned elementary teachers in using ICT. Last, what are the coping strategies to overcome challenges and barriers of a teacher?

LITERATURE REVIEW

This chapter examines relevant literature and studies on the research issue to provide a thorough understanding of existing information, theories, and conclusions. The review looks at both local and foreign sources that help to build the study's foundation. This chapter analyzes past research to identify gaps, support the study's structure, and highlight essential themes that lead the investigation. The debate is arranged into thematic sections that examine the variables, major themes, and perspectives pertinent to the study. This research was about the Lived Experienced of Seasoned Elementary Teachers in Utilization of Computer Technology in their Profession

Advances in science and technology have produced a variety of ICT-based teaching and learning methods and resources. In order to increase digital literacy at all educational levels, practically all educational institutions utilize very effective ICT tools for instructors and students (Tadeu et al., 2019 &Chigisheva et al., 2021; Soltovets et al., 2020). Without technology, education cannot take place. becomes especially important when one is compelled to live in a remote or isolated location (Kuzembayeva et al., 2022; Solt vets et al., 2021).

Studies on "the effect of technology on learners' motivation, performance, and engagement" (Mayer, 2019; Zhu & Urhahne, 2018) and "the necessity to support them in the process" (Christopoulos et al., 2018) are on the rise as the result of the increasing use of ICT in education.

As the application of ICT in schools keeps growing, studies on "the effect of technology on students' motivation, performance, and engagement" (Mayer, 2019; Zhu & Urhahne, 2018) and "the necessity to support them while doing so" (Christopoulos et al., 2018) have gained more significance.

It also speaks about the challenges of implementing ICT in the class, that one of the challenges is "an inability of teacher education programs to impart technical knowledge and skills" (Christopoulos, 2021).

While there are benefits in utilizing technology in the classroom, researchers have found one drawback: computer stress, anxiety, and pressure (Lee & Xiong, 2021) that affects teachers' intention to integrate new technology into their practice (Teo et al., 2019) and hampers their productivity (Qi, 2019).

Miralao (2020) performed a survey of the internet-related competence of Metro Manila teachers in public schools and found that younger teachers were more competent in technology, while long-service teachers were severely deficient.

The most formidable challenge for such teachers was that they had very limited access to professional development training courses, including those concentrating on digital skills.

Some of the most challenging obstacles for these teachers was their insufficient ability to access training and professional growth courses that emphasized digital skills. This study highlights the demand for particular approaches to cope with long-serving instructors' perceptions and limited resources.

Llego (2022) studied the impact of continuing education to enhance digital competence, emphasizing that,

although schools might have the appropriate technological support, teachers' mindsets toward knowing new technologies contribute to their performance. Llego found that, in addition to implementing technological innovations, schools should foster an adaptive and creative society among their teaching staff, especially those with long periods. Teachers with a positive attitude toward technology are more likely to set aside a duty to learning new skills related to technology, as reported by Scherer and Tondeur (2020). Still, teachers with an opponent or disinterested attitude could be against changes that make it challenging to implement technology into the educational setting. The focus on activity-based learning and student-centered classrooms has also changed the field. While education is important for creating a sustainable future, innovation is essential in the learning environment (Serdyukov, 2017). In the last few decades, the pedagogical approach to classroom instruction has changed, with teachers implementing cutting-edge teaching strategies like roleplays, simulations, problem-based learning, and portfolio development (Subramani & Iyappan, 2018) over the conventional lecture format. Through a visual depiction of actual circumstances, it also functions as a tool for teaching problem-solving techniques and fostering critical thinking (Gorakhnath & Padmanabhan, 2017).

Muinde and Mbataru (2019) discovered that 68.5% of the sampled teachers had a positive opinion of the use of laptops in their teaching and learning while researching the laptops project's implementation in public elementary schools. However, they found that 39% of the teachers believed that most of their sessions were spent putting the devices together, and that there was not enough time allocated for technology integration to demonstrate the advantages of creative teaching strategies for students' academic success. According to a study by Vajravelu and Muhs (2016), students who took an innovative course had a much higher success rate and a more consistent experience with the material and assessment than those who took the same course in a traditional format.

Some teachers believe that in order to guarantee learning and meet the unique needs of each student, they must look beyond their current methods and come up with innovative ways to accomplish tasks (Serdyukov, 2017) for others, however, embracing change is difficult.
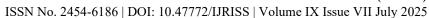
According to Voogt and Roblin (2015), ICT fosters 21st-century skills by enabling interactive learning environments where students can develop problem-solving, critical thinking, and digital literacy. Similarly, Higgins et al. (2015) emphasize that ICT integration, when strategically implemented, leads to higher student motivation and achievement, particularly when digital tools are aligned with curriculum objectives.

Studies also highlight the role of ICT in supporting differentiated learning. Hamidi and Chavoshi (2018) found that ICT enables students to learn at their own pace through multimedia tools, which caters to diverse learning styles and improves comprehension. Furthermore, ICT-based assessments and feedback systems contribute to timely evaluation, which enhances student performance and retention (Nguyen et al., 2020).

Prior to developing a plan for technology integration, Schibei et al. (2017) recommend addressing the stages of individual teachers. A fundamental understanding of technology might be a good place to start for people who are uneasy with it.

Albion et al. (2015) proposed a reciprocal relationship between research and practice when developing professional development programs. Their results indicate that collaborative methods can improve the effectiveness and relevance of training, resulting in a greater incorporation of ICT into the classroom. Teachers who participate in activities that promote students' cognitive, affective, and psychosocial development are better teachers. Most importantly, in physical education, ICT media such as video cameras, film, and on-line resources have an important role to play in transmitting information about many body activities such as cycling, aerobic exercises, swimming, and athletics

ICT also improves the standard of instruction and teaching. efficiency, availability of resources, and management strategies in the learning environment (Dyantyi ,2023). ICT can bring new teaching strategies to physical education, like apps for tracking fitness, video analysis software, interactive simulations, and online resources that improve students' engagement and learning experiences (Batanero et al., 2019). PE teachers should receive ICT training, particularly to meet the needs of children which promotes inclusivity and creativity in education for people with impairments (Batanero et al., 2019).

When ICT is successfully incorporated into educational methods, students and educators. Programs for professional growth and a culture of support inside the company are vital in motivating educators to embrace ICT-based methods (Soomro, 2023). The application of It has been demonstrated that using ICT to teach courses like physics improves student learning. procedure. This demonstrates how crucial it is to use the right ICT tools to efficiently transmit information (Hussaini, 2023). In spite of this, ICT integration in the classroom offers substantial chances to improve instruction and learning, but it also calls for focused professional growth, institutional assistance, and a dedication to continuous creativity to reach its greatest potential.

OECD (2015) reported that nations investing heavily in ICT without corresponding teacher training and pedagogical integration showed limited academic gains. Thus, the effectiveness of ICT hinges on strategic use grounded in learning theories that promote active engagement, scaffolding, and authentic assessment.

Overall, ICT use—when framed through constructivist, TPCK, and SAMR perspectives—has been consistently linked to improved student learning outcomes by fostering motivation, supporting differentiated learning, and cultivating essential 21st-century competencies.
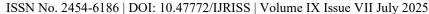
RESEARCH METHODOLOGY

Approach and Rationale

This study makes use of a phenomenology approach and a design based on qualitative research. Textural and structural descriptions that reveal the "essence" of the experience are provided by phenomenological research. Creswell (2015) states that the goal of phenomenology is to describe the fundamental lived experiences while also elucidating their meaning without resorting to interpretive generalizations or causal explanations. Additionally, the transcendental approach that this phenomenological study will employ not only offers a clear framework for data analysis but also suggests the process of drawing on one's personal experiences to see the phenomenon being studied from a different perspective (Merriam & Tisdell, 2016).

Since the researcher realized that she would have to separate her own experiences integrating technology from those of her participants, she chose a transcendental phenomenological technique for this research. We refer to this as the epoch (Moustakas, 1994. Through epoche, we "set aside our prejudgments, biases, and preconceived ideas about things" (Moustakas 1994, p. 85). The goal of transcendental phenomenology, according to Moustakas (1994), is to ascertain the meaning of an event for those who have experienced it and are qualified to give a thorough account of it (p. 13).). By using a transcendental phenomenological design, she, as the researcher, was able to remain focused on the lived experiences of the teachers and not on her own interpretation of those experiences.

In education, a social constructivist ontological perception would view learning as something that doesn't just happen in isolation inside a learner's mind, but is formed through interaction with others—teachers, peers, and cultural tools (like language and technology). A seasoned teacher with this perception might believe that technology isn't just a tool, but a social space where knowledge is built collaboratively.

Ontological perception about social constructivism refers to how reality is understood through the lens of social interactions, language, and shared meanings in other words, the belief that reality is socially constructed rather than existing independently of human thought. Core Idea is a paradigm that believes that knowledge and comprehension are actively constructed by people through their experience, interactions, and reflections. It focuses on the fact that learners (even instructors) do not learn passively but rather construct their knowledge based on their social surroundings and experiences. Relevance to the Study is the study focuses on the lived experiences of teachers using ICT. Teachers, especially seasoned ones, create their own meanings and approaches to integrating technology in the classroom based on their past experiences, professional learning, and the contextual factors of their environment. Those who were 28-33 years of length of service were chosen based on the sample method, a type of sampling that emphasizes the recognition and choice of data Rich cases (Humerman & Miles, 1994) After that, the interviewers got in touch with the participants by personal links in the area, clarified the subject and goal of the study, and guaranteed the moral consequences of maintaining anonymity of identification and asked them to participate in the research project. A scheduled time for the face-

to-face interview was scheduled with the participant. The seasoned elementary teachers' experiences were addressed by the research questions. To produce pertinent data for the study, the phenomenological case study approach was used. Open-ended questions from guiding questions that permitted additional probing were utilized in an in-depth interview. The teachers were interviewed regarding their insights, views, experiences, challenges and problems in Utilization of information communication technology. They asked to narrate and reflect their preparation on their lessons, instructional materials, activities and home tasks to the approach in today's teaching. Smartphones were used to record the interview, which was then transcribed and examined.

Research Setting

The study was conducted in cluster 4 in the division of Laguna consisting of 6 districts Famy, Mabitac, Sta. Maria, Siniloan, Pangil and Pakil. In terms of education, these municipalities have active educational institutions and resources. The success of education is significantly influenced by family and community involvement. The said setting is the most convenient place for the researcher to conduct her study where can have easy access to the different individuals to be interviewed and can make a significant contribution in the conduct of the study. They were 10 seasoned teachers interviewed by the researcher. All of the chosen public elementary schools' involvement in the study's administration and responder selection was confirmed as a part of the study's actual implementation and instrument validation.

Sample and Sampling Procedure

The study's respondents were chosen through the method of purposive sampling. The researcher selected respondent teachers who can be considered as seasoned teachers that have been teaching in the service for almost 28 years and above. They have also been handling advisory classes for 28   years. Since the researcher had to specifically choose the respondents from the district's public schools, it was used as the sampling approach for this study.
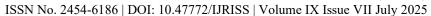
The respondents of the study were seasoned teachers from different schools in cluster 4 of Division of Laguna. Seasoned teachers who have been working as teachers for a considerable amount of time are known as seasoned teachers. They are regarded as seasoned educators due to their skills, knowledge, and years of experience. The responses are also chosen based on the criteria. The researcher first selected teachers with over 28 years of experience.

Data Collection and Analysis

The researcher first secured a permit to conduct the study from the division office. The different target respondent-schools were lined and divided into clusters. The clustering was based on their geographical location and distance.

The researcher personally administered the research instrument to the teacher-respondents where the interview sessions conducted face to face sessions. The series of interviews conducted with the participants where they gave the chance to present and elaborate their ideas based on the given questions. To start the research process for this initiative, a pilot study carried out to obtain quality data for analysis upon finishing the research study, piloting interview questions and honing questioning skills was essential for the researcher. Thematic analysis is one of the most frequent techniques of qualitative research, and it gives lucid explanation and description of a set of data's patterns and themes. Heuristic research, which is a qualitative research strategy involving self-study, meaning construction, and self-awareness, was formulated by Clark Moustakas. His framework is frequently employed in phenomenological and humanistic psychology research, especially in investigations into individual experiences. Important Components of the Heuristic Inquiry Framework by Moustakas. First Engagement is based on their own experience; the researcher chooses a profoundly significant and personal research question

Immersion is when the researcher gives the subject their whole attention, living the question out in real life while gathering pertinent information (e.g., literature review, interviews, self-reflection). Incubation is a phase of subconscious processing during which the researcher takes a backseat and lets fresh ideas come to them organically. A breakthrough when new connections, meanings, and patterns become apparent is called

illumination. Explanation is a more thorough investigation and formulation of the results, examining the core of the encounter.

Creative synthesis is the final step, where the researcher integrates all insights into a meaningful and creative expression (e.g., writing, poetry, visual art). This framework is unique because it emphasizes the researcher's personal experience and intuition, making it particularly useful in studies exploring deeply personal or emotional topics.

Ethical Considerations

Numerous considerations arose when conducting research during the COVID-19 pandemic. The first and foremost, is the responsibility of the involved institutions like the administration offices in the Schools Division and public elementary schools of the teachers who got involved in the process. To accomplish this, time is of the essence.

Voluntary participation is considered for the participants where they know the purpose, benefits, risk, and funding behind the study before they agree or decline to join. The identity of the teacher participants is not revealed and solely for the purpose of research validity. The data treated with utmost confidentiality which can limit harm, physical, social, psychological and all other types of harm are kept to an absolute minimum. The output is free from plagiarism where the ideas and information will be properly annotated and cited that represent accuracy and validity.

Teacher respondents must be individually interviewed face to face. This is best accomplished by developing a plan that progresses from initial plans to the school and evolves into reports describing in more detail the results on what be the potential reasons behind schoolchildren's vocabulary-learning issues. strict confidentiality with regard to respondents' data privacy, which is only focused on achieving the validity and reliability of the study's findings.
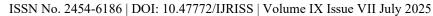
RESULTS AND DISCUSSION

From the data obtained from the participants, the findings of the study are discussed in this chapter. The qualitative data collected are examined and interpreted for findings of patterns, themes, and meaningful insights pertinent to the research aims. Interview responses are thoroughly scrutinized to present a clear picture of the phenomenon under study. The discussion is organized in line with emerging themes so that the analysis is congruent with the research questions. The findings herein reported form the basis of the conclusions and recommendations in the next section.

As Alrasheedi and Capretz (2015) explain, meaningful use of ICT improves learning and student engagement when directed by explicit pedagogical objectives. Likewise, a study by Zhao et al. (2019) highlights that technology skill professional development is important for teachers to effectively implement ICT in the classroom. More recent writings, including Smith and Johnson (2023), add that the COVID-19 pandemic hastened the digital shift in education, forcing educators to integrate blended and totally online modes of learning. Overall, this decade's literature implies that though problems such as infrastructure gaps exist, the planned adoption of ICT continues to revolutionize teaching techniques, encourage cooperation, and enable lifelong learning abilities among students.

Table 1 shows the experience of seasoned elementary teachers in the utilization of information and communication technology in their profession,4 themes emerged. These are as follows: ICT Integration in Teaching, Student Interaction, Challenges in ICT Use, and Teachers' Attitudes toward ICT.

ICT integration is the first theme that emerged from the responses that explained that teaching refers to the effective use of digital tools and technologies in the classroom to enhance the teaching and learning process. This is justified by the statement of teachers 1 and 9.

"The integration of ICT in my instructions has greatly raised student engagement within the classroom"
-T1.

*"Classroom and interactive platforms such as Padlet, students are able to collaborate, exchange ideas, and participate in real-time discussions even after class hour*s "-T9

Such constant connectivity has created a sense of community among students, where they feel more at ease asking questions, giving feedback to their peers, and working on group projects. It's great to see how technology enables not only learning but also substantial peer.

Voogt et al. (2017) assert that the application of digital platforms brings students together so that they engage in collaborative problem-solving and immediate peer feedback. In the same way, Hsu et al. (2020) highlight that online discussion forums and interactive tools give students a chance to interact beyond physical classrooms, which enhances their participation and achievement. Furthermore, studies by Martin and Dowson (2019) identify that digital collaboration tools foster a sense of belongingness and community, particularly in blended or distance learning contexts. Generally, the use of ICT not only enhances learning but also enriches social relationships among students, promoting more active social and cognitive involvement.

Student interaction is the second theme describing how students connect, communicate, and work together during the learning process. It is essential for improving comprehension, developing communication skills, and creating a supportive learning atmosphere. This is justified by Teachers 2 and 3.

"In my classroom, I promote active student engagement through group discussions, cooperative projects, and peer learning exercises." -T2

The challenges in ICT are the third theme. Although integrating information and communication technology (ICT) into the classroom has many benefits, several challenges may prevent it from being used effectively in the teaching and learning process. This is justified by teacher 3.

"One of the largest obstacles is the disparity in technological access, particularly in financially strapped schools where devices and consistent internet is scarce". -T3

Technical problems, like software failures or connection problems, frequently interrupt classes, frustrating both teachers and students. Furthermore, a steep learning curve for non-autonomous teachers remains a significant impediment to effective ICT integration, and thus the issues arising above can only be resolved with constant professional growth, organizational help, and appropriate funds for assured equitable access for all pupils to technological capabilities.

Despite the numerous advantages ICT can provide in teaching, there exist many challenges in incorporating it efficiently into classrooms. In the estimation of Anderson and van Weert (2018), inadequate access to necessary resources and infrastructure like the internet and recent devices are among the central inhibiting factors of ICT incorporation. In the work of Tondeur et al. (2017), technical skills from teachers were shown to be confined as well as their teaching practices.

A teacher's attitude toward Information and Communication Technology (ICT) is the last theme that emerged. It plays a critical role in how effectively it is integrated into the teaching and learning process. Attitude refers to a teacher's beliefs, feelings, and readiness to adopt and use ICT in education. This is justified by Teachers 7 and 10.

"My mindset about the use of ICT in teaching changed over time. I used to be reluctant to use technology in class due to technical difficulties and the learning process identified". -T7

"I was nervous and unconfident at first, but I soon came to understand that technology is a useful tool that may enhance and support the learning process, not a substitute for effective instruction. I now approach ICT with curiosity and an open mind because I know it enables me to engage and connect with pupils in more meaningful ways." -T10

However, after professional development training and noticed how it affected the engagement of the students positively, their perception changed. Now, they perceive ICT as a crucial resource that maximizes teaching and

learning. It enables more individualized learning, facilitates student collaboration, and accesses resources that were not previously easily available. As much as there are occasional drawbacks, like the requirement for ongoing training, educators believe in utilizing technology to enhance the learning experience.

The teacher's attitudes towards ICT play a major role in the successful integration of technology in the classroom. Al-Alwan and Al-Rousan's (2016) studies indicate that ICT-positive attitude teachers tend to utilize digital tools smoothly in their classroom practices. Similarly, Ertmer (2019) asserts that teacher belief, experience in the past regarding technology, and professional development training are key to determining their ICT readiness. Research by López-Morteo et al. (2021) also indicates that teachers who are supported and trained continuously are more confident and able to utilize ICT, which drives classroom practice and learner outcomes. Overall, the literature highlights that developing a positive attitude towards ICT through professional development and organizational support is key to successful technology integration in education.

Table 1. Experience of Seasoned Teacher in Using Information and Communication Technology

THEME	CATEGORY	KEY CONCEPTS
ICT Integration in Teaching	Classroom Application	Digital tools, multimedia lessons, online resources
Student Interaction	Engagement Strategies	Interactive activities, online discussions, gamified learning
Challenges in ICT Use	Barriers	Technical issues, lack of devices, internet connectivity

Table 2 shows the importance of Information and Communication Technology in Education. From the participants, 3 themes emerged. These are as follows: teaching and learning, assessment and feedback, and classroom management.

Teaching and learning are the first themes that core processes in education that involve the transfer and acquisition of knowledge, skills, attitudes, and values. These two processes are deeply interconnected and essential for student development and academic success.

"My approach to teaching has been totally changed by the use of digital resources including multimedia presentations, educational apps, and interactive whiteboards."-T2.

"The resources enable me to better explain difficult ideas, maintain student interest, and modify my instruction to accommodate various learning preferences". -T8.

In order to accommodate different learning styles, ICT offers dynamic tools and multimedia materials that enhance interactive and captivating learning.

Additionally, Liu and Yuan (2017) emphasize the use of ICT in fostering active learning, where learners are more responsible for their learning. Computer-based instructional tools such as virtual labs, online tests, and collaborative tools not only enhance engagement but also enhance critical thinking and problem-solving skills. Teachers who effectively integrate these tools report increased student motivation and better academic outcomes (Mayer, 2019). Blended learning is an approach that combines traditional face-to-face classroom instruction with online learning activities. It allows students to benefit from both personal interaction with teachers and the flexibility of digital tools.

"My teaching style has completely changed as a result of blended and online learning. I can provide students the freedom to learn at their speed while still allowing for one-on-one connection, when necessary, by combining in-person and online training". - T5.

"Online and blended learning have had a big impact on my teaching style as a teacher. With this method, I can

give students the freedom to learn at their speed while still providing one-on-one assistance and support as required". -T 9

Studies conducted by Horn and Staker (2015) indicate that blended learning settings support more individualized learning, with students gaining increased autonomy over when, where, and how they learn. This system enables students to become more responsible for their learning by accessing content at their own pace but still enjoying face-to-face instruction that enhances engagement and feedback. Means et al. (2013) further indicated that blended learning results in higher student participation and academic performance, especially where interactive and collaborative tools are employed.

Student engagement refers to the level of interest, enthusiasm, and involvement that students show in their learning process. It goes beyond simply attending class; it involves active participation, emotional investment, and a sense of responsibility for one's learning.

"I can make learning more engaging and fun by utilizing games, interactive tests, and movies. Pupils are actively participating, solving problems, and working together rather than merely passively absorbing knowledge. For example, gamification makes learning feel more like an exciting challenge than a chore by providing students with goals and prizes. "-T10

Interactive materials, such as online quizzes, simulations, and interactive videos, are especially aligned with active learning principles since they involve students to be an active participant in real-time problem-solving and critical thinking. Bower et al. (2017) note that interactive content helps learners achieve a better understanding of the topic by facilitating them to manipulate and directly interact with the concepts being taught, leading to better retention and interest. They also cited that interactive content assists learners in establishing a stronger grasp of the content through the ability to manipulate and physically engage with the concepts being learned, which enhances retention and interaction.

Assessment refers to the process of evaluating and measuring students' understanding, skills, and learning progress. It can be formal or informal and helps both teachers and students identify strengths and areas for improvement. Feedback refers to the information provided to students about their performance. It helps students understand how well they are doing, where they need to improve, and how to improve.

"The way I monitor my pupils' development has altered significantly as a result of using digital assessment tools. It speeds up and streamlines the grading process." -T6
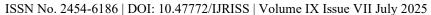
"I can give students immediate feedback, letting them know exactly   where they stand and where they need to grow."-T1

These technologies can monitor individual student progress, allowing teachers to make their feedback responsive to the specific needs of each student. Ramsay & Hinton (2020) add to this by pointing out that online assessments have the potential to yield useful data for instructional adjusting, including which students are having difficulty with certain topics and where targeted interventions can be delivered.

"Grading has become much faster, as I can enter scores digitally, and the system calculates final grades for me. It also allows for immediate feedback, which my students really appreciate."-T3

"Scheduling lessons, assignments, and exams are much easier with integrated calendar tools, and I can easily communicate any changes to my students."-T4

McKenny and Kinash (2017) found that the use of digital attendance tools, such as mobile apps or online portals, provides a more efficient and accurate method for recording attendance. These technologies support real-time tracking and entry of data, eliminating manual errors and administrative burdens. Additionally, automatic systems can also create reports of attendance patterns, useful to both instructors and school officials. Based on Bates (2015), using ICT technologies to grade—namely, automatic grading programs and online test management systems—saves instructors much time and effort. These tools can automatically grade multiple-

choice questions, quizzes, and even assignments that are uploaded in specific formats (e.g., PDFs or Word documents).

Table 2. Importance of Information and Communication Technology in Education

THEME	CATEGORY	KEY CONCEPTS
Teaching and Learning	Digital Instructional Tools	Use of smartboards, online simulations, and educational apps to enhance lessons.
	Blended/Online Learning	Integration of LMS (e.g., Google Classroom, Moodle) for hybrid learning models.
	Student Engagement	Interactive content, multimedia, and gamification to keep students actively involved.
	Digital Assessment Tool	Tools like Kahoot!, Google Forms, and Quizizz for formative and summative tests.
Classroom Management	Routine Automation	ICT tools for attendance, grading, scheduling, and reporting.

Table 3 shows the challenges of a seasoned teacher in using information and communication technology. The themes are basic computer skills, internet connectivity, ICT resources, digital literacy, and emotional barriers.

Basic computer literacy is the level of skills essential to operate a computer and the software efficiently enough to perform general tasks. Basic computer skills imply knowing how to use the computer, handle documents, access and use the internet and email, and handle routine programs such as word processing software and spreadsheets.

"I am not well-versed with basic tools such as creating digital presentations, using online testing websites, or embedding multimedia in lessons ". -T3

"I have not yet developed the confidence to use many digital tools and resources." -T4

"I struggle with troubleshooting technical issues in the classroom. This has been an issue since I am aware that technology continues to play an important role in improving student motivation and learning achievements". -T5
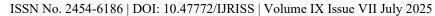
"I recognize that my skills in using ICT for teaching have been a challenge as I often feel unsure about how to effectively integrate technology into my lessons". -T8

In ICT, a study conducted by Ertmer & Ottenbreit-Leftwich (2010) concluded that teachers' inability to possess technological skills is one of the biggest obstacles to the effective use of technology in classrooms. Similarly, Al-Emran & Shaalan (2018) noted that even at the tertiary level, teachers and students both have difficulty with fundamental ICT skills, which negatively impacts the learning environment and student performance.

Internet connectivity means the capability to access and utilize the Internet via different networks and devices.

"As a teacher, I usually find myself having unpredictable access to the internet, which infuriates my efforts towards delivering clear lessons."-T2

"Whether slow speeds, intermittent connectivity, or occasional outages, such issues render usage of

online tools and resources challenging for contemporary teaching". -T10

Not only does it frustrate the teaching process but also the learning experience of students, as they cannot afford to engage themselves in the digital material fully or finish online assignments.

In a study by Nguyen & Meier (2019), it was discovered that a lack of good internet connectivity impacts teachers as well as students, as teachers are not able to impart interactive lessons, and students are obstructed from gaining access to the required material for learning. In addition, the OECD (2019) pointed out that poor internet coverage in schools tends to restrict the use of technology in the classroom, depriving teachers of the ability to adopt electronic devices that would improve learning outcomes and engagement.

Moreover, the Pew Research Center's study (2021) noted that among the majority of rural and low-income neighborhoods, teachers, as well as pupils, encounter major difficulties as a consequence of not accessible or inaccurate broadband connections, which not only affects the process of learning but also reduces the efficiency of remote and hybrid learning models. The research study discovered that equal accessibility to the Internet is important for assuring that all children, whatever their physical location, receive equal chances for academic success.

Digital instructional materials are the numerous technologies, tools, and materials that are being used for enhancing teaching and learning on the Internet. They may vary from both software and hardware to online environments and internet materials, all of which encourage pupils, allow cooperation, and increase learning in creative methods.

"*As a teacher, I deal with poor facilities. Limitations in schools that limit my performance teaching lessons whether it's obsolete computers, or inadequate. The difficulties whether connected to modern technology or a shortage of an accessible internet, It's impossible to implement technology into my classroom.*" -T1

Ertmer and Ottenbreit-Leftwich's (2010) study on the impact of infrastructure on technology integration in classrooms found that a lack of stable technological infrastructure, such as a lack of computers, a slow internet connection, and inadequate technical support, prevents students from engaging with modern learning materials and technology.

Insufficient trust regarding knowledge of technology can be highly limiting for people, especially in both businesses and institutions. The absence of belief in digital knowledge can be a result of a variety of causes, undermining someone's ability to use technology to benefit educational purposes, interaction, and troubleshooting.
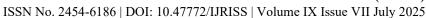
"*I often get annoyed while trying to make use of technology in instruction, as I am unaware of different applications and innovations.*" -T6

This lack of confidence hinders from making good use of technology in teaching, which in turn restricts the chances of students being exposed to digital learning materials.

In addition, Teo (2010) discovered that self-efficacy, or confidence in being able to utilize technology effectively, is a major predictor of technology adoption by teachers. Teachers who have low self-efficacy are less prone to experiment with new technologies or use them positively, and this has a direct impact on students' motivation and performance.

Emotional barriers are emotions and psychological issues that may hinder the capacity of an individual to participate, learn, or perform well in a given situation. Emotional barriers have deep roots in fear, stress, anxiety, low self-esteem, and negative past experiences, which may direct an individual's behavior, motivation, and performance.

"*I regularly find myself overwhelmed by technology. As a teacher, I am concerned that I may not be able*

to cope with all the new software and gadgets due to the speed at which digital tools and platforms are evolving". -T7

This fear sometimes inhibits incorporating technology into lessons, although I am aware that it may be useful for students. The fear of making a mistake or failing to troubleshoot quickly contributes to my concern. Rehman et al. carried out a comprehensive analysis of the literature and underscored that technophobia prevents teachers from adopting digital learning tools and hence slows down digital education. The paper pointed out the need for more research on the causes of technophobia and its impacts on teachers and students.

Table 4 shows the effect of challenges on the performance of seasoned teachers. From the seasoned teachers, 5 themes emerged. These include the following; emotional and psychological effects, environmental and infrastructure, needs for professional development, emotional and psychological effects, and teaching challenges.

Table 3. Challenges of a Seasoned Teacher in Using Information and Communication Technology

THEMES	CATEGORY	KEY CONCEPTS
Basic Computer Skills	Digital Literacy	Lack of Basic Skills
Internet Connectivity	Technological Barriers	Unreliable Internet Access
ICT Resources	Infrastructure Limitations	Limited Access to Tools
Digital Literacy	Teacher Confidence	Low Confidence in Using ICT
Emotional Barriers	Fear of Failure	Fear of Technology

The emotional and psychological effect is the effect that experiences, settings, or occasions have on a person's psychological well-being and emotional state. These effects could be positive or negative, and they determine the way people feel, think, act, and relate to other people. In educational or working settings, emotional and psychological factors matter in motivation, participation, performance, and quality of life.

"I get really anxious using new technology in class. I'm afraid I'll mess up in front of my students." -T3

"I'm afraid I'll make mistakes or be unable to assist students. I'm cautious to completely use technology in my lessons because of this lack of confidence. "-T7
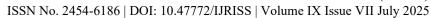
The teacher feels anxious, which suggests they are under psychological stress when expected to use new digital tools or platforms. Pupils may hesitate or avoid utilizing ICT entirely as a result of performance pressure brought on by their fear of failing in front of their peers. One of the biggest barriers to the effective integration of ICT in the classroom is still technophobia, or the fear and anxiety related to utilizing technology. Al-Awidi and Aldhafeeri, (2017) stated that a lack of confidence in their abilities and a fear of failing while implementing new technology in the classroom cause anxiety in many teachers. Due to this emotional barrier, students frequently underuse the digital resources that are available, which restricts their exposure to contemporary teaching techniques.

The environmental and infrastructure dimensions of ICT (Information and Communication Technology) use involve the physical, technical, and organizational conditions for or against supporting the effective application of technology in education, the workplace, or the community. The factors are key because, regardless of how able or willing the users are, without adequate infrastructure and a good environment, ICT tools cannot be used effectively or sustainably.

"We don't have reliable internet in our school, so I avoid planning lessons   that require it."-T5

The teacher is confronted with unpredictable internet connectivity, a frequent problem with many schools, particularly rural or low-funded districts. Unpredictable internet connectivity prevents the instructor from

planning or applying technology-augmented lessons (e.g., having students use online videos, digital resources, or live collaboration tools)

Barakabitze et al. (2019) emphasized that the lack of stable internet access often leads to frustration and demotivation among teachers, who then tend to avoid using digital tools altogether. This not only affects the quality of instruction but also reduces students' exposure to digital learning environments. Similarly, Hennessy et al. (2016) found that even when teachers are trained and motivated, infrastructure challenges—especially internet issues—discourage them from using ICT. Their study in sub-Saharan Africa observed that these constraints compel teachers to use out-of-date pedagogic means, thus expanding the digital divide within classrooms.

The psychological and emotional impact of ICT use is how the act of using digital tools and technologies impacts an individual's emotions, mental well-being, attitudes, and behavior. With ICT being increasingly used in education, the workplace, and everyday life, it has both positive and negative psychological and emotional impacts—especially when ICT users face problems or are without support.

"I feel less motivated because I can't give my students the best tools to learn." -T8

"I frequently feared that I wouldn't be able to rapidly resolve technological problems or make blunders in front of my students. I became nervous and scared to use the new tool as a result. "-T10

The teacher demonstrates demotivation, a well-known indicator of emotional exhaustion or burnout. Not feeling equal to the task of fulfilling students' learning requirements often leads to guilt, frustration, or feeling helpless. Likewise, Beauchamp and Kennewell (2010) contend that when instructors are not in a position to offer the best resources to their pupils, there is a professional sense of inadequacy and that leads to low morale, affecting their general teaching effectiveness. This puts teachers in a less stable position to enhance their teaching practice or involve students in more active learning experiences.

Instructional problems in the use of ICT refer to challenges faced by educators and teachers in trying to integrate digital tools and technologies into teaching and learning. These challenges can affect the effectiveness of lesson delivery, student participation, evaluation, and learning.

"I have had no proper training on these tools, so I just keep using the traditional way of teaching." -T9

"I still use traditional teaching approaches because I haven't been properly   trained on these tools." -T2

"I stick to what I know works because I lack the skills and confidence to use new technology properly." -T6

Professional development plays an important role in enabling teachers to learn the skills and knowledge needed to embed technology in a useful way into their teaching practice. Without it, educators are not ready and end up hesitating to innovate with new tools. Without it, teachers feel unprepared and are often reluctant to experiment with new tools. Due to the absence of training, the teacher adheres to conventional teaching practices, which they are more accustomed to Traditional practices (e.g., chalk talk, textbooks, etc.) are perhaps more used to, and the teacher feels safer using them since they know how things go and there are pre-established procedures.

In their work, Tondeur et al. (2017) underscore the fact that ongoing professional growth (CPD) is significant for teachers to acquire the required skills and confidence to effectively employ new technology. Instructors who are not well-trained see themselves as unprepared and may only view technology as a further complication and not a way of furthering learning.

"Lacking interactive technology, it's difficult to maintain my students' focus. They simply aren't interested in traditional lectures." -T1

"I find it difficult to maintain my students' interest when I don't have access to interactive technology.

They just don't find typical lectures interesting, and they appear to become distracted easily."-T6

The teacher is responding to a change in how students interact with material. Students are used to instantaneous access to data, multimedia content, and interactive environments on their own devices during the information age. Lectures (where the teacher is the main source of information) tend to be static and less exciting than the engaging content on the internet.". Freeman et al. (2014) carried out a study of active learning methods and their effects on student performance. The research established that interactive learning methods, which frequently involve the use of technology (e.g., interactive simulations, real-time polling, group work, educational games), lead to considerably greater student participation and academic success than conventional lecture-based instruction. This emphasizes the need to apply interactive technology in order to make lessons more stimulating and effective**.**

Table 4. Effect of Challenges to the Performance of Seasoned Teacher

THEMES	CATEGORY	KEY CONCEPTS
Emotional and Psychological Impact	Low Confidence and Anxiety	Technophobia, fear of failure, lack of self-efficacy
Environmental and Infrastructure	Poor Internet and Power Supply	Unreliable internet, limited tech use, disrupted lessons
	Stress and Burnout	Frustration, low morale, helplessness
Instructional Challenges	Reduced Teaching Effectiveness	Student disengagement, lack of interaction

Table 5 shows the coping strategies to overcome the challenge. From the seasoned teachers, 4 themes emerged. These are as follows; technical challenge, collaboration and support, emotional resilience, and action planning.

Technical support refers to the assistance and services provided to help users effectively use and troubleshoot their Information and Communication Technology (ICT) tools, systems, and software. In educational or organizational settings, a robust technical support system is vital for enhancing the effective utilization of ICT resources, minimizing downtime, and swiftly resolving technical issues.

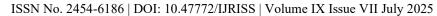*"Participating in workshops and webinars has greatly enhanced my application of ICT in the classroom,"* -T3

"*I've gained insightful knowledge and useful skills from these learning opportunities that have greatly simplified and increased the effectiveness of integrating technology into my course*s". -T7

ICT seminars provide hands-on training and up-to-date knowledge on using digital tools, software, and platforms. This helps individuals improve their technical skills and become more confident in using technology for various tasks. According to research by Frontiers in Education (2023), seminars and training programs focusing on ICT not only improve technical skills but also support the development of pedagogical strategies necessary for effective digital teaching. Similarly, a study published in the Discover Education Journal (2024) emphasizes that ICT-focused professional development leads to more student-centered, inquiry-based learning environments.

"*I've been able to include digital tools like Google Classroom, making PowerPoint presentations and printing different materials into my teaching because I'm self-paced online* ". -T1

"*I've been able to use digital resources like presenting PowerPoint presentations, and print different materials as part of my instruction because of self-paced online learning.*"-T8

ICT courses have given me the freedom to learn at my speed and time. These platforms have made lessons more interactive and engaging for students. The courses also boosted confidence in using technology, especially during

remote learning sessions. A similar sentiment was conveyed by the UNESCO ICT Competency Framework (2022), which stated that ongoing self-directed professional development is an essential factor in empowering educators to address the evolving demands of education in the 21st century.

Collaboration and assistance within the realm of ICT (Information and Communication Technology) denote the joint endeavors of individuals, groups, or organizations to exchange knowledge, resources, and skills to utilize digital tools and technologies effectively. This collaboration can occur within teachers, learners, technical support individuals, or even educational organizations.

"I used to get stressed whenever I introduced ICT in my learning activities. Asking more millennial co-teachers for support has a major impact. They instructed me how to make effective use of various methods". -T2

"Getting advice from my young colleagues also made a major impact. They made me feel better with numerous programs, which not only lessened the irritation while enhancing my belief in using technology in the classroom." - T10

Teachers who collaborate with ICT expertise can provide helpful suggestions and real-life instances of how technology is improving their teaching. The information provided often proves more applicable and promptly useful than classroom instruction alone. Teachers develop a community of career development by seeking recommendations and expressing ideas on a regular basis, especially if it comes to adapting to new technology in the classroom.

In accordance with Gökoğlu and Çakıroğlu (2017), mentoring plays an integral part in promoting teachers to apply technology by providing the required help to overcome ICT issues. In the study by Baser et al. (2021), mentorship focused on promoting the creation of technological-oriented TPACK among in-service teachers has been correlated with better results in implementing technology throughout classes.

Resilience in emotion can be described as the capacity to remain positive, emotionally stable, and psychologically healthy when faced with any kind of difficulty or stress.

"I started confused by all of the digital tools available to me." But it started with a minor outcome, such as using presentations for a lecture. Every achievement, whatever little, improved my self-esteem." - T8

"I felt afraid at first with all of the digital tools obtainable by myself but I began with minor achievements like using PPT for a presentation. Every achievement, no matter how small, built up my strength." -T4

"I'm currently happier trying new instruments. I've noticed that it improved the children's interest."-T7

Educators may minimize the sense of overload that sometimes comes with technological advances by implementing small, easy tasks (such as creating a basic PowerPoint slide show or using an educational management system for participation). This method makes the process of learning simpler and more accessible.

Furthermore, Kimmons et al. (2018) noticed that the path to small wins often had a snowball effect, with every positive outcome prompting teachers to adopt new technology and methods of instruction. In addition, Ertmer and Ottenbreit-Leftwich (2020) found that teachers who began with reasonable technological tasks felt less apprehensive, resulting in enhanced technology integration in classrooms. These small initiatives offer the basis for an intense dedication to technology use and a positive attitude toward even more career development in technology.

Planning for action is the act of developing clear goals, indicating what steps are necessary for attaining those goals, and figuring out how and when something will be accomplished. It is a planning instrument that enables people or groups to plan their work, maintain plans, and evaluate progress as time goes by. In educational institutions, planning for action is essential for producing systematic plans to enhance teaching strategies, embrace new technology, improve the achievement of pupils, and execute educational activities.

"At first, I attempted to find out all about technology. At one point, I quickly discovered that this was impossible. I now give every goal a suitable schedule, such as studying a new digit function per week" (T5)

"Setting reasonable goals, like learning a new digital tool feature every week, has helped to make the process much more efficient and manageable." -T6

Establishing achievable deadlines for each seek is an essential method for maintaining this balance effectively. It helps teachers develop confidence, remain inspired, and make steady progress toward their targets without feeling stressed.

Goktas et al. (2015) discovered that setting attainable goals with stated deadlines improves teachers' embrace and implementation of new technology into their lessons. For teachers' confidence and long-term achievement, these suitable timeframes are critical for handling the complexities of embracing technology and avoiding stress. In line with this, setting short-term, achievable objectives is a significant factor in building ability and increasing motivation, encouraging teachers to travel the challenges of technology integration with greater success.

Table 5. Coping Strategies to Overcome the Challenge

THEMES	CATEGORY	KEY CONCEPTS
Technical Support	ICT Training	Attending workshops or webinars Self-paced online courses
Collaboration and Support	Peer Mentorship	Seeking guidance from more experienced co-teachers
Emotional Resilience	Stress Management	Building confidence with technology use through small wins
Action Planning	Time Managemen	Setting realistic timelines for each goal

Table 6 shows the barriers encountered by seasoned teachers in the utilization of information and communication technology. From the seasoned teacher's response, 4 themes emerged. These are as follows; resistance to change, technological barriers, inadequate professional development, and lack of time.

Resistance to change is the normal hesitation or opposition that people and organizations might encounter as they deal with novel concepts, techniques, or innovations. In the environment of learning, resistance to change may arise whenever pupils, educators, or even educational organizations hesitate or reject new teaching methods, educational modifications, or integration of technology.

"I've been teaching for almost 30 years, and I feel entirely at home. Using my typical teaching methods. It can be hard to let go of. What is easy, and I know what works best for my pupils. At all times, I comprehend the positive effects of technology; I often think that it makes. Tasks that are harder than I can currently achieve well in the learning environment". -T2

Teachers may be afraid to adapt their strategy since they have years of expertise utilizing proven techniques. Several worry that new technologies could disrupt their current environment. Being aware of created addresses could lead to an unconscious reluctance to adopt new tools, particularly when those tools take more time to understand and integrate into lesson plans.

Rousouli et al. (2020) reported that teachers who have been teaching for several years frequently depend on traditional, tried-and-true methods of instruction due to their level of expertise as well as perceived effectiveness. Teachers like these are more inclined to be resistant to utilizing ICT, imagining that new methods can disrupt their traditional routines and deliver unsuccessful outcomes.

Additionally, Hsu and Ching (2018) discovered that resistance to change, stemming from comfort, is common among experienced classroom teachers. They can find it difficult to adjust to digital tools and new pedagogical practices, usually due to a lack of knowledge or perception of how technological advances may improve their professional lives. Similarly, Ertmer and Ottenbreit-Leftwich (2020) state that teacher beliefs about the advantages of traditional methods are often greater than the potential of ICT, leading to a delay in putting technology into reality. Because of the possibility of committing mistakes in the presence of other pupils, teachers have been afraid about incorporating new technologies into the classroom.

"I'm afraid of missing the lesson or something else going wrong throughout an entire lesson so it's more than about technological advances. ". -T3

" I started to be extremely worried about losing control of my class or something happening wrong during a based on technology lesson." -T9

Teachers worry about making errors in front of their pupils, particularly when using new technology. A presentation that does not go as intended, such as a technical breakdown or an inadequate activity, can lead to feelings of regret and an absence of authority over the class. This is especially increased when teachers feel they are being observed or critiqued by someone.

According to Ertmer and Ottenbreit-Leftwich (2020), teachers usually have technological anxiety due to the fear of doing something wrong while applying new tools or platforms. This anxiety can be especially daunting for teachers who are used to conventional pedagogy and feel less at ease with the intricacies of new technology Goktas et al. (2015) also support this claim, suggesting that teachers' perceived lack of technological expertise and fear of technical failure led them to resist ICT usage in the classroom.

Technical problems often prevent us from accomplishing anything, even when they utilize digital resources, and it takes away precious class time used by teachers. A slow or non-existent internet connection will make online resources challenging to utilize, research hard to do, or learning management systems difficult to access during class. Online sites, videos, and interactive resources, which are crucial for reaching students and improving learning, grow frustratingly slow or unavailable, wasting class time. Teachers can shy away from technology use to prevent intrusions and delays, compromising the quality of instruction overall. For example, a study by Al-Fadhli and Al-Hunaiyyan (2017) highlighted that computers and internet availability that are old and also not reliable restrict educational technologies in schools. In their research, teachers indicated that low internet speeds and frequent device failure greatly hampered the capacity to provide technology-rich lessons, which resulted in frustration and unwillingness to use technology. Likewise, Tinio's (2016) research revealed that inadequate technical infrastructure was a pervasive obstacle in most developing nations, where schools complained of slow internet connection connectivity and an absence of outdated tools. Teachers in such instances often had to give up on technology instructing or seek out different approaches, reducing the general efficacy of ICT in learning. Educators are in the position of repairing any technological problems that come out during class, such as an unresponsive app.

Technological obstacles are the issues and challenges that limit the correct application and implementation of technological resources in schools. The obstacles can be attributed to an array of situations, including a lack of supplies, technical expertise, or facilities as well as people's beliefs and opinions. In the setting of education, bringing down technological barriers is vital in establishing an environment wherein innovation might enhance the process of learning and teaching.

"The absence of trained technical support restricts teaching time. It can be quite annoying when technology fails and I am left. I am truly trying to correct issues." -T8

One of the biggest obstacles to the effective utilization of technology for communication and information (ICT) in the educational environment is the absence of technical assistance. Assistance from technology plays an important role in avoiding interruptions when teachers experience technical difficulties such as a damaged computer, network issues, or software problems. Teachers might find it difficult to resolve disputes among themselves in their lack of this direction.

As mentioned in Ertmer and Ottenbreit-Leftwich's (2020) study, technical help is critical for effective technology integration in the classroom, particularly when teachers meet unexpected difficulties with technology. Teachers in their research indicated how poor internet connections and system failures readily hindered teaching through technology-based lessons, causing frustration and resistance to the use of digital resources. Likewise, a study by Tinio (2016) identified poor technical infrastructure as a widespread obstacle in most developing nations, where schools had slow internet and inadequate or old hardware. Teachers in such environments were frequently compelled to drop technology-based lessons or resort to other means, affecting the overall effectiveness of ICT in education.

"I'm in charge of fixing any technical problems that crop up in the classroom, like a freezing app. The absence of expert tech support limits my teaching time. It can be really unpleasant when technology breaks and I'm left scrambling to fix it."-T6

Technical support must be readily available in order to avoid disruptions when there are technological issues, like a broken computer, network connectivity issues, or errors in software. Teachers will be unable to correct issues independently without technical support.

As indicated in a study by Ertmer and Ottenbreit-Leftwich (2020), technical support is essential to effective technology integration in classrooms, especially when teachers encounter unforeseen technical problems. Without immediate support, teachers waste time attempting to solve the problem instead of focusing on teaching, which in turn affects the quality of instruction.

In research conducted by Alharbi and McMinn (2017), educators in schools with no or inadequate technical support reported that they were overwhelmed by technical issues. They observed that a lack of technical assistance typically led to disappointment which made them hesitant to integrate the latest innovations into their classroom. Teachers stated that whenever challenges arose in class, they could not deal with them quickly, leading to unnecessary intervention and disruptions.

Insufficient professional growth is referred to as a shortage of adequate, relevant, and ongoing education possibilities for teachers to effectively integrate Information and Communication Technology (ICT) into their methods of instruction. This is an important obstacle to the implementation of modern technology in learning, as teachers require not only the ability to use tools, but also the expertise, abilities, and trust needed to use them effectively.
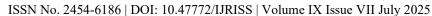
"*Throughout the year, I have been provided with several new technological tools; but the workshops were so limited that I am not ready to apply them. They work effectively. Since I'm not sure I am able to fix it. When anything goes in error, I often avoid employing these devices. I have I have to work anything through myself, but it's a hard process.*"-T4

"*I have no idea how to use them properly in my classroom instruction because the training was quick and too short.* "-T7

Among the greatest important challenges that educators encounter while implementing new tools and platforms is an absence of training. To remedy this problem, educational institutions must provide comprehensive, regular instruction that introduces teachers to fresh technological advances while also providing practice and continuous career development. Teachers must be motivated throughout their training to use technology successfully and effectively.

A Teo study conducted in 2021 discovered that training shortages were particularly apparent among rural and unprepared schools, where career growth chances for new technology are rare or absent. Teachers at such schools stated that they did not receive sufficient assistance to learn how to use new technologies, which significantly hindered their willingness to implement ICT into learning.

The study highlighted that without the help of particular instruction programs, teachers were able to use computers above their fundamental capacity, hence not realizing their full ability to promote student learning.

Sener and Erdogan (2020) additionally showed that inadequate instruction on new ICT tools was the root of technological inequalities in schools where training initiatives were inadequate or insufficient, it was obvious that teachers used technology minimally in the classroom. Teachers felt overwhelmed by the number of new gadgets and platforms introduced to them, and without adequate instruction, they were less prepared to manage their students' various requirements through digital.

" *I am often wondering why I do not have enough time to prepare and plan my classes properly; I'm constantly rushed to insert meetings, grading, and paperwork*. -T6

Teachers have substantial challenges in effectively integrating ICT (Information

and Communication Technology) into their teaching practice due to a lack of time. Teachers often face several responsibilities, including preparing lessons, evaluation, managing the classroom, office duties, and continuing education, giving little time to study, experiment with, or integrate new technology.

"I'm often trying to find time in discussions, grading, and paperwork. As an outcome, I either quickly through lesson plans or don't have the time to incorporate new digital tools or technologies that I would prefer to utilize in instruction." -T10

"I have a short period for proper lesson preparation and utilization of the digital tools. I would like to use it in my teaching because I'm always managing conferences, examinations, and homework." - T5

Limited scheduling and preparation time are an essential obstacle for teachers, especially when implementing Information and Communication Technology into their jobs. Based on Ertmer and Ottenbreit-Leftwich's (2020) research, the period teachers need to prepare lessons, organize activities, and get comfortable with new tools has a direct impact on how effectively they can implement technology into the classroom. Teachers frequently lack time due to a slew of administrative tasks, grading, and other duties, which prevents them from properly preparing and applying new technologies in the classroom.

A study by Tondeur et al. (2017) further highlights that insufficient planning time is one of the greatest impediments to ICT adoption, particularly when teachers are supposed to juggle traditional pedagogical approaches with incorporating new technology. Teachers indicated that they were overwhelmed by the expectations of their jobs, so there was limited space for discovering new tools, mastering them, and creating technology-infused lesson plans. Consequently, a lot of instructors used technology superficially or in limited capacities.

Table 6. Barriers Encountered by Seasoned Teachers about Utilization of Information and Communication Technology

THEMES	CATEGORY	KEY CONCEPTS
Resistance to Change	Attitude and Beliefs	Comfort with traditional teaching methods
		Fear of failure or making mistakes with new technology
Technological Barriers	Access and Resources	Poor technical infrastructure (slow internet, outdated hardware)
		Lack of technical support for troubleshooting issues
Inadequate Professional Development	Training and Support	Insufficient training on new tools and platforms
Lack of Time	Time Management	Limited planning and preparation time

Table 7 shows the effects of barriers to the performance of seasoned teachers. From the seasoned teachers, 3 themes emerged. These are as follows; fear of failure, comfort with traditional methods, and time management.

Fear of failure is a common emotional barrier among teachers when it comes to integrating ICT (Information and Communication Technology) in the classroom. This fear stems from concerns that using unfamiliar digital tools might lead to mistakes, technical issues, or a loss of control during lessons, potentially affecting their credibility or the students' learning experience.

"I have been shy about integrating the new digital resources fully into my classes. I understand that I will continue to hold to what I believe because it is easy, and it has proven useful previously.". -T 8

"It's simpler to remain with traditional methods that do not involve technology."-T2

Some seasoned teachers are afraid to use new tools because they are unfamiliar with them. The ongoing development of new digital tools, platforms, and applications can cause stress. Teachers may be afraid that the tools will not integrate well with their present lesson plans or teaching practices, or that they lack the experience that is required. Traditional teaching methods may be used because they feel safer and more reliable, and they have a fear of making errors or experiencing difficulties with technology.

Based on Ertmer (2015), traditional teaching methods become familiar and comfortable to teachers, thus they prefer to stick with them. Teachers may feel confused by the enormous variety of technologies available and lack the knowledge or confidence to use them effectively, despite the possible benefits of integrating technology. Tondeur et al. (2017) observed that lecturers are familiar with traditional methods frequently leads to their hesitancy to embrace new technology, particularly when they do not see the benefits right away or are unsure of their technical

Many teachers feel more comfortable with traditional teaching methods—such as lectures, textbooks, and chalk-and-talk—because these strategies are familiar, reliable, and have been used effectively over time. While these approaches still hold value, this comfort can sometimes lead to resistance or reluctance to adopt newer, technology-based methods.

"I am convinced there are more creative ways to use ICT to teach, but I'm frequently afraid to give them a try. I'm afraid I won't be able to use the computer correctly in front of my pupils since I believe I don't have adequate time to learn and experiment with them."-T1
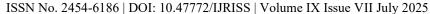
"I believe there are more creative approaches for integrating ICT into the lessons I teach. However, I am not always willing to give them a chance. -T5

"I seldom have the opportunity to try things and practice with the ICT I'm nervous that I won't use the devices appropriately in front of my pupils."-T7

Teachers who have been using the same teaching methods for years may experience resistance to change. There can be a natural comfort with familiar practices, and the thought of changing to something new—especially technology—can seem daunting. This resistance is often compounded by the belief that existing methods are sufficient and effective for achieving learning outcomes, making it harder for teachers to embrace innovation or new tools.

Teo (2021) also noted that fear of failure and concern over technical malfunctions typically discourage teachers from adopting new ICT tools. Teachers are frightened that technology might fail in the midst of a lesson or even fail to function as desired, leading to frustration and disruption. Such anxieties stifle the ease of experimenting with new methods, thereby suppressing innovation within the classroom.

Time management refers to the ability to effectively plan and allocate time to tasks and responsibilities. In the context of education, especially with the integration of ICT (Information and Communication Technology), time management becomes crucial for teachers who must balance lesson planning, teaching, grading, administrative duties, and professional development—while also learning and applying digital tools.

"I had problems with the online submission system and took longer than I expected trying to work out how to upload the document, which made me miss the deadline for submitting my report." -T3

"I'm not familiar with some pieces of software and platforms." -T5

"I eventually missed the report submission date because I had trouble with the online submission method and took longer than expected to figure out how to upload my document."-T9

"The online submission process caused several challenges for me recently. I tried my best, but I had trouble working out how to properly upload my report."-T 10

Teachers who don't know various digital tools well (e.g., online submission systems, and learning management systems) might have difficulty completing even the simplest tasks. Here, the inexperience of the teacher with the online submission process created confusion and time spent to understand how to go about it. Lack of competence will hinder the working process, with insufficient time to achieve deadlines. As Tondeur et al. (2017) state, unfamiliarity with digital platforms and software tools is one of the primary reasons why so many teachers have difficulty incorporating technology into their workflow.

This may result in inefficiencies when it comes to filling and submitting reports since teachers will take more time familiarizing themselves with the systems, resulting in frustration and procrastination in fulfilling deadlines. Furthermore, the investigation emphasizes the need for professional development in boosting teachers' ICT literacy. In addition, the research highlights the need for professional growth to improve teachers' knowledge of information and communication technologies. Educators who lack preparation are more likely to feel confused by new technology and might not be applying it as effectively as they should. Similarly, Teo (2021) acknowledges that the fear of making mistakes with new technology is another significant barrier to ICT adoption. Educators who are fearful of making mistakes or disrupting their workflow may postpone report submissions or avoid utilizing digital tools entirely, limiting their ability to fulfill targets.

Table 7 Effects of Barriers to the Performance of Seasoned Teacher

THEMES	CATEGORY	KEY CONCEPTS
Fear of Failure	Lack of Confidence	Avoidance of new tools, reluctance to incorporate ICT fully.
Comfort with Traditional Methods	Resistance to Change	Reduced innovation in the classroom, and failure to adopt ICT tools.
Time Management	Effective Time Allocation	Efficient use of work tir neeting deadlines consistently.

Table 8 shows the coping strategies to overcome the barriers. From the seasoned teacher, 3 themes emerged. These are as follows; professional development, support system, and stress reduction.

Professional development (PD) in education refers to the continuous learning and growth opportunities for educators to enhance their skills, knowledge, and practices. This process is essential for teachers to stay updated on new teaching strategies, digital tools, and subject matter expertise. It helps teachers become more effective in their roles, supports their career progression, and ultimately improves student outcomes.

"To get better in ICT, I've started going to more workshops and seminars for professional development. Because I am learning new methods which I can immediately apply in my classes, these interactions have been really useful". -T1

"Attending several seminars on incorporating technology into the classroom greatly improved my confidence with digital tools."-T5

"I have participated in lots of workshops on incorporating technology into the classroom, and each one has made me much more comfortable with digital tools." -T9

Workshop and seminar attendance is an immediate approach to teachers acquiring ICT competence in an organized environment. Such events are generally conducted by experts who can impart new methods, tools, and techniques for applying technology in the classroom. For new educators, these chances offer the basis for gaining important skills that may increase their competence and trustworthiness. Ertmer (2015) discovered that organized, realistic experiences of learning significantly enhance teachers' ICT competencies. Professional development programs, including seminars, allow teachers to have more knowledge of technology tools and how they can effectively be incorporated into their teaching methods.

Tonder et al. (2017) suggest that ongoing professional growth through seminars and education programs equips teachers with the expertise and trust necessary to use technology in the learning environment. Teachers who participate in such programs indicate a boost in self-confidence and an incentive to try out new technology.

With education, a system of assistance is an organization of assets, coworkers, coaches, and instruments that facilitate teachers to fulfill their responsibilities as teachers. This approach gives the aid along with guidance necessary to overcome difficulties, raise skills, and support growth in one's career and life. A powerful support system may significantly boost a teacher's effectiveness, satisfaction with employment, and general health.

"Workshops and seminars provide teachers the opportunity to interact with peers, discuss circumstances, and gain. With other teachers on working strategies."-T2

"Interaction with my peers has really made me more effective. Utilizing technology for educational settings." -T3

"*Performing work with my peers has significantly improved the skills I have to utilize Technology in Teaching."* -T8

Collaborating together enables teachers to contribute strategies, assets, and technological advances associated with ICT integration. As teachers work together, they may resolve, find new methods for implementing technology into the learning environment, and gain comfort in using new resources. Teachers may make ICT adoption less frightening and more accessible by sharing their experiences and learning from one another about what works and doesn't in the classroom.

Vermunt and Verloop (2017) claim that collaboration among peers is vital in enhancing teachers' ICT competence. The learning environment enables teachers to share their expertise, learn from one another's experiences, and provide hands-on answers to common challenges, thus encouraging the use of ICT in the classroom. Through collaboration, teachers are able to reduce the anxiety and skepticism that their use of new technology may produce. As noted by Harrison et al. (2018), mentoring is yet another key technique in facilitating the growth of educators' ICT skills. Guidance from mentors with experience helps teachers report increased self-efficacy in employing technology in teaching processes. Mentors, typically individuals who are experts in ICT integration, offer one-on-one guidance, moral encouragement, and best practices, which speed up learning. Indeed, mentorship helps new teachers to minimize errors and gain confidence in the application of new tools.

Stress reduction in the context of teaching refers to strategies and practices that help educators manage the mental, emotional, and physical pressure that often comes with the demands of the profession. Teaching can be highly demanding, with teachers juggling multiple responsibilities like lesson planning, grading, managing classroom m behavior, and engaging students. Effective stress reduction techniques can help teachers maintain their well-being, stay productive, and deliver quality education.

"When I first began to utilize new technology in class, I was nervous of doing anything wrong."-T4

"I had worries that I would not be able to use the technology or anxious my children might lose respect for me and adapt my strategy gradually."-T7

"I now regard mistakes as opportunities for improvement, not failures.". -T6

The teacher's understanding of the importance of a growth mindset may help pupils overcome their fear of failure. In the words of Dweck, those who have a growth perspective think that with time and effort, they can improve their ability and knowledge. Growing up with a growth mindset enables one to accept difficulties, perform new things, and acquire knowledge from errors rather than considering failure as inevitable. Developing a growth mindset allowed the teacher to overcome her fear of failure and experiment with technology more openly and with trust.

Hughes (2017) also notes that teachers who demonstrate a growth mindset in the classroom establish a culture of resilience and risk-taking in students. When teachers learn from their mistakes as learning experiences, then students are likely to follow suit. This is particularly needed in environments where technology is dynamic and can often make teachers feel inadequate with regard to new tools. Hughes stresses that establishing a culture in which errors are embraced as learning experiences is critical to fostering innovation and creative problem-solving.

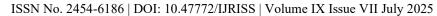**Table 8**. Coping Strategies to Overcome the Barriers

THEMES	CATEGORY	KEY CONCEPTS
Professional Development	Training & Skill Enhancement	Participating in workshops, attending seminars, taking online courses
Support Systems	Peer & Institutional Support	Collaboration with colleagues, seeking mentorship from experienced teachers
Stress Reduction	Mindset & Confidence Building	Shifting focus from fear of failure to a growth mindset, acknowledging mistakes as learning opportunities

CONCLUSIONS

In conclusion, although the integration of ICT into the classroom could change teaching and learning forever, there are numerous hindrances that make its full utilization a distant reality. The use of technology in the classroom is challenging for teachers and schools because there are some barriers, such as the lack of administrative support, lack of training, resistance to change, fear of failure, and lack of enough resources, and time.

It is imperative to provide detailed professional training, adequate technical support, advanced infrastructure, and a spirit of innovation to overcome such hurdles Schools possess the ability to make teachers whole-heartedly implement ICT, develop the teaching methodologies, and ready learners for the issues of the age of digital technology by removing such barriers.

These suggestions are put out to address the challenges and barriers to ICT integration such as Improved Professional Development Programs. Educational institutions such as schools should make investments in thorough training programs that give teachers the abilities and information required to use ICT efficiently. Both fundamental and advanced technology abilities should be included in these continuing education courses. Peer mentoring and collaboration networks can be established to assist teachers in learning from one another. Second, educational institutions must create a culture that encourages creativity and risk-taking. Teachers should be encouraged to try out new technology, and errors should be viewed as learning opportunities. Teachers with a growth mindset are less fearful of failure and more inclined to actively use technology. Third, instructors should have dedicated time in schools to plan and implement ICT-based curricula. This may include adjusting the schedule to allow educators to become acquainted with and test new technologies. The next step is Leadership and Administrative Support, which includes clear rules, enough budget, and continual professional development opportunities. School administrators should aggressively promote and encourage ICT integration. Creating a vision for ICT integration and ensuring that all teachers have the resources and support they need to succeed
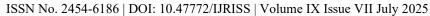
necessitate strong leadership. Finally, increasing peer collaboration in educational institutions should give educators the opportunity to work together on ICT-related tasks and exchange their experiences. Collaborative teaching communities can establish a sense of shared responsibility for ICT integration, reducing the alienation that many teachers experience while using technology.

REFERENCES

1. AKTARUZZAMAN, M., SHAMIM, M., & CLEMENT, C. (2011). Trends and issues to integrate ICT in teaching-learning for the future world of education. International Journal of Engineering & Technology, 11(3), 114–119

2. AL-AWIDI, H. M., & ALDHAFEERI, F. M. (2017). Teachers' beliefs and technology integration in Kuwaiti schools: A study of EFL teachers. Educational Technology Research and Development, 65(3), 1–22.

3. ALBION, P. R., TONDEUR, J., FORKOSH-BARUCH, A., & PEERAER, J. (2015). Teachers' professional development for ICT integration: Towards a reciprocal relationship between research and practice. Education and Information Technologies, 20(4), 655–673. https://doi.org/10.1007/s10639-015-9401-9

4. AL-FADHLI, S. H., & AL-HUNAIYYAN, A. (2017). Barriers to the integration of information and communication technology in Kuwaiti schools. Computers & Education, 115, 87–98. https://doi.org/10.1016/j.compedu.2017.07.003

5. ALHARBI, S. M., & MCMINN, M. (2017). Barriers to the integration of technology in education: A case study in Saudi Arabian schools. Education and Information Technologies, 22(2), 299–314. https://doi.org/10.1007/s10639-016-9510-

6. ALRASHEEDI, A., & CAPRETZ, L. F. (2015). Determination of critical success factors affecting mobile learning: A meta-analysis approach. Computers in Human Behavior, 51, 1–12. https://doi.org/10.1016/j.chb.2015.04.022

7. ALRASHEEDI, M., & CAPRETZ, L. F. (2015). An empirical study of critical success factors for mobile learning platform development. Journal of King Saud University- Computer and Information Sciences, 27(2), 153-164. https://doi.org/10.1016/j.jksuci.2015.03.002

8. ANDERSON, R. E. (2008). Implications of the Information and Knowledge Society for Education. In J. Voogt & G. Knezek (Eds.), International Handbook of Information Technology in Primary and Secondary Education (pp. 5–22).

9. ANDERSON, C. A., & VAN WEERT, T. J. (2018). Challenges in integrating ICT into education: A comprehensive review of the literature. Computers & Education, 118, 1-12. https://doi.org/10.1016/j.compedu.2017.10.005

10. BAGOZZI, R. (2007). The legacy of the technology acceptance model and proposal for a paradigm shift. Journal of the Association of Information Systems, 8(4), 244–254. https://doi.org/10.17705/1jais.00122

11. BĂLAN, R. A., & PETRE, C. (2018). Teachers' perceptions of ICT integration in elementary education: The influence of cultural and demographic factors. [Journal Name, Volume (Issue), pages]. https://doi.org/xxxx

12. BARAKABITZE, A. A., et al. (2019). Transforming ICT education in African higher education institutions: A systematic review. Education and Information Technologies, 24(1), 1–24.

13. BASER, D., KOPCHA, T. J., & OZDEN, M. Y. (2021). Individualized technology mentoring: A model for supporting in-service teachers' TPACK and classroom technology integration. Education and Information Technologies, **26**, 2403–2422. https://doi.org/10.1007/s10639-020-10369-2

14. BEAUCHAMP, G., & KENNEWELL, S. (2010). Computers in the classroom: How teachers and students perceive the impact of computers on education. Computers & Education, 54(4), 878–885.

15. BEBELL, D., RUSSELL, M., & O'DWYER, L. (2004). Measuring teachers' technology use: why multiple measures are more revealing. Journal of Research on Technology in Education. https://doi.org/10.1080/15391523.2004.10782425

16. BROWN, A., & OTIENO, B. (2020, May 7). Learning from home in Kibera during COVID-19. UNICEF Kenya. https://www.unicef.org/kenya/stories/Learning-from-home-in-Kibera-during-COVID-19

17. BULIVA, N. (2018). Teachers' attitudes towards the utility of computers in education in Kenya. African Educational Research Journal, 6(1), 5–6.

18. CHIGISHEVA, O., SOLTOVETS, E., & DMITROVA, A. (2021). Digital literacy and its relevance to comparative education researchers. EURASIA Journal of Mathematics, Science and Technology Education, 17(11), em2004. https://doi.org/10.29333/ejmste/11458

19. CHRISTOPOULOS, A., SPRANGERS, P., & CHRISTOPOULOS, E. (2018). Supporting students in the process of learning: A review of current practices. Education and Information Technologies, 23(4), 1531–1553. https://doi.org/10.1007/s10639-017-9706-4

20. CHRISTOPOULOS, A., SPRANGERS, P., & CHRISTOPOULOS, E. (2021). Integration of educational technology during the Covid-19 pandemic: An analysis of teacher and student receptions. Cogent Education, 8(1), 1964690. https://doi.org/10.1080/2331186X.2021.1964690

21. CLARK, R. E. (1983). Reconsidering research on learning from media. Review of Educational Research, 53, 445–449.

22. DELAMARTER, C. W., & EWART, M. R. (2020). Responding to student teachers' fears: How we're adjusting during the COVID-19 shutdowns. Northwest Journal of Teacher Education, 15(1), Article 3. https://doi.org/10.15760/nwjte.2020. 15.1.3PDXScholar

23. ERTMER, P. A. (2015). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research and Development, 63(4), 617–635. https://doi.org/10.1007/s11423-015-9381-1

24. ERTMER, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. Educational Technology Research and Development, 47(4), 47–61. https://doi.org/10.1007/BF02299597

25. ERTMER, P. A. (2019). Teacher beliefs and technology integration: The role of teacher development programs in promoting effective ICT use. Journal of Research on Technology in Education, 51(2), 149-166. https://doi.org/10.1080/15391523.2019.1575161

26. ERTMER, P. A., & OTTENBREIT-LEFTWICH, A. T. (2020). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 52(1), 1–23. https://doi.org/10.1080/15391523.2019.1701948

27. ERTMER, P. A., & OTTENBREIT-LEFTWICH, A. T. (2020). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 52(1), 1–23. https://doi.org/10.1080/15391523.2019.1701948

28. ERTMER, P. A., & OTTENBREIT-LEFTWICH, A. T. (2020). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 52(1), 1–23. https://doi.org/10.1080/15391523.2019.1701948

29. FREEMAN, S., ET AL. (2014). Active learning increases student performance in science, engineering, and mathematics. Proceedings of the National Academy of Sciences, 111(23), 8410–8415

30. GÖKOĞLU, S., & ÇAKIROĞLU, Ü. (2017). A study on the effectiveness of mentoring on ICT integration: The case of the FATIH project. Education and Information Technologies, 22, 333–351. https://doi.org/10.1007/s10639-015-9456-9

31. GOKTAS, Y., YILDIRIM, S., & YILDIRIM, Z. (2015). The integration of ICT into education: A study on teachers' perceptions. Education and Information Technologies, 20(3), 553–570. https://doi.org/10.1007/s10639-014-9316-5

32. GORAKHNATH, S., & PADMANABHAN, A. (2017). Visual depiction of actual circumstances as a tool for teaching problem-solving techniques and fostering critical thinking. Journal of Education and Practice, 8(14), 45–50. Retrieved from https://www.iiste.org/Journals/index.php/JEP/article/view/38044

33. GURUNG, L. (2021). Experiences of online and distance learners of Nepali universities. Kathmandu University eLibrary. https://hdl.handle.net/20.500.14301/208

34. HADDAD, W. D., & DRAXLER, A. (2002). Technologies for education: Potentials, parameters, and prospects (p. 16). UNESCO and the Academy for Educational Development. https://unesdoc.unesco.org/ark:/48223/pf0000119129

35. HAMIDI, H., & CHAVOSHI, A. (2018). Analysis of the essential factors for the adoption of mobile learning in higher education: A case study of students of the University of Technology. Education
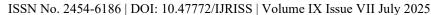
and Information Technologies, 23(1), 349–366. https://doi.org/10.1007/s10639-017-9611-HEINRICH, C. J., ADUANA, J. D., & MARTIN, C. (2020). The potential and prerequisites of effective tablet integration in rural Kenya. British Journal of Educational Technology, 51(2), 498–514. https://doi.org/10.1111/bjet.12870

36. HENNESSY, S., HARRISON, D., & WAMAKOTE, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. Itupale Online Journal of African Studies, 2, 39–54.

37. HERRMANN, B., & GALLO, J. (2020). Being kind to ourselves and our students in times of crisis. Western Teacher Education Journal, 15(1), Article 3. https://doi.org/10.15760/wte.2020.15.1.3ScholarWorks

38. HIGGINS, S., XIAO, Z., & KATSIPATAKI, M. (2015). The impact of digital technology on learning: A summary for the education endowment foundation. Durham University. https://educationendowmentfoundation.org.uk

39. HOWARD, S. K., TONDEUR, J., & MA, J. (2021). What to teach? Strategies for building digital competence in preservice teacher training. Australasian Journal of Educational Technology, 37(2), 1–15. https://doi.org/10.14742/ajet.6671

40. HSU, L., CHING, Y. H., & GRABOWSKI, B. L. (2020). Technology-mediated interaction in online learning environments: A systematic review. Computers & Education, 147, 103778. https://doi.org/10.1016/j.compedu.2019.103778

41. HSU, Y. S., & CHING, Y. H. (2018). Factors influencing teachers' adoption and integration of information and communication technology in teaching. Educational Technology & Society, 21(2), 1–14. https://www.jstor.org/stable/10.2307/26196018 https://doi.org/10.1016/j.compedu.2021.104198

42. HUSSAINI, R. A. (2023). The influence of Information and Communication Technology in the teaching and learning of Physics. International Journal of Learning, Teaching and Educational Research, 22(6), 98–120. [DOI or URL]

43. JOO, Y. J., LIM, K. Y., & KIM, N. H. (2016). The effects of secondary teachers' technostress on the intention to use technology in South Korea. Computers & Education, 95, 114–125. https://doi.org/10.1016/j.compedu.2015.12.004

44. KALPANA, T. (2014). A constructivist perspective on teaching and learning: a conceptual framework. International Research Journal of Social Sciences, 3(1), 27–29.

45. KARSENTI, T., COLLIN, S. HARPER-MERRETT, T. (2012). Pedagogical integration of ICT: successes and challenges from 100+ African Schools. IDRC. http://www.ernwaca.org/panaf/IMG/pdf/book-ict-pedagogical-integration-africa.pdf

46. KIMMONS, R., HALL, C., & GREENHALGH, S. (2018). The PICRAT model for technology integration in teacher preparation. Contemporary Issues in Technology and Teacher Education, 18(2), 1–17. https://citejournal.org/volume-18/issue-2-18/general/the-picrat-model-for-technology-integration-in-teacher-preparation

47. KÖNIG, J., JÄGER-BIELA, & GLUTSCH, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. European Journal of Teacher Education, 43(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

48. KUZEMBAYEVA, G., TAGANOVA, A. M., SPULBER, D., & MAYDANGALIEVA, Z. (2022). Teachers' perspectives on using information and communication technology in secondary school practice: A case study. Journal of Social Studies Education Research, 13(2), 1–22. https://doi.org/10.17499/jsser.2022.13.2.1

49. L-ALWAN, I. A., & AL-ROUSAN, M. (2016). Teachers' attitudes towards ICT adoption in education: A study of the use of ICT in Jordanian schools. International Journal of Emerging Technologies in Learning (iJET), 11(3), 34-42. https://doi.org/10.3991/ijet.v11i03.5202

50. LBION, P. R., TONDEUR, J., FORKOSH-BARUCH, A., & PEERAER, J. (2015). Teachers' professional development for ICT integration: Towards a reciprocal relationship between research and practice. Education and Information Technologies, 20(4), 655–673. https://doi.org/10.1007/s10639-015-9401-9

51. LEE, X., & XIONG, Y. (2021). Factors influencing teachers' technostress experienced in using emerging technology: A qualitative study. Journal of Educational Technology & Society, 24(4), 1–

12. https://www.jstor.org/stable/26926235ResearchGate+1Academia+1

52. Li, C., & Lalani, F. (2020). The COVID-19 pandemic has changed education forever. World Economic Forum. https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/

53. LLEGO, R. (2022). Resource availability and technological mindset on digital competence of long-serving teachers. International Journal of Research and Innovation in Social Science (IJRISS), 8(14), 334–345. Retrieved from https://rsisinternational.org/journals/ijriss/Digital-Library/volume-8-issue-14/334-345.pdf

54. LÓPEZ-MORTEO, M., GARCÍA-VALCÁRCEL, A., & SÁNCHEZ-MENA, A. (2021). The role of continuous professional development in teachers' attitudes toward ICT adoption. Computers & Education, 168, 104198.

55. MAHYOOB, M. (2021). Challenges of e-learning during the COVID-19 pandemic experienced by EFL learners.), 11(4), 351–362. https://doi.org/10.24093/awej/vol11no4.23

56. MARTIN, F., & DOWSON, M. (2019). Student engagement and learning outcomes in online and blended learning environments: A review of the literature. Education and Information Technologies, 24(5), 3125-3142. https://doi.org/10.1007/s10639-019-09819-

57. MIRALAO, V. (2020). Digital literacy competencies of Metro Manila public school teachers. Philippine Journal of Education, 99(1), 1–15. https://www.deped.gov.ph/2020/01/15/digital-literacy-competencies-of-metro-manila-public-school-teachers/

58. KANGUNDO SUB-COUNTY, MACHAKOS County. International Academic Journal of Law and Society, 1(2), 328–352. Retrieved from https://www.iajournals.org/articles/iajls_v1_i2_328_352.pdf

59. OECD. (2020). The Impact of COVID-19 on Education: Insights from Education at a Glance 2020. OECD Publishing. https://doi.org/10.1787/21908f64-en

60. NGUYEN, T., NETTO, C. L. M., WILKINS, J. F., BRÖKER, P., VARGAS, E. E., SEALFON, C. D., PUTHIPIROJ, P., LI, K., BOWLER, J. E., HINSON, H. R., & ROSSETTIE, A. J. (2020). Insights into students' experiences and perceptions of remote learning methods: From the COVID-19 pandemic to the future of education. Education Sciences, 10(8), 229. https://doi.org/10.3390/educsci10080229

61. PHILLIPS, M., & WEXLER, L. (2022). Veteran teachers as digital leaders: Supporting colleagues through change. Journal of Educational Change, 23(3), 423–440. https://doi.org/10.1007/s10833-021-09418-w

62. QI, C. (2019). The impact of technostress on the academic productivity of university students. Education and Information Technologies, 24(5), 2671–2688. https://doi.org/10.1007/s10639-019-09955-0SpringerLink+1ResearchGate+1

63. RAMOS, R. J. M., RAMOS, R. G. A., ESPALDON, R. N., OLAÑO, D. G. D., LARANANG, S. E., & BAUTISTA, R. G. (2021). Online education in the midst of COVID-19 pandemic: Evidence from the lenses of IT students. Turkish Online Journal of Qualitative Inquiry (TOJQI), 12(7), 5193–5201. https://doi.org/10.17569/tojqi.10748

64. ROUSOULI, L., KORDAKI, M., & KOMIS, V. (2020). Barriers to the use of information and communication technology (ICT) in secondary schools: Teachers' perspective. Education and Information Technologies, 25(2), 1075–1097. https://doi.org/10.1007/s10639-019-10326-7

65. SALMON, G. (2021). The future of learning: Navigating a digital shift. British Journal of Educational Technology, 52(2), 567–578. https://doi.org/10.1111/bjet.13095

66. SANG, G., VALCKE, M., VAN BRAAK, J., & TONDEUR, J. (2016). How teachers' educational beliefs and ICT attitudes influence their ICT integration: A structural equation model. British Journal of Educational Technology, 47(2), 235–247. https://doi.org/10.1111/bjet.12148

67. SCHERER, D., & TONDEUR, J. (2020). The importance of attitudes toward technology for pre-service teachers' technological pedagogical and content knowledge. Computers & Education, 148, 103798. https://doi.org/10.1016/j.compedu.2019.103798

68. SENER, M. K., & ERDOGAN, V. (2020). Barriers to technology integration in rural schools: A case study of rural teachers in Turkey. Education and Information Technologies, 25(4), 3001–3015. https://doi.org/10.1007/s10639-020-10480-4

69. SERDYUKOV, P. (2017). Innovation in education: What works, what doesn't, and what to do about

it. Journal of Research in Innovative Teaching & Learning, 10(1), 4–33. https://doi.org/10.1108/JRIT-10-2016-0007

70. SHIBANI, A., & BUCKINGHAM SHUM, S. (2024). AI-assisted writing in education: Ecosystem risks and mitigations. In Proceedings of the Third Workshop on Intelligent and Interactive Writing Assistants (In2Writing '24). https://arxiv.org/abs/2404.10281

71. SMITH, J., & JOHNSON, L. (2023). Teaching in the Digital Age: Lessons Learned from the COVID-19 Pandemic. International Journal of Educational Technology in Higher Education, 20(1), 1-15. https://doi.org/10.1186/s41239-023-00396-8

72. SMITH, M. D., & JOHNSON, R. (2023). The abundant university: Remaking higher education for a digital world. MIT Press. https://doi.org/10.7551/mitpress/11884.001.0001

73. SOLTOVETS, E., CHIGISHEVA, O., & DMITROVA, A. (2020). The role of mentoring in the digital literacy development of doctoral students at British universities. EURASIA Journal of Mathematics, Science and Technology Education, 16(4), em1839. https://doi.org/10.29333/ejmste/117782

74. SOLTOVETS, E., CHIGISHEVA, O., DUBOVER, D., & DMITROVA, A. (2021). Russian digital education landscape during the current pandemic: Is the impact felt? E3S Web of Conferences, 273, 12026. https://doi.org/10.1051/e3sconf/202127312026

75. STARKEY, L. (2020). A review of research exploring teacher preparation for the digital age. Cambridge Journal of Education, 50(1), 37–56. https://doi.org/10.1080/0305764X.2019.1625867

76. SUBRAMANI, S., & IYAPPAN, S. (2018). Innovative teaching strategies in the classroom: Role plays, simulations, problem-based learning, and portfolio development. International Journal of Research and Analytical Reviews, 5(4), 123–127. Retrieved from https://ijrar.org/papers/IJRAR19J1141.pdf

77. TEO, H. (2021). Barriers to using technology in rural schools: The challenges of professional development. International Journal of Educational Technology, 29(3), 245–258. https://doi.org/10.1016/j.ijet.2021.04.004

78. TEO, H. H. (2021). Factors influencing teachers' adoption of ICT: A meta-analysis. Computers & Education, 174, 104308. https://doi.org/10.1016/j.compedu. 2021.104308

79. TEO, H. H., LEE, C. S., & CHAI, C. S. (2019). Unpacking teachers' intentions to integrate technology: A meta-analysis. Computers & Education, 129, 1–13. https://doi.org/10.1016/j.compedu.2018.10.002ScienceDirect

80. TINIO, V. L. (2016). The role of information and communication technology (ICT) in education: A review of research. Proceedings of the International Conference on Education, 2016, 183–193. https://doi.org/10.2139/ssrn.2836171

81. TONDEUR, J., et al. (2017). Preparing teachers for the digital age: A systematic review of the literature on ICT integration. Computers & Education, 117, 121–135.

82. TONDEUR, J., VAN BRAAK, J., ERTMER, P. A., & OTTENBREIT-LEFTWICH, A. T. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of the literature. Educational Technology Research and Development, 65(3), 577–595. https://doi.org/10.1007/s11423-017-9521-8

83. TONDEUR, J., VAN BRAAK, J., ERTMER, P. A., & OTTENBREIT-LEFTWICH, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational Technology Research and Development, 65(3), 555–575. https://doi.org/10.1007/s11423-016-9481-2

84. TRUST, T., KRUTKA, D. G., & CARPENTER, J. P. (2020). Preparing future teachers for digital age classrooms: Examining their attitudes toward digital learning. TechTrends, 64(6), 856–867. https://doi.org/10.1007/s11528-020-00536-1

85. TSIOTAKIS, P., & JIMOYIANNIS, A. (2020). Teachers' ICT competencies and their integration in education: The importance of digital literacy in teaching practices. Educational Media International, 57(2), 89-104. https://doi.org/10.1080/09523987.2020.1750711

86. TZAFILKOU, K., PERIFANOU, M., & ECONOMIDES, A. A. (2022). Development and validation of students' digital competence scale (SDiCoS). International Journal of Educational Technology in Higher Education, 19(1), 30. https://doi.org/10.1186/s41239-022-00330-0ERIC+2CedTech+2SpringerOpen+2

87. UNESCO, (2012). ICT in primary education: Analytical survey. UNESCO Institute of Information Technologies in Education. https://unesdoc.unesco.org/ark:/ 48223/pf0000220212

88. UNESCO. (2022). ICT competency framework for teachers. United Nations Educational, Scientific and Cultural Organization. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000380936

89. VAJRAVELU, M., & MUHS, J. (2016). The impact of innovative teaching methods on student success. Journal of Innovative Education, 11(2), 145–158. Retrieved from https://files.eric.ed.gov/fulltext/EJ1105125.pdf

90. VENKATESH, V., MORRIS, M. G., & DAVIS, G. B. (2003). User acceptance of the information technology: towards a unified view. Management Information Systems Research Center, 27(3), 425–478. https://doi.org/10.2307/30036540

91. VOOGT, J., KNEZEK, G., COX, M., KNEZEK, D., & TEN BRUMMELHUIS, A. (2018). Under which conditions does ICT have a positive effect on teaching and learning? A call to action. Journal of Computer Assisted Learning, 34(4), 391-403. https://doi.org/10.1111/jcal.12279

92. VOOGT, J., KNEZEK, G., COX, M., KNEZEK, D., & TEN BRUMMELHUIS, A. (2017). Under which conditions does ICT have a positive effect on teaching and learning? A call to action. Journal of Computer Assisted Learning, 34(4), 391-403. https://doi.org/10.1111/jcal.12279

93. WAMBIRI, G., & NDANI, M. N. (2016). Kenya primary school teachers' preparation in ICT teaching: teacher beliefs, attitudes, self-efficacy, computer competence, and age. African Journal of Teacher Education, 5(1), 1–16. https://doi.org/10.21083/ajote.v5i1.3515

94. WANG, Q. (2008). A generic model for guiding the integration of ICT into teaching and learning. Innovations in Education and Teaching International, 45(4), 411–419. https://doi.org/10.1080/14703290802377307

95. ZHAO, Y., PUGH, K., & SHELDON, S. (2019). Conditions for classroom technology innovations. Educational Leadership, 77(5), 38–43. https://www.ascd.org/el/articles/conditions-for-classroom-technology-innovations

96. ZHAO, Y., PUGH, K., SHELDON, S., & BYERS, J. L. (2019). Conditions for classroom technology innovations. Teachers College Record, 121(4), 1-29.

97. ZHU, Y., & URHAHNE, D. (2018). The impact of technology on students' performance in mathematics. Research in Education and Learning Innovation Archives, 22(1), 1–16. https://doi.org/10.14201/reed.2018.e22