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Technology Integration in Teaching: Opportunities and Challenges for Secondary School Teachers in District Swat

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Abstract

Teaching strategies have transformed significantly in the past few decades because of technology integration. Teachers and students are now increasingly benefiting from these modern technologies such as Artificial Intelligence (AI) in their teaching learning process. The integration of these digital technologies is extremely crucial in today's world. Therefore, this study explores the experiences of teachers about the technology integration in teaching at secondary school level in District Swat of Khyber Pakhtunkhwa (KPK). Phenomenological research design was used in this study and data were collected through semi-structured interviews. Eight participants were selected through purposive sampling with varied subject background from different secondary Schools. The data obtained were transcribed for themes with Thematic Analysis technique. The prominent themes identified included enhanced content delivery through digital tools, subject-specific support via AI technologies, improved lesson planning, and extended learning beyond the classroom. Despite all these benefits, teachers are also faced with significant challenges to integrate technologies in teaching, such as poor internet connectivity, lack of digital resources, resistance to change, particularly among older teachers and inadequate professional training. The study offers awareness for educators, policymakers, and institutions seeking to support effective and equitable technology integration at secondary level.

Key Words

Technology Integration, Teaching, Challenges, Opportunities, Secondary School

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Introduction

Digital technology integration in teaching has transformed the teaching learning methodologies bringing drastic changes in the sphere of education (Alenezi et al., 2023; Hill & Hannafin, 2001). The year 2019 had been instrumental in utilizing digital tools in integrating technologies in education. With the Covid-19 pandemic outbreak globally, teachers around the world were forced to opt for digital technologies, helping in lesson planning, creating a learning situation (Guo & Lee, 2023), instructing (Díez-Pascual and Jurado-Sánchez, 2022), augmenting the emotional requirements of the students (Kaplan-Rakowski, 2021; Davis *et al.*, 2022), and growing teachers professionally (Kalman *et al.*, 2022). Numerous studies have emphasized the importance of technology-integrated

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teaching approaches in fulfilling the educational requirements of the students by increasing their attention and maintaining students motivated, which is regarded as a substantial factor for students' educational development (Xu et al., 2021). Technology integration in education is extremely important for multiple reasons. Firstly, it increases engagement and interaction in the teaching learning process, as students involve with concepts via diverse multimedia tools, they gain improved opportunities for deeper understanding, interactive simulations, and virtual environments (Mohebi, 2021). Today, evolving technologies such as artificial intelligence, virtual reality, and augmented reality offer the potential for even greater progress in education. Facilitating rich, personalized approaches to education that address the requirements of the individual needs and preferences of students (Rane et al., 2023). The fact that technology integration in teaching is vital for teaching learning process has long been recognized by teachers and education departments and therefore it is imperative for both teachers and students to stay informed with the most recent technological innovations in instructional practices to enhance their professional growth (Suyatno et al., 2023, Alneyadi, 2022; Venketsamy & Zijing, 2022). Teachers also find it much convenient to connect with their students within the institution or outside through various digital tools such as Facebook, WhatsApp, and google groups (Hodgson & Shah, 2017). Likewise, Ertmer & Ottenbreit-Leftwich (2020) identified that teachers incorporating technologies into the teaching process become more skillful at using them and their confidence increases with improvement in their pedagogical practices. This leads to a more interactive and engaging learning experience for the students.

Low technical awareness among many educators has been recognized as a significant obstacle in technology integration in teaching. Another standpoint advocates that professional enhancement programs, which do not allow the incorporation of technologies in teachers' training, have led to instructors' limited technical expertise in incorporating technology in their instructional practices (DeCoito, 2023; Starks & Reich, 2023).The integration of technology in teaching learning practices offers plentiful advantages. Firstly, technology boosts engagement and motivation by giving interactive and multimedia-rich learning experiences that attract students' attention and arouse their curiosity. Despite all the advantages, there are some challenges also to the integration of technology in teaching. One such barrier is the digital divide, which points to inequalities in access to technology and internet connectivity across various segments of the population (Reddick et al., 2020). Tusiime et al. (2020), in their study found that the main challenges to the integration of technologies in education were school characteristics and teacher factors. The biggest challenge identified was instructors' negative attitudes toward technology incorporation in teaching. Lack of digital tools, inadequate training for teachers to use these tools, and absence of institutional rules on the use of technologies in teaching was among the institutional features that hindered the integration of technologies in teaching and learning activities. Besides these factors, Lack of confidence, teacher readiness, and technical expertise in the use of digital technologies were among the variables affecting the teachers' aptitude for integration of technologies in teaching. Students from poor families and backward areas may find obstacles regarding accessing devices and internet connectivity, restricting their capacity to fully join the digital learning experiences. Furthermore, integrating technology into teaching requires new skills, and some educators may struggle with the transition, feeling inadequately prepared or supported. (Schuessler, 2020). The benefits of integrating technology in education clearly surpass its drawbacks. Therefore, it is important for educators and policymakers to actively remove these barriers and foster more comprehensive and better learning environments through careful implementation (Miao et al., 2021).

Before the advent of these technologies, it was extremely difficult for teachers and academicians to get the required information according to their teaching learning needs. But since the introduction of these technologies, it has become extremely easy for teachers to benefit from these technologies and refine their teaching learning practices. Despite the widespread availability and use of these technologies, there are still challenges which are hindering the integration of these technologies in teaching. The aim of this study is to investigate the experiences

of teachers about the integration of technologies in teaching and the challenges and obstacles which restrict the incorporation of these technologies in teaching.

Significance of the Study

The study carries significance for teachers, students as well as for the policy makers. Teachers can utilize these digital technologies in their lesson planning and during classroom instruction. It makes information access extremely easy for teachers in any subject. They widen their sphere of knowledge and give them relevant information in preparation of their lecture. Integrating these technologies in teaching, teachers can present complex concepts in a very easy way. Students learning is also augmented by the integration of these digital technologies because they not only provide them in-depth information of the contents but also can provide them visual image of the abstract ideas. For policy makers, insight about importance of technology integration in teaching provides them a guideline to include these tools in the educational policies and ensure their availability in every school.

Objectives of the Study

1. To investigate teachers' experiences of technology integration in teaching.
2. To find out the challenges faced by teachers in the integration of technology in teaching.

Research Questions

The study is guided by the following research question:

1. What are teachers' experiences of technology integration in teaching?
2. What are the challenges faced by teachers in integrating technology into their instruction?

Methodology

This study utilized Qualitative Phenomenological research design to obtain a thorough understanding of the teachers' experiences of technology integration in teaching and the challenges that teachers faced at secondary level. Qualitative research tries to explore the deeper meanings of human experience by using data collection methods such as interviews, text analysis, observations, allowing researchers to see events from different angles (Muktaf, 2016). Qualitative research studies events from a subjective perspective, emphasizing on their interpretation and understanding with a specific mention of the participants and the context in which the study takes place.

Phenomenology is a type of Qualitative research that aims to uncover the subjective meanings that individuals assign to specific experiences. It does not try to find explanations or general theories about a phenomenon but how individuals feel and interpret it. In depth interviews and reflections are used to understand the basic human experience in a particular context (Tumangkeng & Maramis, 2022). Teachers in this study described their experiences about technology integration in teaching in detail with in-depth personal reflection.

Data Collection

Semi structured interviews were used for data collection to find the teachers' experiences with integration of technology in teaching and the challenges they faced. The participants' interviews were audio recorded. The participants were given complete information about the nature of the topic to extract maximum information from them.

Participants

Eight participants with varying educational and technological backgrounds were selected through purposive

sampling from various secondary schools in swat to ensure diversity in teachers' interaction with technology and its integration in teaching learning process.

Data Analysis and Interpretation

Data collection and analysis in qualitative research is a difficult job as the data obtained does not have any apparent themes. It is the researcher's job to sort out the themes from the qualitative data so that it makes sense. To get insightful information, the data was coded, transcribed and categorized. According to Ngulube (2015), qualitative data analysis deals with transforming primary data by identifying and organizing patterns, themes, and categories through techniques like, coding, mapping, exploring and describing patterns, trends, themes and categories in the unprocessed data, with the goal of interpreting and uncovering their underlying meanings. The teachers were coded fromT1 to T8. The data obtained from the interviews was transcribed and important themes were identified through thematic analysis. Some prominent themes from the interviews include.

Benefits of Technology Integration in Teaching

Improved Teaching of the Content

Some of the teachers highlighted that the use of digital tools like, YouTube, ChatGPT and Google have significantly improved the delivery of the teaching content, making teaching more interactive and increasing students' engagement. These tools have the capacity to present content in visually to improve students' comprehension.

For instance, according to participant T:
"I use YouTube as a visual tool which extensi b vely benefits me to provide my students with a concrete idea of the abstract concepts. This creates an environment in the class that is more engaging and interesting for students".

This statement highlights the shift from traditional teaching methods to multimedia-based teaching. Before these technologies, it was difficult for the teacher to provide a visual image of the delivered contents. But now it has become so easy now to provide such an experience and make the class more engaging.

Another participant "T8", shared the same views:
"While using various technologies in teaching, I have noticed that these tools have made my lectures unique but have also increased the curiosity and focus of my students."

Here the participant emphasizes that integration of technologies in teaching increases the focus and curiosity of the students. Maintaining the focus and curiosity of students in traditional lecture method is a great challenge for not being as interesting as technology integrated teaching is.

Fulfilling the Subject Specific Needs of Teachers with the use AI and other Digital Technologies

Teachers, teaching various subjects integrate technologies in teaching according to their specific needs. From the teachers' perspective, AI has become a major technology tool that is providing them personalized support in finding the most relevant content for their lectures. It has become one of the biggest platforms that provides them accurate information and is increasing their understanding in subjects such as English and Physics. The following participants support this current theme of AI, providing them Subject-specific content.

"In my view, Chat gpt is the most important tool that I use for getting information on any topic even in the subject of Pashto. There is no language barrier now as Chat gpt can support and understand any language (T1 Pashto teacher)."

The statement of this participant indicates that AI not only fulfills the subject specific needs but also has the capacity to overcome the linguistic barrier by providing the most relevant and to the point information in almost any language.

Another participant "T2" who teaches English is of the view that:
" I am highly interested in using AI tools such as Chat gpt and Deep Seek in creating my lecture and during teaching since their introduction. These tools are useful for me to carry out different English Grammar activities in class. It is so easy for me now to create relevant content in no time. With the use of these digital tools, the accuracy of contents such as Grammar, contextual use of words and sentences and pronunciation has been drastically improved."

The views of participant T2 give an idea that through traditional teaching, it is difficult to give students accurate grammatical and contextual information of vocabulary and sentences as well as accurate pronunciations. But now these barriers have been overcome with the advent of these technologies.

Participant "T4" who teaches Physics is of the opinion:
"I benefit from AI (chat gpt) for clear mental depiction of the physics concepts and Google search, YouTube for pictures and videos, which provides me a better visual understanding of the various phenomenon in Physics."

Science subjects, especially Physics poses great difficulty to the students in understanding. But now with these technologies, we can teach its concepts to students through computer simulations, increasing their understanding manifold. Even AI has the capacity to solve Physics problems.

Participant T5, who teaches Chemistry is of the opinion:
"Since the beginning of AI, I am frequently using Chat gpt for improving my understanding of the abstract concepts of Chemistry."

This participant views that he faced a lot of trouble finding the relevant content on the issues in Chemistry, searching them on Google search and YouTube. It was also very time-consuming job. But now with the introduction of AI, such as Chat gpt, I receive the most relevant and to the point answers to my questions.

Use of Digital Technologies for Lesson Planning

Digital technologies have significantly improved the performance of teachers in lesson planning and classroom activities designing. This reduces the workload and burnout of the teachers and improves their quality of teaching.

According to participant T6:
"I use digital technologies such as Chat gpt and Deep Seek for lesson planning and classroom activities. I use these technologies for generating lesson ideas, worksheets and explanations."
This highlights the importance of these AI tools in terms of saving the time and energies of teachers to create lesson planes, worksheets and new lesson ideas.

Another participant T7 was of the opinion:
"All the AI digital tools have the capacity to summarize the whole text and provide it in a nutshell, which makes it very easy for teachers to understand the content."

The Text-Books do not provide sufficient explanation and are mostly not written in a clear easy manner to be understood. So, providing image of the content from the Text-Book to the AI tool such as Chat gpt will summarize it into easier and comprehensible writing with more explanation. This saves a great deal of the teachers' time.

Learning Beyond the Classroom

Teachers use digital platforms to record lectures which can be used beyond classrooms for teaching learning process. These are especially helpful for the students who miss classes.

Participant T8, describes his experience in this way.

"I record my presentation, then upload it on YouTube and Facebook so that those students who are absent watch the lecture later on. So, this benefits both students and teacher."

This is how asynchronous learning is supported by the digital technologies, widening access of the students having attendance issues.

Another participant T6 is of the opinion:
"I use Google Classroom for assignments and discussions and AI powered tools such as I.AI to improve students' speaking skills."

This merging of traditional and digital pedagogies represents a blended learning approach which enhances students' participation.

Variation in Digital tools to Provide Easy and in-depth Insight beyond the Limited Bookish Information for Teachers

There is not just one tool that can assist teachers in their lesson planning. Plethora of such digital tools are available online which have the capacity to transform teaching learning process by providing detailed information of topics in a simple manner.

Participant T7 points out that:
"I myself utilize google search for creating my lecture because the textbook does not provide enough information and guidance. Sometimes I search topics in YouTube because teachers and subject experts from around the world explain the topics very efficiently and in a simple manner. I would recommend YouTube to teachers and students to improve their knowledge of various topics. In the AI technologies, I personally use Gauth and Gemini because of being user friendly and simple to operate".

Challenges in the Integration of Technology

Poor Internet Connectivity and High Costs of Packages

The most common barrier in the way of digital technologies integration in teaching cited by the participants was the Internet connectivity issue. Expensive internet packages was another prominent issue that that the participant highlighted.

Participant T7 in this regard views that:
"Among the most important challenges, internet connectivity is the biggest obstacle faced by the teachers in the integration of technologies in teaching. Besides this, lack of resources, lack of proper teachers' training on use of technologies are among the biggest challenges.

This suggests that even if teachers want to benefit from digital technologies to improve their teaching practices, internet connectivity and infrastructural deficiency do not allow this to happen.

Participant T8 shares the same views to augment this theme:
"The challenges faced in the integration of technologies in teaching in my personal view are, poor internet connectivity and lack of teachers' motivation in using technologies."

Along with internet connectivity, Participant T8 also mentions that lack of teachers' motivation is also one of the leading obstacles in the way of technology integration in teaching.

Non-availability of Digital Resources

Many teachers complained about the unavailability of digital resources in classrooms which plays a vital role for

the integration of technologies in teaching.

Participant T3 highlights that:
"There are no digital tools provided in classes for aiding us in delivering our lecture, such as multimedia, Smart Tv Screens or laptops. I personally use my mobile phone as a visual tool during the class, though it is too small for the whole class to be clearly visible and audible.

This illustrates the scarcity of technological recourses for classroom use.

Teachers' Resistance to Adapt Technologies

Some teachers, especially from older generations, show resistance due to lack of familiarity or belief in traditional methods. Teachers from older generations are resistant to technology adaptation in teaching. They stick to the old traditional teaching methods.

According to Participant T3,
" The new generation is more inclined towards using these technologies and also have better technological background while the older generation doesn't have higher tendency of integrating these technologies in teaching. Older generation mostly prefer traditional teaching methods for teaching. Negative attitude of these teachers towards technology and lack of technical expertise to use these tools are the biggest reasons for not integrating technologies in teaching".

This highlights the need for imparting technical training and also a mindset shift to adapting technologies in teaching.

Lack of Professional Training

A key barrier was the absence of professional development programs or institutional support to equip teachers with the necessary digital skills.

Participant T5 was of the opinion:
"Poor internet connectivity, teachers' negative attitude towards technology, lack of digital facilities and training or expertise are the main causes for non-integration of digital technologies in teaching ".

This points to lack of proper technical training and facilities for teachers.

According to Participant T6:
"There is a lack of awareness in some teachers about the utilization of digital tools as well as lack of any training and facilities".

This indicates that teachers struggle in the utilization of digital technologies in teaching.

Limitations of AI Tools

While the role of AI is undeniable in the improvement of teaching, its use is not free from discrepancies.

Participant T7 points out that:
"But there are some shortcomings of AI also because I have found that sometimes AI does not give you a correct response. So, AI must be used cautiously."

This means that we should verify the content we search on AI tools because it can be misleading sometimes.

Discussions

Teaching methodologies have transformed around the world due to enormous developments in digital technologies. These digital technologies have made it extremely easy for the teachers to acquire the relevant

information and prepare their lectures. This has not only saved their time but have also helped teachers impart the most refined and accurate knowledge to their students. Preparation is crucial to leverage the benefits of technological change, realizing its potential to spur innovations. In order to benefit from technological innovations in education, it is imperative to equip teachers with the latest digital advancements. In the educational institutions, it creates networks among instructors and students in a revolutionary way, leading to extensive fundamental change even in the modes of the pedagogical practices. It updates teaching-learning approaches by encouraging collaboration, equity and decreasing accessibility gaps. Technology integration also improves learning experiences that best fit to the needs of the learners (ukiarlsen et al., 2016).

Besides this, understanding of the students has increased due to the fact that these tools can be used as audio-visual aids. The rise of Artificial intelligence (AI) has made it much simpler for the teachers to get the required information and integrate it into their lecture. AI tools like Chat gpt, Deep seek, Gemini, Gauth and many more are extremely precious tools at the disposal of teachers which provide them quick information on any topic that suit their needs. These tools can provide the required information at any depth according to the level of students. Text-Books do not provide sufficient information and sometimes the content is much complex to be understood by the teachers. This issue has been resolved by the Digital tools, especially AI tools.

In addition to AI, Visual tools such as YouTube have been instrumental in providing students with a real-world experience of the content taught. According to cognitive theory of Multimedia learning, for deeper learning to take place, information may be presented in both text and graphics (Moreno & Mayer, 1999).

Likewise, Mayer 2002, points out that, information system in humans consists of visual, verbal depictions and prior knowledge. Images are processed in graphic and pictorial networks and verbal words are treated in auditory and verbal network. Visual and symbolic channel are accountable for the processing of written material which then transfers to the auditory and verbal channel.

This has also led to lower teachers' burnout and greater efficiency. The teachers' own knowledge base has also been improved. Previously there were little resources available to teachers to improve their knowledge of the topics taught to the students. Even if available, they could not fulfill all of their needs. Now they can search the same topic on different digital platforms and can verify and validate the authenticity of the content. This not only refines their own knowledge but also help them convey the most accurate knowledge to their students.

Using digital tools, teachers can also deliver the content to the students online at any time. This has facilitated learning beyond classroom. Students and teachers' WhatsApp groups provides a connection between students and teachers. Teachers can share their lectures and home assignments in these groups. Even YouTube Channels created by teachers can be utilized for this purpose. Students can access these channels online at any time and understand different concepts.

Apart from all the advantages, there are many challenges also regarding the integration of technologies in teaching. These barriers hesitate teachers from using technologies in their teaching. The biggest challenges posed to teachers are poor internet connectivity, expensive internet packages, lack of teachers' technical skills and facilities in schools. Historically, factors, such as the availability of technological tools and technical support are considered 'first-order factors'. These factors are regarded as the main barriers to technology integration. These factors are no longer considered as major barriers in many countries and their significance has decreased in recent times (Ertmer et al., 2012). Teacher-related issues, described as 'second-order' barriers, play a vital part in technology use. These include, teachers' beliefs, such as their attitudes and perceptions about the role and importance of technology, are seen as critical emotional barriers to academic transformation (Ertmer & Ottenbreit-Leftwich, 2013; Kim et al., 2013).

Conclusion

The findings from this study discovered that integration of technology in teaching has been instrumental in the teachers' preparation for class, improving his conceptual understanding, effective classroom delivery, students' classroom engagement and understanding, online delivery of contents. But despite all these advantages, there are still barriers to integration of technology in teaching such as poor internet connectivity, teachers' lake of technical skill to utilize these tools, their attitude to not integrate technologies in teaching and lack of facilities in schools. For effective integration of technologies in teaching, provision of facilities, teachers training and fast internet connectivity must be ensured.

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