Journal for Social Science Archives

Online ISSN: 3006-3310
Print ISSN: 3006-3302
Volume 3, Number 2, 2025, Pages 258 – 277
Journal Home Page
https://jssarchives.com/index.php/Journal/about

Effects of ICT on Teaching and Learning Environment at Secondary School Level: A Secondary School Head Teachers' Perspective

Dr. Muhammad Aqeel Raza[1], Najam Abbas[2] & Fayyaz Ahmad[3]

[1]*Associate Professor, NCBA & E Sub Campus Multan, Email: razaaqeel06@gmail.com*
[2]*M.Phil Scholar, NCBA & E Sub Campus Multan, Email: najam3397@gmail.com*
[3]*M.Phil Scholar, NCBA & E Sub Campus Multan, Email: fa167715@gmail.com*

ARTICLE INFO

Article History:

Received:	*February*	*28, 2025*
Revised:	*April*	*18, 2025*
Accepted:	*April*	*26, 2025*
Available Online:	*April*	*30, 2025*

Keywords:

Learning Environment, ICT, Teacher's Perspective

Corresponding Author:
Dr. Muhammad Aqeel Raza
Email:
razaaqeel06@gmail.com

ABSTRACT

The current research study investigates the effect of Information and Communication Technology (ICT) on the teaching and learning environment at the secondary school level with respect to head teacher perspective. The main objectives of the study were to explore the use of ICT in daily life and to highlight its role in the teaching and learning process. The design of study was survey type and quantitative in nature. The population consisted of 201 high school head teachers. A sample of 133 Head teachers was selected for the study. The self-developed research instrument i.e., Likert scale was physically delivered to respondents to collect data. Data was analyzed by using both descriptive statistics (frequency, percent, mean, and standard deviation) and inferential statistics (T-test and ANOVA). The findings revealed a strong positive impact of ICT on the teaching and learning environment. ICT was found to enhance the effectiveness of teaching methods and improve student engagement and learning outcomes. Findings of the study identified the need for more resources and training to help head teachers effectively use ICT in the classroom at high school levels. Head teachers who wish to improve their ICT teaching skills should be provided with further support and professional development opportunities. Further studies in this domain should be qualitative and at college and university level.

Introduction

Learning is considered permanent change that is brought about into students by the teachers by using advanced techniques to develop specific skills, their attitudes, specific scientific laws. Pedagogical process is defined as transfer of knowledge from teachers to students. This process involves the integration of several elements overall including determination of learning goals,

plans instructional approaches and to implement them to attain the intended learning objectives (Fayyaz et al., 2025).

Process of learning is continuous that happens inside the classroom as well as outside school we gain knowledge from social interactions and experiences. Education plays a crucial role in personality development and to have positive impact on society. Keep in mind that education plays more important role than books when you are learning new contents, asking questions, and trying to develop into accomplished person. During the last several decades, ICTs development has increased. (Frydrochov-Klimova & Poulova, 2014).The term "environment" is about external factors that considerably influence school management and performance of student including the competent teachers' influence, libraries usage, literature sources and the tools and apparatus that are used in laboratories (Wechsler et al., 2000).

ICT usage encourages active learning and cooperation among students. Usage of Google Classroom, Zoom and other learning management systems make real time interactions among students and peers and teachers. As a result of this improved interaction not only develops teamwork but also promotes critical thinking (C.T) and problem-solving skills (Zhang & Aikman, 2020). The usage of multimedia in lessons such as videos makes learning more appealing and helps students to grasp multifaceted concepts in effective manner. Subsequently, ICT usage creates a more active and cooperative environment in classrooms (Alharbi, 2014).

ICT has become a transformative agent in contemporary education especially influencing the teaching and learning environment to large extent. The ICT tools such as computers, smart-boards and educational software's are integrated to enhance teaching process as well as student commitment. Research shows that use of ICT increases the efficacy and usefulness of teaching by using different methods to present information and to enabling teachers to adapt instruction to individual learning styles (Lawrence & Tar, 2018).

Integration of technologies like ICTs in education especially at the university level, the process of learning has become more vibrant. Utilization of innovative and creative methods plays important role to share information and to shift teaching and learning process from teacher-centered to student-centered (Lawal & Olawale, 2020).The incorporation of interactive classrooms, engagement, collaborative and creative learning are some examples of the ICTs strategies (Siddiquah & Salim, 2017).Everywhere around the globe governments have started to integrate ICTs at all levels of education. Several nations equipped their institutions with the newest technology including multimedia, printers, scanners, computers, Internet access and laptops and smartphones. ICT usage by the students can increase their motivation, interest and involvement to teach effectively (Pavel et al., 2015).

Computer based communication usage into the teaching and learning process in the classroom is known as information, communication, and technology (ICT) integration in education. In order to prepare students for contemporary digital world, role of teachers is considered as facilitator to ICT usage in the classroom. ICT allows teaching and learning to take place in an appealing and active environment (Arnseth & Hatlevik, 2010).

ICT usage was found to improve the efficiency of teaching methods and increase student engagement and learning's. The study revealed that there is need of more resources and to train teachers how to use effectively ICTs in the classroom. Teachers who want to increase their teaching skills should be provided with full support and professional development opportunities. It

is also recommended to conduct further studies in this domain should be at graduate level (Najam et al., 2025).

Technology driven approach in teaching and learning is ICT integration in field of education in classrooms is known as ICT integration. All Schools should integrate ICTs in the classroom, as a result students can learn more effectively in a technologically advanced environment. This is due to the fact that integrating technology into education meaningfully increases the instructional features, leading to active learning through the use of ICT elements and components (Jamieson-Procter et al., 2013).

The rapid advancement in learning technology in the late 20th century has brought about many changes in the field of education. This all is due to latest technology that has capability to create such an environment that is practical and comprehensive for teaching and learning. Now-a-days, all over the world education ministries are providing a mass of resources and training to enhance the use of leading-edge technology in the teaching and learning process in educational institutions. Educational ministries allocated a huge budget to provide instructors with ICT tools necessary to increase the learning outcomes. Many countries are facing with similar problems; teachers are not using the technology in effective manner (Nakayima, 2011).

Many researchers have investigated that many factors can affect ICT usage in the classrooms by the teachers (Capan, 2012; Zhao, 2013). It is showed that teachers are primary barrier to implement ICTs in classrooms because they are responsible for change in teaching and learning process. Educators' role is becoming more important in using ICT in teaching to increase student accomplishment and to encourage critical thinking and creativity (Cassim & Obono, 2011)

The present generation is considered as digitally active. Higher expectations are attached with younger students to use ICT in the classroom. Research studies unveiled that human self-perceptions capability can determine ICTs integration. Both teachers and students should use ICT in the classrooms as well as outside classrooms. The findings revealed that ICT integration into classrooms can be reduced by factors like inefficiency and lack of skills in teachers (Chien et al., 2014).

Integration of ICTs in the classroom may increase students' cognitive skills as well as their motivation. If a teacher doesn't describe, students can recall the events of the description in their minds (Suryani, 2010). Usage of ICTs can encourage students to learn and to avoid them being boring. Students can work in partnership with teachers and other fellows. The student's performance at schools and universities can be improved with the usage of ICTs (Lavoie, 2008).

ICT has profoundly impacted the teaching and learning environment, offering both opportunities and challenges. While technology has the potential to enhance learning outcomes and increase access to education, its successful implementation depends on addressing issues such as the digital divide, teacher training, and infrastructure. As education systems continue to evolve, the role of ICT in education will only become more significant, requiring ongoing research and policy interventions to maximize its benefits (Mayer, 2022).

The COVID-19 pandemic further highlighted the significance of ICT in education. During the global lockdowns, schools and universities had to transition to online learning almost overnight, relying heavily on ICT to ensure the continuity of education. This shift accelerated the adoption of digital tools, but it also exposed existing gaps in infrastructure and digital literacy (Pokhrel & Chhetri, 2021). Research conducted during the pandemic underscores the importance of ICT in

ensuring the resilience of education systems in times of crisis. However, the pandemic also revealed that successful integration of ICT requires not only technological infrastructure but also support systems for students and teachers (Czerniewicz et al., 2020).

Information and Communication Technology (ICT) has become an integral part of modern education, transforming traditional teaching and learning environments. The use of ICT tools has been shown to enhance learning experiences by making them more interactive, accessible, and personalized (Selwyn, 2019). This shift has allowed educators to implement innovative pedagogies that cater to diverse learning needs, thereby fostering a more inclusive learning environment. Recent studies indicate that the integration of ICT in classrooms has led to improved student engagement and motivation, as technology facilitates active learning through simulations, multimedia resources, and online collaboration (Jimoyiannis, 2020). The use of digital tools has also made education more accessible, breaking down geographical barriers and allowing students to access educational resources from anywhere (Nouri et al., 2020).

Students use ICT to find new things to study, to solve difficulties, and to help solve other problems they encounter while learning. When students actively participate in the use of ICT, they gain a deeper understanding of concepts in learning domains, making knowledge acquisition more accessible (Brush, 2008). Now-a-days, young generation is increasingly using computers for educational purposes. They use the latest technologies to create new knowledge. They use ICTs to locate, sort, analyze and to interpret facts and information. By usage of ICTs, students are now able to gain information and data from numerous sources and they can also evaluate the quality of the learning materials (Castro et al., 2011; Afaq et al., 2022).

Despite its benefits, the integration of ICT in education comes with its own set of challenges. One major issue is the digital divide, where unequal access to technology creates disparities in learning opportunities. This divide is particularly prevalent in low-income regions, where students and teachers may lack the necessary resources to fully engage with ICT (Zhong, 2021). Moreover, while ICT can enhance learning, it also requires teachers to develop new skills and adapt their teaching. Professional development programs for teachers are critical in this regard, as they help educators become proficient in using technology effectively in their classrooms. Without adequate training, the potential benefits of ICT in education may not be fully realized (Kim et al., 2021).

Objectives of the study

The main objectives of research study were

1. To study high school head teachers' usage of ICTs in daily life.
2. To highlight high school head teachers' usage of ICTs in Teaching and Learning environment.
3. To investigate the role of Information and Communication Technology in the teaching and learning Environment.

Significance of the Study

Head Teachers can learn about impact of usage of ICTs in their schools from this study. It provides information how to improve teaching methods, engaging lessons, and overcoming technology integration issues. From this research, students can get benefit. It helps students to learn digital skills to get education. The usage of ICTs helps to create a learning environment that is beneficial to students.

This research study informs policy makers about influence of ICTs on education and helps them to create policies that ensure access of learning technologies at all schools. This research study may help policymakers to address issues to implement ICTs and may help to create technologically advanced school system. This research study may help curriculum developers to integrate technology into curriculum in educational institutions. The research may be helpful to build relevant and latest content according to needs of contemporary world.

This research study may improve head teacher leadership skills. It helps head teachers to enhance quality education. With help of ICT, head teachers may improve ICTs skills of their teachers and possibilities by aligning training programs with this research. This report provides a comprehensive guide for head teachers, teachers, students, politicians, curriculum developers, and training institutions to improve education in Pakistan.

Research Methodology

The survey type quantitative research design was used and data was collected through questionnaire. The population of the research study was the high school head teachers in District Jhang working. The size of populaton was 201 secondary school teachers.

Table 1: Population of the study

Sr.No	Tehsil	High Schools		Head Teachers		Total
		M	F	M	F	H.Ts
1	18-Hazari	13	9	13	9	22
2	Ahmed pur sial	14	11	14	11	25
3	Jhang	65	50	65	50	115
4	Shor kot	22	17	22	17	39
	Total	114	87	114	87	201

M= Male, F= Female, High School H.Ts= Head Teachers,

Source https://sis.punjab.gov.pk/

Raosoft calculator was used to calculate sample size. A Sample of 133 high school head teachers was selected by using Simple random sampling technique. The research instrument i.e., Likert scale was created according to objectives of the research study and used to collect the necessary data from respondents. At initial stage 85 items were written. After consultation with experts and supervisor only Fifty (50) items were finalized for research tool.

The researcher got 20 questionnaires from head teachers. Reliability was calculated based on data collected. By using SPSS software, the research instrument reliability relevant to the study objectives was assessed. The value of Cronbach Alpha found out was 0.925.

Table 2: Reliability value of Questionnaire

Sr.No	No of Items	Cronbach's Alpha value
1.	50.0	0.92

Data was collected from high school head teachers serving in government high scools located in District Jhang with the help of self-made questionnaire. Data was collected with the from head

teacher of secondary schools in hard form. Data was collected from respondents in 1.5 month duration.

Data Analysis

Both descriptive statistics (frequency, percent, mean, and standard deviation) and inferential statistics (T-test and ANOVA) were used to analyze the data.

Descriptive Statistics

Table 3: The Use of ICTs in Daily Life

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
1	I regularly use social media platforms like Facebook for communication and networking.	24 18.0	59 44.4	9 6.8	31 23.3	10 7.5	3.42	1.23
2	YouTube is internet source of information and entertainment for me.	36 27.1	55 41.4	9 6.8	24 18.0	9 6.8	3.63	1.24
3	Whatsapp serve as my main communication channels with friends.	31 23.3	59 44.4	12 9.0	22 16.5	9 6.8	3.60	1.20
4	I frequently use online banking services for managing my finance.	9 6.8	45 33.8	8 6.0	55 41.4	16 12.0	2.81	1.21
5	Association of online work has become a routine aspect of my job.	16 12.0	50 37.6	11 8.3	44 33.1	12 9.0	3.10	1.24
6	I rely on GPS navigation apps like Google Maps or Waze for traveling and directions.	8 6.0	18 13.5	12 9.0	45 33.8	50 37.6	2.16	1.23
7	Virtual meeting platforms (e.g., Zoom, Microsoft Teams) have replaced in-person meetings for me.	6 4.5	28 21.1	22 16.5	52 39.1	25 18.8	2.53	1.15
8	The internet is essential in my daily life for communication, entertainment, research and productivity.	19 14.3	58 43.6	12 9.0	34 25.6	10 7.5	3.31	1.21
9	ICT greatly boosts productivity and efficiency in daily tasks, showcasing their pivotal role in modern life.	21 15.8	54 40.6	9 6.8	33 24.8	16 12.0	3.23	1.31

Table 3 shows data about how head teachers use information and communication technologies in their daily lives. Each statement is rated on a scale of strongly agree to strongly disagree. The results are broken down into the following categories:

First, 44.4% agree with the statement that social media sites like Facebook are used regularly for networking and communication. This statement is moderately accepted by the majority of respondents, as indicated by a mean score of 3.42 and a standard deviation of 1.23. It is clear that social media, while a popular tool among many teachers and headteachers, is not viewed in the same way by all.

In the second question, 41.4% agreed that YouTube was a great source for information and entertainment. A score of 3.63 with a standard deviation of 1.24 reflects a positive opinion of YouTube. It is clear that the headteachers find YouTube to be useful both for gathering information and for entertainment. However, there are differences in their perceptions of how important it is for them.

In the third statement, 44.4% agree that WhatsApp serves as their primary communication tool with friends. The average score is 3.60, with a standard deviation around 1.20. This reflects an overall positive view of WhatsApp. While many teachers regularly use WhatsApp, others may prefer to use another method of communication.

In the case of online banking, there is a mean score lower than 2.81. 41.4% disagree that they use it frequently. The lower score indicates that online banking does not play a large role in the daily lives of these teachers. The fifth statement, that online work was a regular part of their jobs, had a median score of 3,10, which indicates mixed feelings about how important online work really is.

Other ICT tools have been used in different ways. GPS navigation apps have a score that is lower than the average, 2.16. Virtual meeting platforms score 2.53, which indicates they are not used as often to replace face-to-face meetings. A mean score of 3.31 was given to the statement that the internet is essential for daily life. This reflects a moderate level of belief about its importance in communication, entertainment, and research. The statement that IT can boost productivity and efficiency received a score of 3.23. This indicates a moderate agreement with the importance of ICT for daily tasks.

Table 3 shows how head teachers are using a wide range of ICTs. Social media, YouTube, and WhatsApp have greater importance in daily life than online banking, GPS, and virtual meetings. Although there's a general consensus on ICT being useful for daily tasks, data shows that the degree to which they are used varies.

Table 4: Use of ICTs in Teaching and Learning Process (Part -A)

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
10	Technology helps me stay organized and manage my classroom in better way.	24 18.0	56 42.1	10 7.5	33 24.8	10 7.5	3.38	1.24
11	ICTs assist me in differentiating instruction to meet diverse student	34	54	10	25	10	3.57	1.26

	needs.	25.6	40.6	7.5	18.8	7.5		
12	I feel more professional when I integrate ICTs into my teaching.	19	63	10	31	10	3.37	1.20
		14.3	47.3	7.5	23.3	7.5		
13	I use ICT tools to enhance my teaching methods.	14	54	12	43	10	3.14	1.20
		10.5	40.6	9.0	32.3	7.5		
14	I feel confident using various ICT tools in my teaching.	19	62	13	29	10	3.38	1.19
		14.3	46.6	9.8	21.8	7.5		
15	ICTs help me create more engaging and interactive lessons for my students.	35	56	10	23	9	3.63	1.23
		26.3	42.1	7.5	17.3	6.8		
16	I use educational software to track students' progress.	7	34	10	58	24	2.56	1.20
		5.3	25.6	7.5	43.6	18.0		
17	I use online resources to prepare my lesson plans.	20	59	15	28	11	3.36	1.20
		15.0	44.4	11.3	21.1	8.3		
18	ICTs help me collaborate with other teachers and share resources.	18	59	17	29	10	3.34	1.18
		13.5	44.4	12.8	21.8	7.5		

Table 4 gives an insight into the perceptions of head teachers regarding the role of information and communication technologies in teaching and learning. Responses are measured using a Likert scale from strongly agree to strongly disagree. The table below helps to understand the integration of ICTs into classroom teaching and how they are perceived.

First, 42.1% agree with the statement that using technology to stay organized helps teachers better manage and organize their classrooms. A score of 3,38 with a standard deviation of 1.24 suggests a moderate degree of agreement. While many teachers are aware of the advantages that technology can bring to classroom management, their opinions on its effectiveness vary.

In the second question, 46 percent of teachers believe that ICTs help differentiate instruction in order to better meet students' needs. This indicates that ICTs are perceived positively by most respondents, with a score average of 3.57 out of a possible 5 and an SD of 1.26. The variability of responses indicates that, while ICTs are useful in this regard, opinions differ on their extent.

In the third statement, 47.3% agree that they are more professional after integrating ICTs in their teaching. A mean of 3.37 with a standard deviation of 1.20 suggests that integration of ICTs into teaching is seen by most as an enhancement of professionalism. However, there are some differences in the way this is perceived.

According to the fourth statement, 40.6% agree that they are using ICT tools in their classrooms. A mean of 3.14 and a standard deviation (SD) of 1.20 indicate a moderate view of ICTs ability to improve teaching methods. The results suggest that although ICT is valued by teachers, its impact on the teaching method may be moderate.

Responses to the statements about using educational software for tracking student progress and online lesson planners are more diverse. It is clear that the mean score for educational software, 2.56, indicates less agreement about its effectiveness. This means many teachers don't use it or do not find it useful for tracking student progress. The mean score for using resources online to create lesson plans is 3.36, which indicates moderate agreement. Online resources are seen by many as helpful, but their usefulness varies.

Overall, Table 4 shows that most head teachers view ICTs as valuable tools in enhancing teaching and classroom management. Although ICTs are recognized as a valuable tool for organizing classrooms and differentiating teaching, they also have varying impacts on the perception of their impact. While there are mixed reactions to specific tools such as educational software or online resources, they show that ICTs can be helpful, but their use and effectiveness may vary significantly between head teachers.

Table 5: Use of ICTs in Teaching and Learning Process (Part -B)

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
19	I use online quizzes and assessments to evaluate student learning.	12 9.0	32 24.1	18 13.5	42 31.6	29 21.8	2.66	1.30
20	ICT tools help me maintain accurate records of student performance.	20 15.0	66 49.6	11 8.3	27 20.3	9 6.8	3.45	1.17
21	Technology helps me create a more inclusive classroom environment.	52 39.1	54 40.6	6 4.5	19 14.3	2 1.5	4.01	1.07
22	I regularly use messaging apps to communicate with parents.	37 27.8	53 39.8	11 8.3	23 17.3	9 6.8	3.64	1.24
23	ICTs make it easier for me to keep up with educational trends and best practices.	31 23.3	59 44.4	10 7.5	24 18.0	9 6.8	3.59	1.21
24	I am confident while using tablets and laptops in the teaching process.	14 10.5 5	56 42.1	16 12.0	37 27.8	10 7.5	3.20	1.17
25	I understand complex concepts with the help of ICT tools.	26 19.5	61 45.9	7 5.3	27 20.3	12 9.0	3.46	1.26
26	I learn difficult content with the help of YouTube and Google.	13 9.8	44 33.1	7 5.3	59 44.4	10 7.5	2.93	1.21
27	Educational videos are available for teachers and students.	16 12.0	54 40.6	22 16.5	31 23.3	10 7.5	3.26	1.16

Table 5 examines the ways in which head teachers utilize information and communication technologies. This table shows responses from strongly agree to strongly disagree on a Likert scale, along with mean scores and SD for each statement. The data is explained in a simple way:

This statement shows that the mean score for using online assessments and quizzes to assess student learning is only 2.66 with a standard error of 1.30. It is clear that only a few head teachers are strongly in agreement with or accept this method. This high level of dissatisfaction (31.6% for DA and 21.8% for SDA) shows that most teachers do not use online quizzes or consider them to be effective assessment tools.

The mean score for the statement about maintaining accurate records on student performance is 3.45 with a standard error of 1.17. The level of agreement is moderate. Around 49.6% agree with this statement, indicating a high level of agreement. This variation (15.0% SDA and 6.8% SA) indicates that although ICTs for record-keeping are highly valued, the degree of support is not uniform.

A high score of 4.01 was calculated for the statement, "Technology helps create an inclusive classroom environment." The standard deviation for this statement is 1.07. The high score of 4.01 and the standard deviation of 1.07 indicate that head teachers are in strong agreement, with 39.1% strongly approving. This low level of disagreement (14% DA, 1.5% SDA) suggests that ICTs in general are seen as having a positive impact on inclusivity.

The mean score for using messaging apps to communicate with parents is 3.64, with a standard error of 1.24. The results show a positive view, with 27.8% strongly agreeing and 39.8% agreeing. This low level of disagreement (27.3% strongly agree and 6.8% strongly disagree) shows that parents are largely in agreement with the use of messaging apps to maintain communication.

A mean score of 2. 93 are given to the responses regarding using ICTs like YouTube or Google for learning difficult material. The standard deviation, however, is only 1.21. The results show a low to moderate level of agreement. This high level of disagreement (44.4%) suggests that, while many head teachers consider these tools useful, they do not find them helpful for understanding complicated concepts. It is clear that ICTs for content learning are not as popular as other technology uses.

Overall, Table 5 shows the diverse perceptions about ICT in teaching. Some tools are highly valued, for example, those that create an inclusive classroom and maintain accurate records. Others, however, such as online tests and resources to learn difficult content, are not so popular. This variation of responses reflects the varied experiences and attitudes that head teachers have towards ICT integration in education.

Table 6: Use of ICTs in Teaching and Learning Process (Part -C)

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
28	I teach difficult topics with the help of animated videos.	20	59	12	32	10	3.35	1.21
		15.0	44.4	9.0	24.1	7.5		
29	Incorporating multimedia elements	18	53	10	36	16	3.15	1.29

	like videos and animation improves engagement in the class.	13.5	39.8	7.5	27.1	12.0		
30	Educational software improves students learning in the class.	28	58	12	26	9	3.52	1.21
		21.1	43.1	9.0	19.5	6.8		
31	The adoption of ICT enhances conceptual learning.	30	70	10	19	4	3.77	1.04
		22.6	52.6	7.5	14.3	3.0		
32	I frequently use Google classroom or similar online platforms for educational purposes.	16	39	7	36	35	2.73	1.42
		12.0	29.3	5.3	27.1	26.3		
33	I rely on Khan Academy or similar online learning platforms to supplement my education	17	66	25	21	4	3.53	1.00
		12.8	49.6	18.8	15.8	3.0		
34	Google Drive or similar cloud storage services are essential for organizing and accessing my digital files.	27	70	10	23	3	3.71	1.04
		20.3	52.6	7.5	17.3	2.3		
35	I use ChatGPT or similar AI tools that are helpful for answering questions and providing information.	20	38	7	48	20	2.92	1.36
		15.0	28.6	5.3	36.1	15.1		
36	I use Google translator for difficult text in the books.	60	47	10	14	2	4.12	1.03
		45.1	35.3	7.5	10.5	1.5		

Based on the responses of head teachers on a Likert scale, Table 4.24 offers insights on how they use ICT in their teaching and learning processes. Table 4.24 lists different statements on the use and impact of ICTs. Each item includes percentages as well as mean scores and standard errors (SD). The following is a simple explanation.

This statement has a score of 3.35 with a standard error of 1.21. It shows a moderate agreement level, as 44.4% agreed and 15% strongly agreed. There are also 24.1% who disagree with this and 7.5% that strongly disagree. This suggests that, while some teachers use animated videos to teach complex topics, it is not a universal practice.

This score reflects a neutral view, with 39.8% agreeing and 13.5% strongly agreeing. This result reflects an overall neutral opinion, with 39.8% strongly agreeing while 13.5% agreeing. 27.1% are in disagreement and 12.0% are very much opposed, which shows that, although some teachers think multimedia is a great way to engage students, many others don't.

In the case of the statement, educational software increases student learning; the average score was 3.52 and the standard deviation was 1.21. It shows that there is a level of moderate agreement. 43.1% are in agreement, and 21.1% are strongly in accord. There are only 6.8% who strongly disagree (and 19.5% that disagree), suggesting there's some variance in opinion.

Google Classroom and similar platforms are used for education purposes. The mean score is 2.73. Standard deviation: 1.42. It shows a slight tendency to disagreement, with 26.3% of respondents strongly disagreeing and 27.1% disagreeing. The low percentages of agreement (12.0% SA vs.

29.3% A) suggest that online platforms may be used by a few teachers but aren't widely or enthusiastically adopted.

Google Translator's use for challenging texts is rated highly with a mean of 4.12 and standard deviation of 1.03, which indicates strong agreement. Google Translator's high value is reflected by the 45.1% who strongly agree and 35.3% who agree. ChatGPT, or other AI-based tools, have a lower mean score (2.92) and standard deviation (1.36), which indicates moderate disagreement. Only 15% strongly agree with 28.6% of the respondents, while 36.1% do not agree. The data suggests that although some teachers are receptive to AI, the tools have not been universally adopted.

Table 6 shows how head teachers are experiencing ICT in their teaching differently. Google Translator is well-regarded. However, other tools such as Google Classroom and AI are not universally accepted. The wide range of responses shows that ICT tool adoption can be very different among teachers.

Table 7: The Role of ICT in Teaching and Learning Environment (Part -A)

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
37	ICT increases learner engagement in the classroom.	52	56	9	14	2	4.06	1.00
		39.1	42.1	6.8	10.5	1.5		
38	Internet usage enhances personalized learning for individual students learning.	16	53	18	39.	7	3.24	1.15
		12.0	39.8	13.5	29.3	5.3		
39	ICT helps to create critical thinking among students.	39	52	17	22	3	3.76	1.11
		29.3	39.1	12.8	16.5	2.3		
40	ICT improves the feedback system in the learning process.	37	34	5	57	00	3.38	1.28
		27.8	25.6	3.8	42.9	00		
41	Student problem-solving techniques are enhanced by ICT.	19	60	19	29	6	3.42	1.11
		14.3	45.1	14.3	21.8	4.5		
42	ICT tools make it easier to differentiate instruction based on student needs.	19	55	13	41	5	3.315	1.16
		14.3	41.4	9.8	30.8	3.8		
43	ICT enhances collaboration among students during group activities.	37	50	10	28	8	3.60	1.26
		27.8	37.6	7.5	21.1	6.0		

Table 7 analyzes how the head teacher perceives the role ICT plays in improving the learning and teaching environment. The table below includes data on ICT's impact on different aspects of education. The findings are broken down into the following categories:

This statement, "ICT improves learner engagement," received the highest score (4.06) with a standard deviation of.00. It is clear that head teachers are in agreement with the idea that ICT can

be used to increase student engagement. More specifically, 42.1% and 39.1% agreed that ICT can make lessons more engaging and interactive.

A standard deviation of 1.15 is recorded for the impact of Internet usage on personalizing learning. The results reflect a neutral or slightly positive attitude. Among the 12.0% who strongly agreed and 39.8% who agree, there are also a large number of 29.3% and 5.3% that disagree. The variability in the responses suggests that, while some teachers may see the benefits of personalized learning via ICT, others might not be able to fully appreciate or use it.

The role of ICT in encouraging critical thinking is rated a median of 3,76, with a standard error of 1,11. The results show that ICT can be used to develop critical thinking in students. Although 16.5% are not in agreement, the majority of 29.3% strongly agree with this, and 39.1% also agree that ICT is a tool to support cognitive learning.

A statement such as "ICT enhances feedback in the learning process" has a score that is a mix of opinions. The standard deviation for this statement is 1.28, and the mean value of the sentence was 3.38. Although 27.8% of teachers strongly agreed and 25.6% of them agree, 42.9% are not in agreement. It is clear that some teachers think ICT improves the feedback mechanism, while others do not.

The mean score for the statement "ICT Tools make it easier" to differentiate instruction according to student needs is 3.31, with a standard error of 1.16. The results indicate a moderate level of agreement with the statement that ICT tools support differentiated instruction. With 30.8% of respondents disagreeing with this statement and 3.8% strongly disagreeing, there are some doubts about the effectiveness of ICT in facilitating tailored teaching.

Overall, Table 7 shows a positive outlook on the impact of ICTs in various areas of education and learning. This is especially true for fostering student engagement and critical thinking. There are differing opinions about ICTs' effectiveness for personalized learning, the feedback system, and differentiated teaching. This highlights areas in which some educators still have challenges or limitations integrating ICT.

Table 8: The Role of ICT in Teaching and Learning Environment (Part -B)

No	Statements	SA	A	N	DA	SDA	Mean	SD
		%	%	%	%	%		
44	ICT helps me integrate real-world applications into my teaching.	41	53	15	21	3	3.81	1.10
		30.8	39.8	11.3	15.8	2.3		
45	Using ICTs helps in keeping students motivated to learn.	39	57	14	20	3	3.81	1.08
		29.3	42.9	10.5	15.0	2.3		
46	ICT tools facilitate a more student-centered learning environment.	27	54	18	28	6	3.51	1.16
		20.3	40.6	13.5	21.1	4.5		
47	ICT helps me in managing and reducing the workload of administrative tasks.	26	61	10	27	9	3.51	1.20
		19.5	45.9	7.5	20.3	6.8		
48	Digital tools enhance my ability to	59	48	10	14	2	4.11	1.03

	assess students' understanding in real-time.	44.4	36.1	7.5	10.5	1.5		
49	ICT allows me to use a variety of teaching methods to cater to different learning styles.	52 39.1	56 42.1	9 6.8	14 1O.5	2 1.5	4.06	1.00
50	ICT makes it easier to incorporate multimedia resources into lessons.	16 12.0	54 40.6	18 13.5	38 28.6	7 5.3	3.25	1.15

Table 8 gives data from the perspective of the head teacher on ICT and its role in the enhancement of the teaching/learning environment. This table measures the impact of ICT on teaching efficiency, based on responses from head teachers.

The statement "ICT is helpful in integrating real-world examples into my lessons" received a score of 3.81 on a scale of 1 to 10. According to this, a large number of school principals (30.8% strongly concur and 39.8% also agree) feel that ICT links classroom lessons with real-life situations. The majority (93%) of teachers find ICT helpful in contextualizing classroom lessons.

A mean score of 3.81 is also found in the data for "Using ICTs can help keep students interested and motivated to study." The standard deviation, however, was only 1.08. According to the data, 29.3% were strongly in favor of ICT tools helping maintain student motivation, and 42.9% agreed. There are only 15.0% who do not agree, which suggests that although many recognize the advantages of ICT tools for student engagement and motivation, others may have yet to fully utilize or experience them.

The average is 3.51, with a standard deviation of 1.16. A moderate degree of agreement is shown, with 20.3% strongly approving and 40% agreeing that ICTs support a learner-centered approach. Unsurprisingly, however, the majority of 21.1% disagrees, showing some concern or limitations with how ICTs are used to help students learn more.

For the statement “ICT helps reduce my administrative workload by managing it and helping me with management tasks,” the mean score was 3.51, and the standard error was 1.20. Overall, the results are mixed. Only 19.5% agree strongly, and only 45.9% believe that ICT is helpful in managing administrative duties. 20.3%, however, disagree. This suggests that ICT, although useful, may not completely relieve the administrative burden for all educators.

With the standard deviation at 1.03, this statement has the best mean score. It is 4.11. It is clear from the high rating, which includes 44.4% who strongly agree with this statement and 36.1% who agree that ICTs can be used to assess student understanding in real time. The low level of disagreement (1.5%) reflects the wide acceptance of ICT as a tool for assessment.

Table 8 reveals that ICT is viewed positively by most head teachers for its ability to enhance the quality of teaching and also support various functions in education. ICTs' role in real-life applications, maintaining students’ motivation, and enhancing the real-time assessment is widely accepted. ICT can be very effective in terms of reducing administration and fostering a student-centered teaching environment. But there is still concern about ICTs' effectiveness.

Inferential Statistics

Table 9: Difference in Head Teachers' Perception Based on Gender

Variable	category	N	Mean	SD	Df	t	Sig
Gender	Male	69	170.18	32.53	131	0.213	0.605
	Female	64	168.98	32.48			

The following table compares perceptions of female and male head teachers. The study includes 69 male head teachers as well as 64 female head teachers. Males' mean scores for head teachers are 170.18, with a standard deviation of 32.53. The average deviation for female head teachers is 32.48, with a mean score of 168.98. The degree of freedom (df) is 131, and the t-value is 0.213. We have set the level of significance (Sig) at 0.605, surpassing the usual limit of 0.05. It indicates that there's not a statistically significant distinction in the perceptions of male and female head teachers.

Table 10: Difference in Head Teachers' Perception Based on location

Variable	category	N	Mean	SD	df	t	Sig
Location	Urban	18	165.05	36.72	131	-0.640	0.439
	Rural	115	170.32	31.78			

The table above compares the opinions of head teachers based on the location they are in—urban or rural. The group consists of 18 head teachers from urban areas, who have an average score of 165.05 with a standard deviation of 36.72, and 115 head teachers from rural areas, who have an average score of 170.32 with a standard deviation of 31.78. The degree of freedom (df) is 131, and the t value is -0.640. We find the level of significance (Sig) to be 0.439, surpassing the significance threshold of 0.05. It suggests that there's no statistically significant difference in the perceptions of head teachers at rural and urban locations.

Table 11: Difference in Head Teachers' Perception Based on Designation

	sum of squares	df	Mean Square	F	Sig.
Between groups	10407.377	2	5203.688	5.280	.006
within groups	128110.292	130	985.464		
Total	138517.669	132			

Significance Level P>0.05

The table analyzes whether the perceptions of head teachers differ depending on the position they hold (e.g., the different names or titles for their jobs). The ANOVA test finds that there is a statistically significant distinction between the groups that have the F value of 5.280 and a significance value of 0.006 that is less than 0.05. This indicates a statistically significant difference in the perceptions of head teachers based on their title. This means that the title of head teacher plays an important role in their perception of the subject they are studying.

Table 12: Difference in Head Teachers' Perception Based on Academic Qualification

	sum of squares	df	Mean Square	F	Sig.
Between groups	2456.090	2	1228.045	1.173	.313
within groups	136061.579	130	1046.628		
Total	138517.669	132			

Significance Level P>0.05

The table 12 examines the different head teachers' views according to their educational qualifications. The ANOVA test results reveal an F value of 1.173 as well as a significance of 0.313 that is higher than 0.05. It suggests that there's no statistically significant distinction between head teachers' perceptions based on their academic credentials. As a result, academic degrees are unlikely to have any impact on the perceptions of head teachers.

Table 13: Difference in Head Teachers' Perception Based on professional Qualification

	sum of squares	df	Mean Square	F	Sig.
Between groups	4463.000	2	2231.500	2.164	0.119
within groups	134054.669	130	1031.190		
Total	138517.669	132			

Significance Level P>0.05

This table analyzes the influence of professional credentials in the head teacher's perception. The ANOVA test reveals that the F-value is 2.164, as well as a significance of 0.119 that is higher than 0.05. It indicates that there's not a statistically significant distinction in teacher perceptions in relation to their professional credentials. Thus, professional certifications do not have a significant impact on how the head teachers view the subject that they are studying.

Table 14: Difference in Head Teachers' Perception Based on Age

	sum of squares	df	Mean Square	F	Sig.
Between groups	1808.603	3	602.868	0.569	0.636
within groups	136709.066	129	1059.760		
Total	138517.669	132			

Significance Level P>0.05

This table clearly illustrates the use of the ANOVA test to determine the differences in head teachers' perceptions based on age. Its F value is 0.569. The significant degree is 0.636, which is more than 0.05. This indicates that there are no statistically significant differences in perceptions based on age. This suggests that views of the head teacher tend to be similar across all categories.

Table 15: Difference in Head Teachers' Perception Based on Teaching Experience

	sum of squares	df	Mean Square	F	Sig.
Between groups	5122.291	3	1707.430	1.651	0.181
within groups	133395.378	129	1034.073		
Total	138517.669	132			

Significance Level P>0.05

The table examines how experience in teaching influences the perceptions of head teachers. The ANOVA test reveals an F-value of 1.651, indicating a significant difference of 0.181 over 0.05. So, there's no discernible statistically significant differences in the views of head teachers according to their experiences in teaching, which suggests that their experience is not a major influence on their views.

Conclusion

Demographic findings provided a better understanding of sample population. Majority of the participants were males from rural areas. A significant percentage had advanced degrees or professional teaching certifications. The demographics of the group reflect an experienced and diverse group of teachers, whose perspectives on ICT reflect their vast experience. Data also revealed that the majority of respondents were middle-aged and had a significant number of years teaching experience. This suggests that they are affected by their maturity as professionals, but are also influenced by their exposure to changing technologies.

This study examines the impact of Information and Communication Technology on secondary education's teaching and learning environments, reveals some key findings. It was found that ICTs were widely used for daily communication and social networking through WhatsApp and Facebook. These high scores indicate that ICT is a part of teachers' everyday professional and communication activities. The lower scores given for navigation and online banking tools led to the conclusion that, while ICT was essential for some functions, the use of ICT in other areas among respondents is much less frequent.

The study concluded that ICT has a significant impact on the classroom environment and the management of instruction. Teachers who scored highly felt that ICT enhanced their abilities to effectively manage classrooms and meet the needs of diverse students. The use of ICT was also concluded to increase teachers' professional qualification and confidence, proving the importance of integrating technology in educational practices. The findings showed that some aspects of ICT are not used as much, for example, using software to track student progress. This indicates areas in which further integration would be helpful.

Final analysis showed that gender, place, qualification, experience, age and location did not have a significant impact on teachers' perceptions of ICT use in education. These statistical tests showed that teachers' perceptions of ICT were not significantly different across demographic variables. This suggests a general consensus on the positive and negative aspects of ICT. The uniformity of perception concluded that ICT is widely recognized as a tool to enhance the learning and teaching environment.

Discussion

In Pakistan, several studies have revealed that the students use social networks for social connection and entertainment, can be best used by in educational settings. Alshaibani & Qusti (2021) conducted a research study showed that among college students Whatsapp is the most popular application. This application inspires teamwork, increases the learning abilities of students’ and inspires them. According to the report, Whatsapp helps the students’ to complete their tasks faster than orthodox methods.

Digital technology enhanced students' new comprehension in their areas of learning. ICT enables more innovative responses to various learning inquiries. For instance, reading aloud exercises in reading classes sometimes make use of electronic books. Students have simple access to a wide range of books, from beginner to expert levels, using PCs, laptops, PDAs, or iPads. To be more precise, these electronic books could include reading apps that contain features like reading aloud, word games, exercises to improve reading comprehension and vocabulary, and more. ICT, which includes purpose-built apps, can creatively address a wide range of learning requirements (Chai et al., 2010)

Farrell and Brunton (2010) propose that, in order to be effective, online teaching and learning are dependent on a variety of factors. These include group collaboration or peer interaction, student-student interactions and teacher-student involvement. Information and communications technology (ICT) has shown in several studies that it can be a powerful tool for improving educational accessibility, teaching and learning, and creating individualized learning environments. The attitudes and opinions of learners shape these benefits.

Autonomy, capacity, and creativity are the three key attributes required to generate high-quality instruction and learning via ICT. Students' have autonomy over their learning through technology. This way, they develop more independence and teamwork skills. Instructors also have the option of letting students work in small groups or pairs to finish specific assignments. Students gain self-assurance, develop a growth mindset, and increase their chances of successfully integrating new information into their existing body of knowledge via collaborative learning using ICT (Lowther et al. 2008).Also, unlike in a conventional classroom, teachers may have greater say over the content of their classes when they use ICT to produce their own materials, which promotes autonomy. In terms of competence, students may improve their ability to apply and transmit information while using new technologies with efficiency and effectiveness because they are more confident in the learning procedures (Serhan, 2009).

Recommendations

The following are some recommendations which may be helpful to address the issue.

1) Educational leaders should support the routine use of virtual meeting platforms to facilitate remote collaboration and meetings.
2) Head teachers should incorporate GPS navigation apps into their daily routines to streamline travel and logistics.
3) Head teachers should promote the use of ICT tools to enhance school management and organizational efficiency.
4) Head teachers should encourage the use of educational software and online resources to improve learning outcomes of students in their schools.
5) Head teachers should provide training to teachers on using ICT tools confidently to enhance teaching and learning processes.
6) This research should be conducted further at graduate level.
7) Qualitative approaches should be adopted to conduct further studies in this domain.

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