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**Abstract:** Teachers in poor nations such as Pakistan are ill-prepared to use the newest technologies in the classroom. Information and communication technologies (ICT) are not widely used in Pakistani classrooms. The aim of this research was to investigate how students' performance in studies was affected by ICT-based instruction. The purpose of this paper is to examine the relationship between students' pedagogical performance and the use of knowledge and information and communication technologies (ICT). Financial analysis in this area hasn't produced strong evidence to date that ICT investments have an impact on students' academic performance. Given that both the instructional setting and the characteristics of the teachers reflect a student's performance, the use of ICT may be a significant determinant of educational outcomes. The differences found in students' academic performance are thus further linked to the unique influence of ICT on typical informative factors. ICT users desire changes to the way upper education is organized. While the use of ICT instruments in global organizations is rapidly increasing, the adoption of complementary structural styles is exceedingly sluggish and varies greatly amongst establishments. This could provide support for the documented differences in students' levels of achievement. The study was carried out based on earlier reviews of the literature covering the years 2000–2018.

Information about teacher abuse, use, and angle of ICT scales to determine students' performance. The findings indicate that among lecturers, the most commonly used and well-known ICT types are the internet, email, data processing, Skype, and the transmission of teachers' generally positive attitudes toward computers and the internet. It was also discovered that their attitudes differ according to the amount of data and years of experience they have. Lastly, we frequently emphasize how crucial it is to support ICT integration in the classroom in order to improve student performance.

**Keywords:** academic success, science, ICT instruction, pupils

## CHAPTER NO 01

**1.1 Introduction:** Activities and programs that modernize and improve teachers' current knowledge and abilities to carry out their jobs more effectively are referred to as professional development.

As a result, professional development is seen as being crucial in situations where teachers' current methods are failing to keep up with the problems and challenges that are arising in the educational system and are lowering the standard of instruction (Peralta and Costa, 2007; Granger et al., 2002). Only in those environments or contexts where educators and administrators have a strong desire, dedication, motivation, and commitment to improve their current practices and to enhance the quality and productivity of education can professional development be successful and meet its stated goals (Volman & van Eck, 2001).

The results of any professional development program and initiative should essentially be determined by teachers and administrators, regardless of how important they think it is. An atmosphere that encourages innovative teacher professional development initiatives should exist. Teachers should feel a common need for the change before any positive changes to the educational environment take place. Constructive change in the educational context or environment is more likely to occur if administrators and teachers in that particular setting and context agree on the problems in education and the solutions to them (Kay, 2006; Vannatta & Fordham, 2004; Wozney et al., 2006).

In a similar vein, when educators feel that learning is a cooperative and reciprocal process, they are more likely to experience changes in their attitudes and behaviors (Jonassen, 1999). Teachers can enhance their pedagogy and current practices, adopt new strategies and innovations, and help students improve in behavior when they give themselves adequate time to engage, study collaboratively, talk about teaching, classroom issues and barriers, and assist in adopting new teaching skills and strategies.

The reason for this is that social influence plays a vital role in modifying educators' attitudes and perceptions (Bandura, 1997; Breisser, 2006).

Without solid subject-matter expertise, a teacher is unable to modify their professional development goals based on the situation or environment (Adams, 2002). According to Jonassen (2000), curriculum and instructional strategies that have a high chance of enhancing students' learning outcomes and transforming them into contributing members of society should be used in professional development programs.

The goal of professional development (PD) ought to be to address and resolve deficiencies found in students' learning and performance. The following areas should receive special attention in professional development:

subject matter

instructional weaknesses

teaching methodology

educational psychology

students' issues and shortcomings

the classroom setting

the evaluation of students' work.

Teachers can successfully accomplish learning objectives and goals, enhance their practices, and raise the standard of the educational system by concentrating on such classroom issues (Yukselturk and Bulut, 2009).

ICT for TPD is viewed as a potential means of bringing innovations and transformation to teacher education, according to Russell (1999). If IT is used properly and productively in teacher education, TPD has the power to transform the way that learning and teaching are done.

Teachers can use ICT to implement an interactive teaching strategy in classroom settings. The use of ICT in teaching and learning activities is relevant to the reasoning behind integrating ICT devices into the educational system (Clausen, 2007; Norris, Poirot, & Soloway, 2003).

Therefore, the goal of ICT integration at the secondary level should be to support and enable educators in modifying their pedagogical practices in order to better meet the demands of the modern world, which are eroding educators' efficacy, efficiency, and sense of self (So & Kim, 2009). (Keengwe & Onchwari, 2008). ICT offers teachers a wide range of new tools, techniques, and strategies to enhance conventional pedagogies and classroom practices, according to Davis (2000). It also gives teachers the chance to develop new methods, techniques, and strategies (Abuhmaid, 2011; Carlson & Gaido, 2003). ICT offers new, interesting, and relevant learning opportunities for teachers and students, thereby improving the education sector (Neyland, 2011).

The extensive use of computers and the Internet in teachers' pedagogical activities has been the subject of numerous studies. These studies showed that teachers can be very helpful in integrating ICT into their lessons in order to improve their effectiveness. It is the duty of policy makers to plan a strong ICT-based infrastructure, and it should be the responsibility of teachers to carry out these plans in their respective institutions. ICT integration requires sufficient funding, sufficient training, and thorough planning (Agnew, Kellerman, & Meyer, 1996).

Developing nations across the globe are currently making every effort to incorporate ICT into the educational system. However, there are numerous obstacles and hurdles that must be overcome before ICT facilities can be successfully provided for teachers in developing nations. The following important goals can be accomplished with the assistance of teachers' development, independent of their foundational or induction training:

To update teachers' knowledge, skills, and competencies in light of the most recent advancements in the field of education

To improve teachers' knowledge, skills, and competencies in accordance with the creation of contemporary teaching methodologies, strategies, new circumstances, and educational research.

To make it easier for teachers to implement new ideas and innovations in the curriculum or other areas of the teaching activities

To let teachers try out new curricula and teaching practices

To exchange teaching expertise, competencies, and skills with other teachers locally, nationally, or internationally

To support and assist less experienced teachers in becoming more effective and efficient educators (OECD, 1998).

The importance of incorporating ICT into teaching methods and enhancing teachers' professional development is heavily emphasized by education reforms (Donnelly et al., 2002). Teachers who are capable of using ICT devices in the classroom appropriately and sufficiently are not being produced by aspiring teacher education programs (Tondeur, Braak, & Valcke, 2008). According to a number of studies, the professional development programs in place today are not good enough or sufficient to prepare competent educators for the twenty-first century (Borko, 2004). ICT must be a basic component of teacher education in order for it to be implemented successfully in schools (Duffield, 2005; Vrasidas & Glass, 2005).

Teachers can update their current knowledge and skills by using ICT tools to explore and discover new bodies of knowledge and skills (Barron, 1998; Hew and Brush, 2007). Teachers can also access new information via the World Wide Web as a virtual digital medium (Berge, 1998; Lee, 2001; Loveless, 2003). ICT can therefore assist, involve, and inspire educators to make their lessons more successful (Williams, 2003). ICT has a significant impact on the educational system, and it has a clear impact on educational activities like teaching and learning (Teo, 2008). ICT can also improve communication and interaction between teachers and students when used properly, both inside and outside of the classroom (Hammond, 1998; Giordano, 2007). The 21st century has seen a great deal of innovation and change thanks to the quick development of ICT. The education system has also benefited from ICT adoption, which has increased teaching and learning activity productivity (Gorder, 2008; Knezek & Christensen, 2002; Lau & Sim, 2008). However, the effective use of ICT in the classroom presents difficulties for administrators as well as teachers, as ICT cannot achieve desired goals at the teacher level without planning (Ali, Haolader, & Muhammad, 2008). Consequently, in order for educators to be competent and productive educators in the twenty-first century, they must become ICT literate.

In addition, educators are skeptical of the value of ICT integration in the classroom and are filled with fear and anxiety about it. According to Friends and Cook (1992), integrating ICT into the educational system necessitates that teachers possess advanced social and psychological skills, just like other educational technologies. Since integrating ICT into the classroom is a complicated process, IT technicians are frequently called upon to help and support teachers.

According to Zhao et al. (2002), teachers typically work alone in the classroom and have little opportunity to interact with their colleagues; as a result, building these kinds of relationships can be uncomfortable for teachers looking to update their IT literacy (Campbell, 2001).

As a result of using ICT in the classroom, teachers feel anxious in front of the students and lose all control over what they teach (Clark, 2000). Therefore, when teachers feel uneasy or reluctant to use new ICT tools, or when they are not prepared to adapt their instructional activities using ICT, the process of teaching using ICT in the classroom becomes more complex (Armstrong, 1999). The influence of ICT tools in the classroom fades quickly in such a setting, and the results of these efforts are meaningless.(Morton,1996)

Since all aspects of education have been changing constantly in recent years, implementing the current curriculum without taking the changing conditions into consideration can only produce the same results as in the past. Technology for information and communication (ICT) has been an important factor in the improvement of educational standards. Teaching educators how to effectively use ICT is so essential. Apart from the advancement of ICT and the application of technology in educational settings, it is now essential for communities to adopt revolutionary technology to enable self-adaptation (Çelik & Gundogdu, 2016).

Success in extracurricular activities shows how effectively a student has learned in regard to reaching the intended objectives, which are the institutions' primary focus for the whole academic year. The goals that a student reaches could be focused on cognitive objectives, which can be either broad or specialized in order to show an individual's accomplishment. Additionally, students accomplish these goals in educational institutions by performing intellectual tasks and acquiring knowledge. These exercises could have a math, science, or linguistic component.

A wide range of educational outcomes are covered by meeting the learning objectives, which have a very broad accessibility. The grades that students receive from standardized examinations or from obtaining grade point averages (GPAs) determine how successful they are. These exams determine a student's eligibility to continue their education (e.g., to enroll in a school) (Steinmayr et al., 2018).

**1.2 Statement of the Problem:** Pakistan is a developing nation, as is recognized, and the twenty-first century is upon us. The globe has been reduced to the size of a global village, and everyone uses ICT to simplify their lives in one way or another. Worldwide recognition is being accorded to new technologies, tactics, capacity, and inventions. The performance of research scholars has been changed by the use of ICT, which has made it simple for them to obtain related

information that was previously extracted using school library books. The study investigates the difficulties and problems that students encounter as well as how ICT affects their performance. It will also combine data on whether or not ICT use has an impact at the secondary level.

### **1.3 Research Objectives:**

examine the impact of ICT-based professional training on teachers' knowledge and skills in utilizing technology in the classroom

identify the challenges and barriers faced by teachers in integrating ICT into their teaching practices

investigate the relationship between teachers' ICT competencies and students' academic performance

### **1.4 Research Questions:**

What effect does teachers' use of ICT have on students' performance at the school level?

To investigate the information-gathering challenge that students encountered?



## CHAPTER NO 02

### 2.1 REVIEW OF LITERATURE

An important part of integrating ICT into education is played by teachers. "Technological tools in the classroom are not scarce, and problems with hardware and software are not the cause of the significant gap between today's digital ICT and teachers' desire and ability to integrate technology into their classrooms" (Levin and Wadmay, 2008, p. 235). The literature cites their resistance to change and attitudes toward technology as the main causes of the failure to successfully integrate ICT into education (Almadhour, 2010; Aslan and Zhu, 2016).

Teachers' willingness to overcome the challenges they encounter when incorporating ICT into their teaching is a key factor in the successful application and frequency of ICT usage. More precisely, there are several obstacles that teachers must overcome in order to successfully integrate ICT into their lesson plans. Several factors contribute to the failure of ICT implementation, including insufficient ICT training, insufficient confidence and competence in technology, accessibility issues, a lack of technical support, and negative attitudes towards technology (Becta, 2003; Bingimlas, 2009; Hew and Brush, 2007).

To make matters worse, integrating technology into the classroom also means drastically altering the role and methods of the teacher. The teacher serves as the focal point of learning in the conventional teaching methodology. This is no longer relevant in learning environments with technology. A portion of the teacher's authority is also transferred to the computer when significant teaching responsibilities are moved from the teacher to the machine. The instructor is not the only source of knowledge in contemporary schools. According to Makrakis (2000), the role of the teacher changes from that of a knowledge transmitter and controller to that of a producer-creator of an engaging experience and an innovative learning environment. Not every educator has embraced these modifications to the same degree. The way a teacher responds to all of these changes, whether or not they want to take on this new role, and how much they want to use new techniques in their instruction will all determine how well ICT integration goes. .. Many educators believe that their role has diminished in the modern educational setting where technology is pervasive. These numerous changes lead to worry and uncertainty. According to Raptis and Rapti (2017), the abrupt integration of technology into the classroom has put pressure on teachers, who are feeling anxious, phobic, and low on self-worth due to their lack of experience with the new reality.

The importance of computer use in relation to current teaching methods has been crucial in fostering positive attitudes, as many teachers are resistant to the new changes (Mueller and Wood, 2012). Teachers' ideas about technology are also influenced by their views about teaching. It appears that they won't be able to incorporate ICT into their lessons until they acknowledge its value as a cognitive learning tool (Mueller and Wood, 2012). Even in cases where all obstacles to integration are removed, teachers' opinions of ICT will indicate whether or not they eventually incorporate it into their lessons. As a result, while a shift in pedagogical

approaches is required, instructors' attitudes also need to shift in tandem. When valuing teachers' ICT skills, varying studies claim that the way they use technology affects how they perceive it and, in turn, how much of it is integrated into the curriculum. They also claim that developing teachers' ICT competencies is necessary to improve education (Almadhour, 2010; Baser-Gulsoy, 2011). Teachers "need to take education and indeed the world economies to the next level, but they lack the knowledge, the means, and the right attitude to do so" and "are expected to be well trained and confident in the use of computer-related technology in the classroom and in other professional activities" (Chao, 2015, p. 78).

The successful integration of ICT into the educational process depends on teachers receiving adequate training in this area. "One of the main issues concerning the integration of ICT in an educational context is directly related to what teachers are capable of doing in their classes with their students," write Costa and Viseu (2006, p. 248). In their paper for the OECD, Enochsson and Rissa (2009) demonstrate how teachers' attitudes, ICT usage, and sense of self are all impacted by training. Additionally, it can make a significant difference in addressing some of the issues that limit the amount of ICT used in the classroom. These factors include, for instance, the unfamiliarity of ICT teachers with the new technologies and their unfavorable attitudes toward ICT.

The training program's format, caliber, and length are also crucial factors. The degree of training instructors receive has been found to positively correlate with their motivation to use ICT, their acquisition of skills, knowledge, and self-worth, as well as their attitudes toward the pedagogical appropriation of ICT (Baser-Gulsoy, 2011; Mura et al, 2016).

Short-term ICT seminars have been shown to be insufficient since they are thought to only provide surface training, which results in a lack of confidence and competence. On the other hand, long-term seminars are highly successful because of their extended length, which allows them to concentrate on teaching ICT skills, acquainting teachers with innovative teaching techniques, and cultivating favorable attitudes (European Schoolnet and University of Liege, 2012, 2013; Lawless and Pellegrino, 2007).

Training programs, however, are not always the source of teacher training. According to studies, the majority of teachers learn on their own during their free time. According to European Schoolnet and the University of Liege (2012) and (2013), over 70% of teachers in Europe prefer to learn about ICT on their own, and most of the time, teachers are not required to receive training on integrating ICT into their regular teaching practices.

Teachers who receive insufficient or no training experience anxiety and low self-esteem regarding their technological proficiency, which makes them avoid using ICT in front of their tech-savvy students. Despite educational reforms and an increase in training programs, it is now clear that teachers lack adequate ICT training (Kalogiannakis, 2010; Saiti and Saitis, 2006).

Adopting a more student-centered teaching approach raises pedagogical issues that must be addressed in an effective ICT training.

It is essential that educators receive formal, in-depth training programs so they can become more knowledgeable about the new technologies and have more hands-on experience with them. Teacher training is deemed necessary to address the new educational challenges because the teaching-learning process in the classroom, using ICT, necessitates the development of a set of skills from the teacher in order to acquire a methodology that will make the most of the technological tools. By doing this, they will develop more positive attitudes toward ICT, be able to engage in technology actively, rebuild their self-confidence, be able to mentor their students effectively, and be able to collaborate and communicate with other educators.

The last twenty years have seen ICT gain sustained significance. The availability of a vast amount of information and resources through the internet, advancements in ICT technology, and increased adaptability in businesses and organizations have all contributed to the global explosion of knowledge and information (Hasan & Sajid, 2013). According to Daniels (2002), information and communication technology (ICT) has emerged as one of the main tenets of modern society in a relatively short amount of time. Many countries view ICT as a means of teaching basic competencies, skills, and concepts. They also view ICT as an integral part of education, alongside writing, numeracy, and analysis. The common misconception about ICT is that it refers to "computer systems and computing associated sports." Fortunately, this is not the case. While computers and their software play a significant role in advanced data control, other technologies and/or structures also exhibit phenomena that are typically referred to as ICTs. Some of the ICT-assisted instructions in some areas are TV Assisted Instructions (TAI), Internet Assisted Instructions (IAI), Radio Assisted Instructions (RAI), and CAI (UNESCO, 2014).

Because the study was of the descriptive survey type, a cross-sectional survey was used to gather data from the respondents. The study's target population included all secondary school teachers, head Abdul Khaliq and Baig 117 educators from public secondary schools, and master trainers from the directorate of staff development. The Rahim Yar Khan division's head teachers, master trainers, and secondary school teachers were all considered members of the accessible population. In Rahim Yar Khan division, there were 838 head teachers, 1746 secondary school teachers, and 122 master trainers. Using the proportionate stratified probability sampling technique, 296 research subjects (84 head teachers, 175 secondary school teachers, and 37 master trainers) were selected as a sample. The research instrument was a self-developed, structured questionnaire, and all psychometric qualities (such as validity and reliability) were guaranteed in the creation of the research instrument's final version. A five-point Likert rating scale was used to gauge the respondents' perceptions (SA=5, A=4, UD=3, DA=2, SDA=1). The research instrument's overall reliability, or internal consistency, was discovered.874. Following the development of the research tool's final version, it was administered in the field by hand. All of the questionnaires that were returned had a 100% response rate. To analyze the data, both

inferential and descriptive statistical techniques were used. The mean, standard deviation, and one-way ANOVA between groups were used for this.

Whether teachers and administrators think a professional development initiative or program is important or not should be the ultimate determining factor in its outcomes. A favorable atmosphere should exist to encourage innovative teacher professional development initiatives. Teachers should feel a common need for change before any positive changes to the educational environment take place. Constructive change in the educational context or environment is more likely to occur if teachers and administrators in that particular setting and context agree on educational problems and their solutions (Kay, 2006; Vannatta & Fordham, 2004; Wozney et al., 2006). Similarly, in such contexts where teachers feel that learning is a mutual and collaborative activity, changes in teachers' attitudes and behavior are more likely to occur (Jonassen, 1999). Instructors can enhance their pedagogy and current practices, adopt new strategies and innovations, and help students improve in response when they give themselves enough time to engage, study collaboratively, talk about teaching, classroom issues and barriers, and assist in adopting new teaching skills and strategies. The reason for this is that social influence plays a vital role in modifying teachers' attitudes and perceptions (Bandura, 1997; Breisser, 2006). Without a solid foundation in the subject, a teacher is unable to modify their professional development goals in light of the situation or environment (Adams, 2002).

According to Jonassen (2000), curricula and instructional strategies that have a high chance of enhancing students' learning outcomes and transforming them into contributing members of society should be used for professional development. The goal of professional development should be to address and resolve any shortcomings that have been found in students' learning and performance. The following areas should be the focus of professional development: i) subject matter; ii) instructional weaknesses; iii) teaching methodology; iv) educational psychology; v) students' issues and shortcomings; vi) classroom environment; and vii) student performance assessment. Teachers can succeed in accomplishing learning objectives and goals, enhance their practices, and raise the standard of the educational system by concentrating on such classroom issues (Yukselturk and Bulut, 2009).

ICT for TPD is viewed as a potential means of bringing innovations and change to teacher education, according to Russell (1999). If ICT is used properly and effectively in teacher education, TPD has the power to transform the way that instruction is delivered and learned. Teachers can use an interactive approach to teaching students in classroom settings thanks to ICT. The use of ICT in teaching and learning activities is relevant to the reasoning behind incorporating ICT devices into the educational system (Clausen, 2007; Norris, Poirot, & Soloway, 2003). Thus, the goal of ICT integration at the secondary level should be to support and enable educators in modifying their pedagogical practices (So & Kim, 2009) so they can contend with the contemporary challenges that diminish teachers' efficacy, efficiency, and sense of self (Keengwe & Onchwari, 2008). ICT offers teachers a wide range of new tools, techniques, and strategies to enhance conventional pedagogies and classroom practices,

according to Davis (2000). It also gives teachers the chance to develop new methods, techniques, and strategies (Abuhmaid, 2011; Carlson & Gaido, 2003).

ICT offers new, more engaging, and relevant learning opportunities for teachers and students, which can help to improve the education system (Neyland, 2011). The extensive use of computers and the Internet in teachers' pedagogical activities has been the subject of several studies. These studies demonstrated that teachers can be very important in integrating ICT into their lessons in order to increase their effectiveness. It is the duty of policy makers to plan a strong ICT-based infrastructure, and it should be the responsibility of teachers to carry out these plans in their respective institutions. ICT integration requires sufficient funding, sufficient training, and thorough planning (Agnew, Kellerman, & Meyer, 1996). Developing nations across the globe are currently making every effort to incorporate ICT into the educational system.

Aside from their foundational or induction training, teachers' development can aid in accomplishing the following main goals: Teacher knowledge, competence, and skills should be updated in light of recent educational developments; teachers' knowledge, competence, and skills should be upgraded in accordance with the development of contemporary instructional methodologies, strategies, new conditions, and educational research; teachers' adoption of inventions and innovations made in the curriculum or in other aspects of teaching activities should be facilitated; teachers should be given the freedom to apply new strategies regarding curricula and teaching practices; teachers should share their teaching skills, competencies, and expertise among themselves on a local, national, or international level, and to assist and enable less experienced teachers to develop into more capable and productive educators (OECD, 1998). The importance of incorporating ICT into teaching practices and enhancing teachers' professional development is greatly emphasized by education reforms (Donnelly et al., 2002). Teachers who are able to use ICT devices in the classroom effectively and sufficiently are not being produced by prospective teacher education programs (Tondeur, Braak, & Valcke, 2008). According to a number of studies, the professional development programs in place today are not good enough or sufficient to produce skilled educators for the twenty-first century (Borko, 2004). ICT must be a core component of teacher education in order for it to be implemented successfully in schools (Duffield, 2005; Vrasidas & Glass, 2005). Teachers can also access new information via the World Wide Web as a virtual digital medium (Berge, 1998; Lee, 2001; Loveless, 2003). ICT can therefore assist, inspire, and encourage teachers to make their classroom activities more successful (Williams, 2003).

ICT has a significant impact on the educational system, and it has undoubtedly had an impact on educational activities like teaching and learning (Teo, 2008). ICT can also improve communication and interaction between teachers and students when used properly, both inside and outside of the classroom (Hammond, 1998; Giordano, 2007). The 21st century has seen tremendous changes and innovations brought about by the quick development of ICT, and the

education system's adoption of it has increased the effectiveness of teaching and learning activities (Gorder, 2008; Knezek & Christensen, 2002; Lau & Sim 2008).

However, the effective use of ICT in the classroom presents a problem for administrators as well as teachers, as ICT cannot achieve the intended goals at the teacher level without planning (Ali, Haolader, & Muhammad, 2008). As a result, in order for educators to be adequate and productive educators in the twenty-first century, they must become ICT literate practitioners. Teachers are also afraid and anxious about using ICT in the classroom and don't think it will benefit their students. According to Friends and Cook (1992), integrating ICT into the educational system necessitates that teachers possess advanced social and psychological skills, just like other educational technologies. Because integrating ICT into the classroom is a complicated process, IT technicians are frequently called upon to help teachers.

According to Zhao et al.(2002), teachers typically work alone in the classroom and have little opportunity to engage with their colleagues; as a result, they typically find that this type of relationship makes it difficult for them to keep up with changes in IT literacy (Campbell, 2001). As a result, when using ICT in the classroom, teachers lose all control over what they teach and become nervous in front of the students (Clark, 2000). Therefore, when teachers feel uncomfortable or reluctant to use certain ICT tools, or when they are not prepared to adapt their instructional activities using ICT, the process of teaching using ICT in the classroom becomes more complex (Armstrong, 1999). The influence of ICT tools in the classroom fades quickly in such an environment, and the results of these efforts are meaningless.

## **2.2 Benefits of ICT:**

The field of education has been greatly impacted by ICTs, which has positively impacted research as well as teaching and learning. Many research studies have examined the benefits of high-quality education and have found that:

1. ICTs can generate, enhance, improve, and deepen abilities; they can encourage and interact with students so they can use their skills in practical fields; they can generate financial capability for future personnel; and they can improve teaching and learning experiences (Okoro & Ekpo, 2016).
2. ICTs have extended students' rise in attention, claim Khan et al. (2015). In the last few years, ICTs have substantially altered the nature of education and brought about revolutionary changes. Over the past ten years, ICT and its application in education have become extremely important in the majority of European countries.
3. Teachers use ICT to support traditional learning methods. For instance, they use it to gather information in situations where college students are more "submissive" to the material than "active producers" who can actively participate in the process of learning a technique.

4. The article is titled "How ICT can Support and Enhance the Educational Process." ICT use in education is prioritized in the UK because of two main goals.

a. To start, ICT can change the pace of the lesson. It has been noted that children wish to develop their talents and abilities to the fullest extent possible by utilizing the new opportunities that ICTs offer.

b. Secondly, a large number of students in the UK are interested in participating in research and learning how to use new technologies that can improve the quality of instruction and learning in a classroom setting. This could assist those who lack experience in achieving better outcomes (Lawsent & Vincent, 1995).

5. Students' academic performance is greatly impacted by the extensive use of ICTs. ICTs help them become more educated, strengthen the integration of education into the increasingly virtual workplace, and improve instructional quality.

6. The long-standing global practice of introducing ICTs into the classroom and other academic settings shows the potential and successful application of ICTs in education (Valasidou & Bousiou, 2005).

### **2.3 ICT Equipment's Impact on Student Performance**

There are two primary ways in which the effects of ICT equipment levels on student performance have been examined. While the other aims to pinpoint the precise impact of students' personal equipment, the first focuses on the effects caused by school's investments in ICT equipment. Below is a more detailed discussion of both literary strands.

### **2.4 The Positive Impact of School ICT Equipment on Students' Average Performance**

Numerous studies demonstrate the beneficial effects of ICT investments made by schools on student performance. These studies' findings imply that these investments may result in three significant, frequently complementary changes.

Investing in ICTs first makes general digital resources more accessible within the school and encourages use of resources created by the schools themselves. It is probable that increased student use of digital content for learning will result from this improved accessibility.

For instance, it has been noted that the availability of intranets involving libraries or other archives greatly increased the amount of time that people spent online consulting library resources, articles, and books.

Secondly, through facilitating online instruction and self-study, higher education institutions can enhance student engagement by investing more in ICT. Focusing on underperforming students while providing everyone with supplementary lessons is made possible by online learning. The

dissemination of particular courses and methods for teaching medicine or learning foreign languages has been facilitated by the use of this educational tool. Additionally, ICT investments can help reduce class sizes, which should improve students' academic performance.

Third, by facilitating the adoption of remote support courses that incorporate a greater variety of educational resources catered to each audience, investments in ICT could raise the caliber of the training provided. Students would be able to "perfect their learning in the forms of teamwork, better sharing of knowledge, and reducing their individualistic behaviors to promote forms of collaborative human capital" thanks to the variety of educational materials made possible by ICTs.

Fourth, a number of current studies suggest that in order to increase information accessibility and foster greater transparency and accountability within universities, they must embrace an open approach to data. This would improve student performance by giving instructors and students access to data that is helpful for their studies and research and by giving them the tools they need to visualize and comprehend the data. But even though ICT spending at schools has increased significantly since 2000 and has been paired with facility upgrades, there hasn't been a discernible improvement in student performance or decline in school failure rates as a result. Although the university sector was among the first to adopt ICTs, Sharpe refers to the "productivity puzzles" in higher education and suggests that measuring productivity in the service sector—and particularly in the schools is problematic. To our knowledge, no research has demonstrated that a significant increase in ICT equipment boosts school systems' overall performance in a way that would increase their "productivity."

## **2.5 Personal Devices as a Contributing Factor to the Digital Divide and Performance Differentials**

Additional research focuses on students' personal equipment ownership. In terms of unequal access to ICTs, they identify a "digital divide" and investigate the impact on student performance. The majority of studies appear to concur that pre-existing social inequalities are amplified by digital disparities, penalizing some populations twice over.

With individual equipment, students should have easier access to resources after school and be able to continue working on and refining their research at home. This body of work mainly examines the function of individual computers but it also takes broadband and Internet access into account. Concerns exist, though, regarding the sharp rise in the cost of individual equipment brought on by technological advancements that are consistently delivering more affordable options. For instance, digital tablets are reasonably priced, offer Internet access, can carry out many of the functions that computers can, and enable full interaction with other computer devices. Part of the digital divide has been closed thanks to this accessibility. This is the outcome of public policies as well as the positive dynamics that define ICT markets on the one hand. Increased competition has led to lower prices for ICT-related services and materials, which has made the situation worse. Simultaneously, public policies have made it possible to improve



student facilities, particularly for the most disadvantaged students, by lowering the cost of computers and other equipment and enabling loans. Universities have also increased the amount of ICT equipment they have available, though some report low usage rates for digital boards and computer rooms. Universities are still making investments in high-speed connectivity systems, though. The increased accessibility of ICT equipment in universities raises the possibility that we should evaluate how students' use of these tools affects their academic performance.

## **2.6 Students' Creative and Teamwork-Based ICT Uses Enhance Their Performance**

In order to comprehend changes in student performance, research priorities now include the use of ICTs rather than their provision, particularly with regard to the intensity of use. Though new ICTs are changing student behaviors, particularly with regard to the amount of time dedicated to studying, a large portion of the literature still concentrates on traditional ICTs, such as computers and the Internet. There are signs that the new wave of ICTs, especially mobile Internet, is promoting innovative uses of technology that have an impact on how students learn.

This is partly because new ICTs (tablets, smartphones) and mobile Internet allow time to be allocated more flexibly and efficiently, making the most of available time—especially time that could be used for work. Students are working longer hours and spending less time learning how to use ICTs as a result of these technologies. These new ICTs are improving interaction between students and teachers and allowing students to contribute to the definition of lesson content. While these forms of interactivity are lacking in more conventional teaching methods, they are generally thought to be more appropriate in the context of higher education and student participation in the creation of course content. In this context, three arguments are put forth by the literature.

First, ICT has made it possible for students to become active participants in learning processes rather than just passive consumers of information and educational materials. The provided pedagogy can be "co-produced" by the student. Regular ICT users have been found to have a greater influence over the pedagogical content of suggested teaching modules. Students are investing more in the material as a result of this status shift, which is motivating them to learn more about the subjects. Students' participation improves their ability to acquire the skills needed to succeed on exams.

Second, by enabling feedback, the new ICTs make it easier for teachers and students to interact. They help students participate in learning activities, which raises their interest in the subjects taught. In addition, they are improving student networking and horizontal interaction outside of scheduled class periods. As a result of all of these interactions, knowledge assimilation is facilitated and student success rates should rise.

Thirdly, students are becoming more creative thanks to the new generation of ICT, which offers opportunities like developing websites, creating digital content, and starting businesses. Their

success is being positively impacted by these opportunities, which also raise their chances of landing jobs that utilize their digital skills.

Improved student performance has generally been found to depend on their capacity to use ICT interactively with teachers, other students, and in tutorial settings. This interaction improves group work skills and collaborative learning.

However, if a student's heavy ICT use is linked to social network participation that has no bearing on their academic work, it may have a negative impact on their performance. The study by Vigdor et al. [17] draws attention to the drawbacks of faster Internet connections and laptop use among US University of North Carolina students. Their basic claim is that having access to a personal computer and high-speed Internet makes it easier for people to engage in non-productive personal learning activities (like playing video games or downloading movies and music) and takes up less time for homework and other academic pursuits at home. As a result, some educational institutions have restricted or blocked access to specific websites and social media platforms. It is also evident, though, that in order to foster student participation in creative, interactive, and collaborative learning, specific skills must be learned.

Additionally, it's critical that students view ICT tools and related educational materials favorably. Exam success and the acquisition of the requisite digital skills appear to be directly impacted by how much students value the ways in which schools develop uses of educational ICT.

## **2.7 Digital Skills' Effect on Student Achievement**

As previously mentioned, increasing student performance is contingent upon the students' capacity to use ICT in an interactive manner. A collection of studies on economics that aim to determine and quantify the three levels of digital skills—instrumental, informational, and strategic—that are required to enhance student performance. The bare minimal skill sets needed to operate a computer terminal are known as instrumental skills. The ability to interpret, prioritize, sort, and cross-reference information is referred to as information skills. It also refers to the ability to store information. These abilities are harder to acquire; according to some studies, a large percentage of people are unable to conduct productive Internet research. The ability to use digital tools and content to enhance social capital, employment prospects, and educational opportunities is referred to as strategic skills. The capacity to collaborate, share, and plan online activities is necessary for the acquisition of these abilities.

ICT use intensity is generally influenced by digital skills, and vice versa. It is widely acknowledged that the impact of ICTs on student performance varies according to the level of use; minimal or irregular use has no positive effect on academic achievement. On the other hand, extensive use for educational purposes (looking up bibliographical references, using translation software, participating in chat rooms and forums, etc.) encourages students to get involved in their studies and leads to better performance and skills.

The acquisition of digital skills has a limit. ICT use at a low level doesn't lead to the investigation of complex application-related functionalities. This kind of use only calls for rudimentary knowledge (level 1 digital skills) and is primarily concerned with solving technical issues. It takes time to develop effective information skills (level 2 digital skills), but more frequent use enables the development of strategic skills needed to accomplish specific goals, like greater knowledge (level 3 digital skills). Prolonged usage also improves one's capacity for self-learning.

Some writers point out that students' increased engagement in their work is thought to have its roots in the types of learning that arise from their heavy Internet usage [5,54]. When ICTs or online educational resources are used to support them, they feel more motivated to study. As a result, by lowering work aversion, these technologies encourage self-learning and improve student performance.

## **2.8 Methods of Learning Digital Skills Restricted to Universities Using ICT-Specific Training**

For students to perform better, ICT use must be intense. However, ICT-specific training and suitable educational approaches are necessary for the acquisition of digital skills. Specific ICT training courses are being offered by numerous universities; these courses can be taken in addition to or in place of regular courses for students. Numerous studies highlight the beneficial effects of basic computer science knowledge on student performance. This body of research indicates that the acquisition of this knowledge is influenced by the student's gender, prior experiences, and social background.

According to other research, when online instruction is accompanied by conversation in forums, tutoring sessions, and online discussions, students' performance improves. This body of research highlights that when support systems are structured and aligned with the shift from teacher-centered to student-oriented learning models, learners become more motivated.

This field of study emphasizes the need of customizing teaching strategies to the needs and backgrounds of individual students. It emphasizes how instruction in ICT, intended for both educators and learners, enables the growth of the informational, strategic, and instrumental e-skills that support student achievement.

The findings in the literature can be explained by the fact that many universities are now expanding their focus to include the development of informational and strategic skills, which are often underdeveloped when students first enter higher education. Originally, these universities were primarily concerned with the development of instrumental skills. For instance, although students frequently claim to be Internet literate, not all are able to look up material pertinent to their academic assignments. Furthermore, if Internet use for education is unrestrained, it may have the opposite effect of what is intended.

In order to gain a better understanding of these abilities and behaviors, Brown and Liedholm classified the test subjects according to their "cognitive style," which was determined by three factors:

their prior intellectual development

the knowledge they had previously acquired

their "attitude" toward academic work. The authors demonstrate how students can be classified into one of several cognitive styles according to how well they learn.

They come to the conclusion that in order to maximize student learning, specialized instruction catered to each cognitive style is required. ICT investments have, on the whole, increased access to digital resources and enhanced the caliber of student-teacher or student-student interactions. Students are using ICTs to participate more actively in their work and self-learning on an individual and group level. But ICT spending won't be worthwhile unless it's combined with digital skill development plans. Universities would be encouraged to improve their digital literacy in terms of ICT skills, pedagogical skills, and curriculum design if they adopted certification programs like the International Computer Driving Licence (ICDL) or the European Computer Driving Licence (ECDL), which are awarded based on users' computer skills according to international or European standards.

## **2.9 Investments in ICT Don't Significantly Affect Students' Academic Performance**

The econometric findings indicate that neither the student's personal nor the school's equipment has an effect on their academic achievement. Having a desktop, a laptop, and an Internet connection at home does not guarantee exam success or help you get a good grade. We observe that there is no statistical significance in the coefficients of the final three variables.

Likewise, the school's equipment variable's coefficient of determination is not statistically significant, indicating that it has no bearing on the likelihood of receiving a high grade.

The outcome supports the claim that students' performance gaps are not caused by a lack of ICT equipment, despite the generalization of this technology. Our findings demonstrate that increasing access to computer equipment does not lessen students' digital divide. The current environment, which is marked by a significant rise in individual equipment, does not seem to lend itself to the double investment in ICT.

A significant portion of the equipment that universities buy is either underutilized or was decommissioned before it is ever put to use. For instance, despite the widespread availability of whiteboards, the utilization of interactive whiteboards in French universities is remarkably low.

## 2.10 Creative and Teamwork ICT Applications Enhance Students' Performance

The obtained econometric results corroborate the analytical arguments regarding the ICT uses specific to students. In fact, at the 1% threshold, the innovative, creative, and cooperative uses that arise from ICT use are statistically significant. They have a favorable impact on students' chances of receiving advanced degrees. Marginal effects support this finding by showing that a one-unit increase in collaborative ICT use positively affects students' chances of receiving high degrees. Supporting this finding, marginal effects show that a student's likelihood of falling into the group of respondents who receive a grade B rises by 7.24% for every unit increase in collaborative ICT uses. However, if all respondents are taken into account, the probability remains the same at 7.82%). Comparably, for both samples, the likelihood that a student will fall into the group of respondents who receive an A rises by 0.4% and 1.25%, respectively. Comparably, the results for marginal effects show that the likelihood that a student will fall into the category of respondents who receive a grade B increases by 4.94% for every unit increase in creative ICT uses. When all respondents are considered, the probability remains the same at 5.42%. Ultimately, for both samples, the likelihood of a student being in the group of students who receive an A rises by 0.3% and 0.8%, respectively.

The findings of Ben Youssef et al. [11] and Kuo et al. [71] are supported by these results. They must, however, be weighed against their potential effects on how universities oversee instruction and create policies to support it. Investing in ICTs necessitates concurrently stepping up student supervision to make sure their use is appropriate and won't impair exam performance.

The degree of ICT adoption, use, and integration in the teaching-learning process is primarily the responsibility of teachers. They ought to offer advice on how to use ICT in a way that is appropriate for the specific study course. Therefore, the degree to which students acquire and apply digital skills is likely to depend on the teacher's ICT proficiency as well as their adoption, use, and integration of ICT. According to Rubach and Lazarides [72], the effective integration of digital technology in teaching and learning environments as well as students' acquisition of digital skills depend on teachers' digital competencies and skill beliefs. Additionally, colleges and/or instructors ought to engage with students and not restrict their involvement to the provision of online learning materials. To enhance conventional instruction, approaches pertaining to the imaginative and cooperative use of suitable ICTs are required. Teachers should suggest websites and resources that are relevant to their students' course of study, and students should be encouraged to use the university's online resources. Since many students are not aware of the variety of websites that can be helpful to them and may not even know how to use them, the goal should be to point out which specific websites to consult. Simultaneously, instruction ought to be planned to take advantage of the synergies between conventional and ICT-based teaching approaches.

Educators and need to be aware of the detrimental effects of unrestricted use of ICTs, which can lower or at least stagnate student performance. If the university implements innovative and

complementary teaching strategies that make use of ICTs, student performance usually improves. The intensity of ICT use for educational purposes varies throughout the academic year among a population of Russian students, as demonstrated by Krasilnikov and Serenova. It can enhance student outcomes and has a tendency to rise during exam times. At other times, use tends to be less frequent but also less productive that is, unrelated to studying. This suggests that in order to increase the educational uses of ICT outside of exam periods, students should be taught more about the usefulness of specific websites. Our findings suggest that in order to lower the failure rates among students, particularly those in their first year, more research should be done on the potential of ICT to foster collaboration and creative uses. Better assimilation of the course material could be achieved through collaborative learning. These suggestions align with the ideas put forth by Kuo et al. Ultimately, it would be advantageous for academic institutions to rethink their approaches to education and support hybrid learning environments that incorporate both online and offline resources.

### **2.11 Effects of Digital Proficiency Levels on Academic Achievement**

The suggested model's two configurations demonstrate a favorable and statistically significant (at 1%), impact on students' performance in higher levels of digital skills. The marginal effects show that a student's probability of receiving a grade B increases by 48.57% for every unit increase in advanced ICT skills. For all respondents and the group that uses the Internet for education less than six hours per week, this drops to 37.66%. When an A grade is achieved, these probabilities rise to 8.23% and 16.1%, respectively, for both samples. These results are significant because they support those found in and because they clarify the higher likelihood that the student will receive a good mark in our instance. Additionally, they demonstrate that students who engage in less ICT-related instructional activities generally perform worse academically than those who use these resources more frequently.

But care should be used when interpreting these findings. Even though the amount of time a student spends online can be interpreted as a measure of their proficiency with ICTs, students who have used the Internet for longer periods of time and for purposes other than education may experience shorter connection times as a result of their increased search engine usage. This implies that methods for enhancing students' digital skills should be taught.

It's interesting that the survey's findings are still relevant even though it was carried out before the COVID-19 pandemic started. The pandemic revealed an ongoing digital skills crisis and created new opportunities, upending all stakeholders and imposing a historically unprecedented shock on work and education systems. The pandemic has made things more challenging for educators and learners with limited digital literacy, and it has brought attention to the dearth of relevant and easily accessible training resources. Lack of digital skills hinders the ability of many teachers and students—including those in environments with sufficient infrastructure—to continue developing professionally and to provide quality instruction. The pandemic has brought

to light the impact of digital literacy on the productivity of employees, educators, and particularly students, who will make up the workforce of the future.

The goal of investing in the country's youth is to build the future of the nation by obtaining the best and maximum rate of return (ROI) (HEC, Pakistan, 2016). For over two decades, higher education institutions have allocated a significant portion of their budgets to information and communication technologies (ICTs) (Youssef & Dahmani, 2008). This is because the integration of ICTs into higher education fosters the social and economic advancement of these institutions (Balasubramanian et al., 2009). Many Asian countries have implemented courses or objectives on computer basics because these are the fundamentals needed for lifelong learning (UNESCO, 2014).

According to Ali et al. (2014), IT is becoming more and more necessary in Pakistan. School students regularly use libraries that have internet access, among other technological features. The Pakistani government is pushing and guiding the use of ICTs in educational settings. Millions of dollars are being spent in this regard, with the majority going toward infrastructural improvements and the enhancement of human assistance. The Pakistani government is working hard to implement a technological revolution in the nation in order to improve human resources, infrastructure, and the integration of technology into both the public and private sectors.

There are several obstacles to ICT integration in less developed nations, and it costs a significant amount of money to establish an institution with ICT systems compared to developed countries. The primary issues included using unlicensed applications, outdated hardware and software systems, a lack of methodological support for the systems, and the exorbitant cost of obtaining, connecting, operating, maintaining, and switching the ICT system (Balasubramanian et al., 2009). ICT in education faces significant challenges in Pakistan due to abandoned infrastructure, primarily in rural areas (UNESCO, 2014).

ICT is still in its early stages and has not yet been fully integrated into the educational process (Balasubramanian et al., 2009). ICT, according to Mark (2017), is concerned with technologies that are used to transfer information (process data) between computers and other devices. These technologies include computers, fax machines, multimedia software, computers, audio-visual equipment, and the internet. Basic skills are taught with the aid of computers. Students can study at their own pace with computer assisted instruction (CAI), which makes use of drills, tutorials, and a specific computer adaptor for the deaf. Worksheets with student grades are managed with the aid of word processing-created spreadsheets. The use of ICT in education has rapidly increased. Consequently, more students are learning online and there is e-learning in the classroom. There are currently online courses offered by far-off universities.

Phakkdey (2016) reports that more educators are presenting content to students in a more engaging way by utilizing computer graphics, video discs, CD-ROMS, and other digital media. Some teachers use computers and multimedia tools to create in-class Power Point presentations,



while others mentor students with animation and AutoCAD. In order to involve their students more in the learning process than they would with traditional, teacher-controlled media presentations—which are perceived as passive—many educators use hypermedia and interactive multimedia tools.

ICT has been predicted to revolutionize education since the 1980s (Cuban, 2001). But from the standpoint of policy, these expectations often seem inflated (OECD, 2015), and scholars from all around the world (like Lindqvist, 2015) frequently dispute them. In their review of the literature, Olofsson et al. (2015) assert that small case studies may need to go beyond the current needs for educational research and that there may be successful co-curricular and curricular activity implementation because instructors must understand ICT adoption and usage at the secondary or upper levels and successfully implement it from a variety of different perspectives, both in theory and in practice.

According to Sipila (2014), teachers' use of ICT-based teaching and learning resources is influenced by their degree of digital competency. According to Male and Burden (2014), students' degree of digital competency affects their comprehension of how ICT might be used for learning in educational settings. A third theory posits that the way in which students utilize information and communication technology (ICT) outside of the classroom could influence their perceptions of its application to classroom instruction (Kolikant, 2012). Only a small number of studies, however, focus on how teachers and students understand and use ICT and target similar contexts and conditions (Ingleby, 2014).

According to Ali et al. (2013), there are a number of variables that could affect how well ICT is used in the classroom. These factors included the ICT-related educational and professional backgrounds of teachers, their prior experience with using these tools, the administration's provision of technical support, the successful implementation of government policies, the pressure to use ICT, the accessibility of ICT tools for teachers and students, the support of school leadership, and technological features.

Numerous scholars have investigated ICT-based instruction in educational settings. ICT-based digital literacy, the shift to digital platforms, and its impact on students' academic performance were all examined by Ben Youssef et al. in 2022. Thirteen hundred and twenty-three French school registrants answered a questionnaire. Based on goals, factorial analysis and logistic regression were used to collect and analyze the data. Four deductions were made based on the findings. It was discovered that students' performance has suffered as a result of insufficient investment in the ICT sector. Second, there is no correlation between students' performance and the instruction they receive on using ICT tools. Thirdly, encouraging innovation and teamwork in ICT use has improved students' performance.

According to Livingstone's (2015) case study on the use of ICT in Physics instruction, the majority of the time, ICT was used for preparation—specifically, for typing up lesson plans and



work schemes. He said that educators also use computers to evaluate the performance of their students on tests. ICT use during course delivery was relatively low, even though the majority of the physics teachers in the tested schools had computer training. He made the point that teachers and students would benefit if ICT was used in lesson design, course delivery, and assessment.

Research by Basri et al. (2018) examined how well students performed when tertiary education adopted an ICT-based curriculum. This study took students' socioeconomic status and GPA into account. This study also looked into the relationship between ICT use and academic achievement. Four Saudi institutions used the survey design and quantitative study. A basic random technique was used to distribute the questionnaire to a sample of one thousand students. Structure equation modeling (SEM) was used to assess the validity and reliability of the instrument. The analysis process employed the Analysis of Moment Structures (AMOS). Following analysis, the results demonstrated a significant correlation between academic success and ICT use. Additionally, female students performed better than male students.

An attempt was made to list the various ways that ICT has affected postsecondary education by Ishaq et al. (2020). Pakistani researchers investigated the relationship between ICT use by students and their academic performance in both public and private universities. Three hundred students and a questionnaire were used in the study. The rate and existence of any relationship between ICT and academic performance among students were ascertained through the application of the Pearson correlation coefficient and descriptive statistics. The results showed that most students had laptops and personal computers, and that they could access the Internet in classrooms. Many students reported using ICTs to improve their core skills and take an active role in their education.

### **2.12 ICT has an impact on students' academic performance:**

Without computers, the impact of ICT on student achievement at the university level of higher education in Pakistan is insufficient. When compared to other students who have not used a computer, students who use one learn more quickly. et al., Sosin (2004).

The use of ICT in common office automation software can assist in maintaining the records of individual students. Additionally, since textbooks and instructional materials are available electronically, students can easily adopt by simply clicking a button to obtain all the information they require. Following the use of ICT at the university level, this consistent trend aids in long-term student motivation (Anja Balanskat, 2007; Oscar Becerra, 2010).

### **2.13 Utilizing Multimedia in Teaching:**

Multimedia instruction has proven to be incredibly successful in helping people learn about a wide range of subjects. The way we communicate with each other is changing due to multimedia. When utilizing multimedia in the classroom, students can learn more easily than when using other approaches. Studies based on exaggerated information are occasionally mixed

with visuals or videos in lectures to aid in better understanding of the subject matter (Salem, 2000).

Both the affectiveness of traditional teaching methods and students' academic achievement are enhanced by multimedia. According to Akkoyunlu and Yılmaz (2005), teachers can enhance student performance by implementing multimedia in the classroom. A multimedia program guarantees that students, who have struggled in certain subjects—such as mathematics and English—develop their competency in these areas (Obaid 2001). Universities may use a variety of ICTs for coaching and learning for specific purposes. For instance, some students may need to use multimedia to enhance their communication and learning abilities (Valasidou, Sidiropoulos, Hatzis, and Bousiou-Makridou, 2005).

According to Ng and Komiya (2000), multimedia has the highest rate of information preservation and produces results for a shorter learning time. When multimedia is used with university students, the outcome is a shift in positive attitudes toward its use (Neo and Neo, 2001).

According to a study conducted in 2006 by Ubogu, multimedia properties effectively support human knowledge regardless of time. Multimedia technology is very valuable when used in Pakistani universities and other research organizations, both in Pakistan and in Western nations. These days, ICT is a crucial part of education and plays a part in success in any field. A distinct kind of multimedia communications, according to Babajide (2003), consists of computers, software, hardware, projectors, films, slides, and so forth.

### **2.14 Skype:**

Another free tool that is very helpful for educational purposes is Skype. Skype has a positive and effective impact on student learning at the university level. These are instructional aids that instructors use in the classroom to add excitement and interaction to their lectures. With its ability to connect students virtually and in real time, this tool is ideal for teaching English to higher education students. It also makes it easier for them to discuss ideas with experts (Graddol and Courtner, 2015).

Skype improves students' language learning abilities by connecting them with native speakers, which is helpful for students who have trouble learning languages in the classroom (Eaton, 2010). Students who require extra assistance or have limited capacity can also benefit from Skype (Mirtschin, 2008). Students can use Skype for Life to make phone calls. Interaction with other university educators can facilitate communication and facilitate reading, writing, and watching with educators (Smith, 2009). Students with disabilities who struggle to attend university classes and participate fully in class from home can also benefit from Skype (Stephenson, 2009). Through Skype, students from various environmental locations can communicate with their teachers, classmates, and support staff (Eaton, 2010).

When a university organizes a field trip for its students, Skype plays a significant role in communicating with their parents, inviting them to join the exciting trip and informing them about their children. It also facilitates calls and discussions regarding students with parents.

## **2.15 Concepts for Skype**

### **1. Personal Use**

Teachers and students can use the Skype app for personal purposes, such as communicating with friends and family, among other things.

### **2. Use in Organizations:**

Due to its low cost when compared to landline telephones, Skype is favored by numerous non-profit organizations. With an account, you can make calls from both mobile and landline phones.

### **3. The Use by Leadership Managers:**

When conducting long-distance communications, managers frequently utilize technologies like Skype's video and conference call capabilities. Compared to the custom of cradling a phone on one's shoulder, the official corresponding was made incredibly simple by the use of technology.

### **4. Program Promotion:**

Building long-lasting relationships is the foundation of marketing and business, particularly in the educational sector (Drysdale, n.d.; Eaton, 2009). Create a Skype account for students so they can call and ask questions; teachers or administrative staff will answer these calls. This will establish a basic rapport with the students.

### **5. Email that Teachers Use:**

Teachers use emails to notify their students about new tasks, assignments, and homework in order to help them (Harris and Jones, 2000). Emails are widely used at all levels of organizations to spread information from one person to another within the staff or employees. These various studies (Alexander, Zhao, & Underwood, 2002; Clingerman, & Bernard, 2004) described email use and examined its intangible foundation, which ensures the efficacy of performance.

According to Sather and Mawr (2007), some researchers outline the fundamental advantages of email use, including how it helps students perform better academically by enhancing the skills they actively practice and how they can check their mail to see what assignments their teachers have sent them. Building interpersonal skills, gaining insight, creating cognitive tasks, cautious analysis, critical thinking, planning, reflection, and awareness of other people's behavior are some of these advantages (Boxie, 2004; Cook-Sather & Mawr, 2007).

Research has indicated that the use of email enhances professional, academic, and psychosocial development. It can also strengthen the essential communication between the subjective and non-cognitive aspects of learning.

## **Chapter No 3**

### **Research Methodology/ Instrumentation**

#### **3.1 Methodology**

The research design and methodology utilized in the study, including the method, research design, instruments, population, sampling technique, and sample size, will be covered in this chapter. The methodology was used to carry out the research study on the subject of "The Effect of ICT Based Professional Training of Teachers on the Academic Performance of Students at Secondary School Level of District Rahim Yar Khan" and it provides a detailed account of the phases that the study went through.

#### **3.2 Research Design**

This study employed a descriptive research design. This study uses a quantitative methodology to examine the phenomenon in depth. Teachers in the private sectors at the secondary level are the subjects of the research. Thus, the Questionnaire chose the survey method to collect the desired data. Because of the short time and large number of respondents, this survey method—convenient sampling and numerical statistical survey method—was chosen.

#### **3.3 Research Method**

Quantitative research is taken to collect the data by simple random sampling technique, data is collected from teachers to know the effect of ICT based Professional Training of Teachers on the Academic Performance of Students at Secondary School Level of District Rahim Yar Khan .

#### **3.4 Population**

Students in Al-Muslim Girls Higher Secondary School made up the study population. In a brief amount of time, the population for this study was limited to three secondary private schools in district Rahim Yar Khan.

#### **3.5 Sampling Technique**

A sizable representative population is included in the sample. Since there wasn't a better way to collect data with the time and resources available, the researcher used a convenient sampling technique for the study.

#### **3.6 Sample Size**

Convenience sampling was used to choose a sample of 220 respondents. Where women made up the minority and men the majority. The majority of the population attends private schools since they are more conveniently located there.

#### **3.7 Instrumentation: Tools and Instruments for Gathering Data**

The type of problem to be studied determines which instrument to use. A self-developed questionnaire was designed to ascertain the effect of ICT Based Professional Training of Teachers on the Academic Performance of Students at Secondary School Level of District Rahim Yar Khan according to the literature review. A closed-ended questionnaire was the tool used in this study to collect data. There were two sections to the questionnaire. The demographic section was one of them, and the statements section was the other. The five items that make up the demographic section are the respondent's name (which is optional), age, gender, grade, and school sector. The remaining portion consists of a questionnaire with 20 questions and five response options.

1. Five (strongly agree)
2. four (agree)
3. three (neutral)
4. two (disagree)
5. one (strongly disagree) are the ratings given for each point of view. Each categorized factor's rating average is calculated.

The factor that has the highest average rating among the categories is the one that has the biggest impact on how teachers and students use ICT for academic purposes.

### **3.8 Validity and Reliability of the Tool/Questionnaire**

Expert judgment is used to validate instruments. The reliability process was used for that specific type of study. There is standardization in the questions. The same questions are posed to each respondent three inquiries in the same sequence. This implies that it will be simple to duplicate the checklist in order to verify its accuracy.

### **3.9 Time frame**

Students will need roughly 5 days to complete the questionnaires. Google forms that are accessible online will be used to collect data. Through links, a questionnaire or survey will be created. Respondents will receive links to the questionnaire via social media (whatsapp, facebook, messages, etc.).

### **3.10 Questionnaire**

Dear Friends,

The Effect of ICT Based Professional Training of Teachers on the Academic Performance of Students at Secondary School Level of District Rahim Yar Khan is the research topic I am working on as a B.Ed. (Secondary) student at the Virtual University of Pakistan. Your thoughts will only be applied to the study.

Google Form Link:

[https://docs.google.com/forms/d/e/1FAIpQLSeIDIgQk3vl2eMTaipx778nlZMp7ORDAWQLFVOJqHhdqKQVNg/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSeIDIgQk3vl2eMTaipx778nlZMp7ORDAWQLFVOJqHhdqKQVNg/viewform?usp=sf_link)

### Part 1: Demographic Information

Name of the Respondent: \_\_\_\_\_.

Information	A	B
Age	13-15	15-18
Gender	Male	Female
Grade	9th	10th
Subject discipline	science	Arts
Monthly-test marks	50-70%	75-95%
PC/ Laptop	Yes	No

### Part 2: Questionnaire Statements for Study

Please rate your experiences with the following resources/services/spaces provided by your institution.

Download or access online audio/ video recordings to revise the content of lectures you have already been to?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Use instant messaging/chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Teachers give us guidance on how to use ICT tools for learning tasks to be completed at home.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Online or virtual technologies (e.g. network or cloud-based file storage system, Web portals, etc.)

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Information is much more easily available by using ICT tools than by visiting the library.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Download and use of free and open source software for teaching and learning.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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ICT assists teachers in creating a more favorable learning environment in the classroom.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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My teacher use a computer during their classes.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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### **Perceptions of Use of Technology-Enabled Learning**

Please rate the following statements about technology use in your studies.

I want to use technology in my studies because:

It will help me get better results in my subjects.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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It will help me understand the subject material more deeply.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

It makes completing work in my subjects more convenient

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

It motivates me to explore many topics I may not have seen before.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

It will improve my IT/information management skills in general.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

It allows me to collaborate with others easily, both on and outside of the campus

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

Use Web-conferencing or video chat to communicate/collaborate with teachers in the course?

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

I save time if I use a PC/Laptop for learning.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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**Please indicate to what extent you agree with the following statements**

I get more actively involved in courses that use technology.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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I am more likely to skip classes when materials from course lectures are available online.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
----------------	-------	---------	----------	-------------------

Technology makes me feel connected to teachers.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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ICT can help teachers create new teaching-learning environments

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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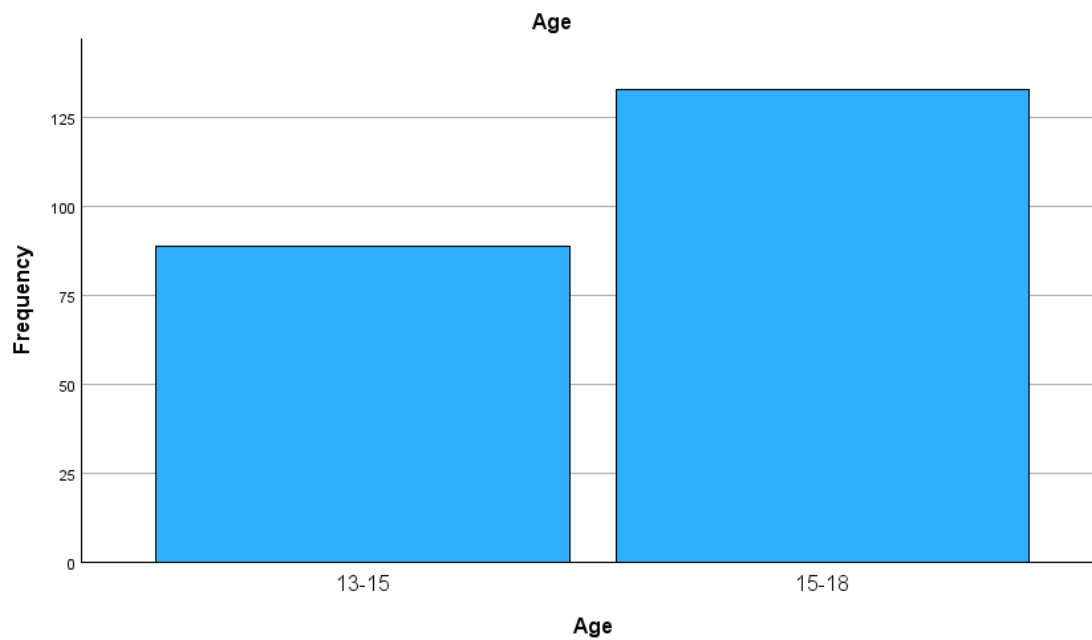
## Chapter no 04

### 4.1 FINDINGS AND CONCLUSION:

**Table No. 4.1.1.**

*Analysis of age of respondents.*

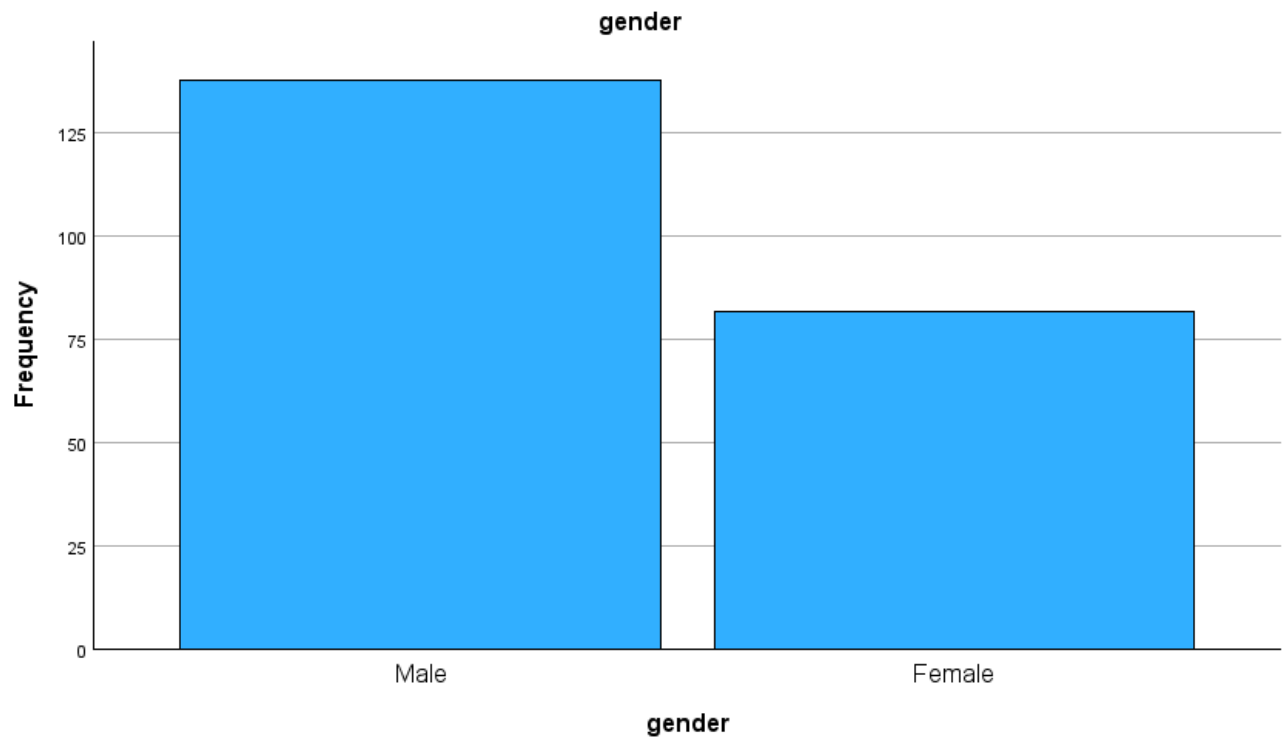
Age group	Age	
	N	%
13-15	89	40.1%
15-18	133	59.9%



**Table No. 4.1.2.**

*Analysis of Gender of respondents.*

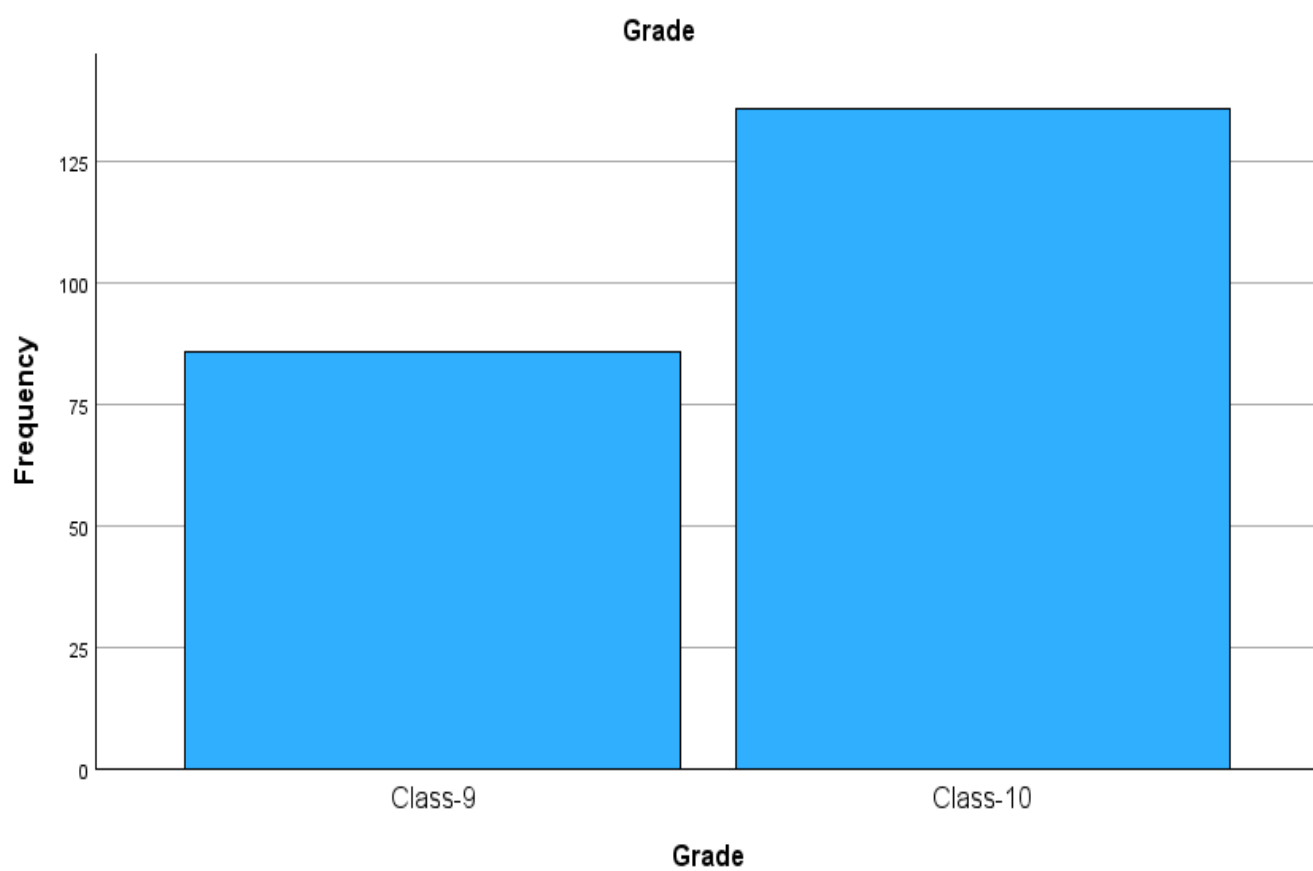
Gender		
	N	%
Male	138	62.2%
Female	82	37.8%



**Table No. 4.1.3**

*Analysis of Grade of respondents.*

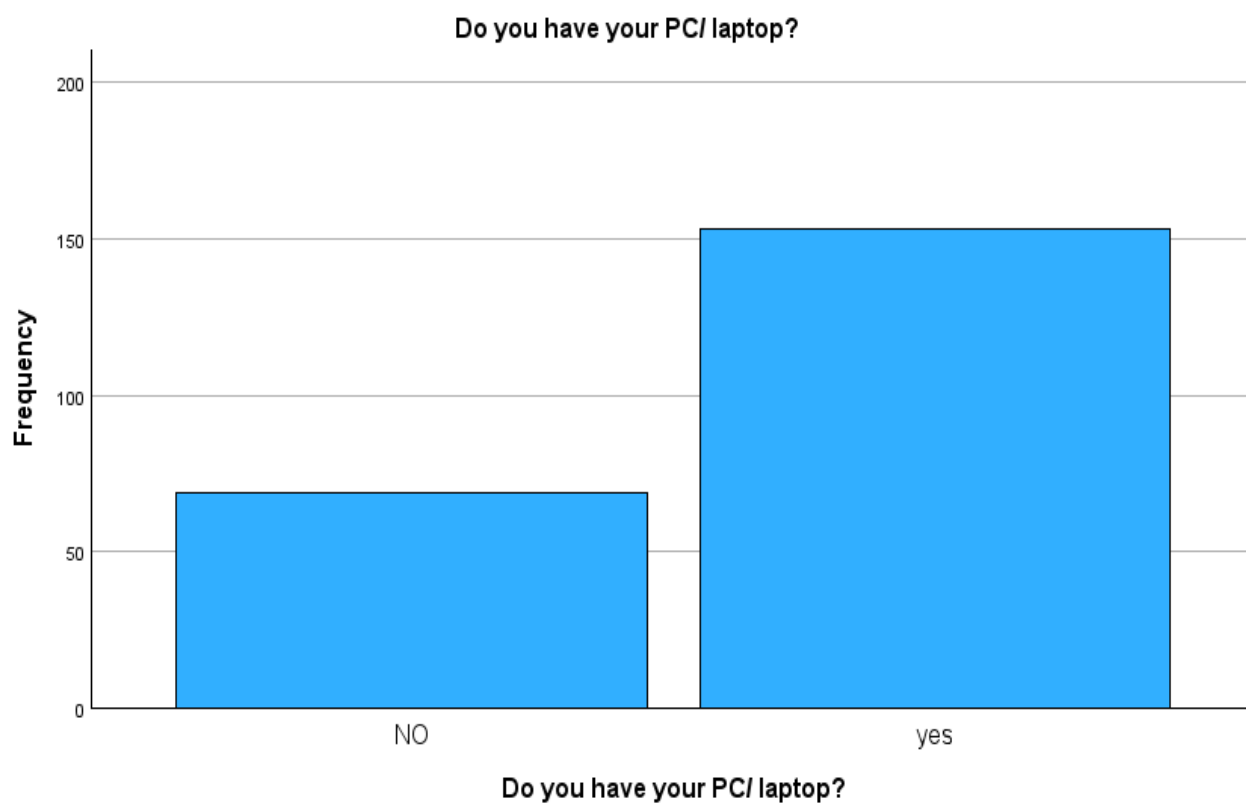
	Grade	
	N	%
Class-9	86	38.7%
Class-10	136	61.3%



**Table No. 4.1.4.**

*Analysis of Do respondents have PC/Laptop ?*

Do you have your PC/ laptop?		
	N	%
NO	69	31.1%
yes	153	68.9%



**Table No. 4.1.5**

*Analysis of Download or access online audio/ video recordings to revise the content of lectures you have already been to?*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Download or access online audio/ video recordings to revise the content of lectures you have already been to?	62	27.9	85	38.3	45	20.3	22	9.9	08	3.6	2.23	1.075

**Table No. 4.1.6.**

*Analysis of Use of instant messaging/chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Use instant messaging/chat (e.g. Skype, Messenger, Hangout, etc.) on the Web to communicate/collaborate with other students in the course?	56	25.2	79	35.6	40	18.0	42	18.9	5	2.3	2.37	1.122

**Table No. 4.1.7.**

*Analysis of Teachers give us guidance on how to use ICT tools for learning tasks to be completed at home.*

Statement	Degree of Response										Mea n	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Teachers give us guidance on how to use ICT tools for learning tasks to be completed at home.	49	22.1	69	31.1	56	25.2	34	15.3	14	6.3	2.53	1.175

**Table No. 4.1.8.**

*Analysis of Use of online or virtual technologies (e.g. network or cloud-based file storage system, Web portals, etc.)*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Use of online or virtual technologies (e.g. network or cloud-based file storage system, Web portals, etc.)	50	22.5	69	31.1	43	19.4	47	21.2	13	5.9	2.57	1.215

**Table No. 4.1.9.**

*Analysis of Information is much more easily available by using ICT tools than by visiting the library.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Information is much more easily available by using ICT tools than by visiting the library.	73	32.9	78	35.1	25	11.3	24	10.8	22	9.9	2.30	1.298

**Table No. 4.1.10 .**

*Analysis of I get more actively involved in courses that use technology.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
I get more actively involved in courses that use technology.	55	24.8	85	38.3	36	16.2	36	16.2	10	4.5	2.37	1.153

**Table No. 4.1.11.***Analysis of Technology makes me feel connected to teachers.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Technology makes me feel connected to teachers.	36	16.2	71	32.0	69	31.1	27	22.2	19	8.6	2.65	1.147

**Table No. 4.1.12.***Analysis of I am more likely to skip classes when materials from course lectures are available online.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
I am more likely to skip classes when materials from course lectures are available online.	48	21.6	80	36	38	17.1	56	55.2	00	00	2.46	1.091



**Table. 4.1.13.**

*Analysis of I wish my teachers in the School would use and integrate more technology in their teaching.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
I wish my teachers in the School would use and integrate more technology in their teaching.	56	25.2	64	28.8	30	13.5	44	19.8	28	12.6	2.66	1.375

**Table. 4.1.14.** *Analysis of It motivates me to explore many topics I may not have seen before.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It motivates me to explore many topics I may not have seen before.	42	18.9	69	31.1	35	15.8	46	20.7	30	13.5	2.79	1.334

**Table.4.1.15.**

*Analysis of It allows me to collaborate with others easily, both on and outside of the campus.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It allows me to collaborate with others easily, both on and outside of the campus.	53	23.9	72	32.4	34	15.3	55	24.8	8	3.6	2.52	1.202

**Table.4.1.16.**

*Analysis of I save time if I use a PC/Laptop for learning.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
I save time if I use a PC/Laptop for learning.	65	29.3	83	37.4	24	10.8	41	18.5	9	4.1	2.31	1.190

**Table 4.1.17.**

*Analysis of It will help me understand the subject material more deeply.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It will help me understand the subject material more deeply.	45	20.3	102	45.9	37	16.7	29	13.1	9	4.1	2.35	1.068

**Table.4.1.18.**

*Analysis of Use Web-conferencing or video chat to communicate/collaborate with teachers in the course?*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Use Web-conferencing or video chat to communicate/collaborate with teachers in the course?	59	26.6	70	31.5	43	19.4	39	17.6	11	5.0	2.43	1.196

**Table.4.1.19.**

*Analysis of It will improve my IT/information management skills in general.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It will improve my IT/information management skills in general.	57	25.7	69	71.1	51	23	19	8.6	26	11.7	2.50	1.282

**Table.4.1.20.**

*Analysis of It makes completing work in my subjects more convenient.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It makes completing work in my subjects more convenient.	40	18	74	33.3	50	22.5	40	18	18	8.1	2.65	1.201

**Table.4.1.21.**

*Analysis of Download and use of free and open source software for teaching and learning.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
Download and use of free and open source software for teaching and learning.	67	30.2	61	27.5	35	15.8	39	17.6	20	9.0	2.48	1.324

**Table.4.1.22.**

*Analysis of ICT tools create a better atmosphere in the classroom.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
ICT tools create a better atmosphere in the classroom.	56	25.2	71	32	55	24.8	29	13.1	11	5.0	2.41	1.145

**Table.4.1.23.***Analysis of My teacher use a computer during their classes.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
My teacher use a computer during their classes.	45	20.3	69	31.1	49	22.1	43	19.4	16	7.2	2.62	1.211

**Table.4.1.24.***Analysis of It will help me get better results in my subjects.*

Statement	Degree of Response										Mean	St. Dev.
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree			
	N	%	N	%	N	%	N	%	N	%		
It will help me get better results in my subjects.	81	36.5	68	30.6	45	20.3	28	12.6	00	00	2.09	1.034

## 4.2 DISCUSSION

ICT tools, according to Valasidou and Bousiou (2005), motivate teachers to adapt their current practices and acquire new knowledge, skills, and competencies. ICT resources like smart phones, teleconferences, webinars, radio, videos, television, Internet, and multimedia computer software open up new avenues for improving and updating teachers' knowledge, abilities, and competencies. The current study agrees with Valasidou and Bousiou's findings, which showed that most respondents felt that using ICT makes them more motivated to advance their pedagogical competencies. Teachers now have greater access to information through ICT, which helps them produce more outstanding work. Additionally, this result is in line with the Barron (1998) and Hew and Brush (2007) assert that teachers can update their current bodies of knowledge and skills by using ICT tools to explore and discover new bodies of knowledge and skills.

ICT can help teachers create new teaching-learning environments, which are essential for them to become successful educators in the millennium, claims Obunadike (2010). As a result, ICT can generate educators who are able to effectively and sufficiently remove obstacles from the classroom. The current study also discovered that ICT assists teachers in creating a more favorable learning environment in the classroom. The current study examined how ICT provides new avenues for educators to stay current with their knowledge and abilities.

This finding is also consistent with the findings of Davis and Tearle (1999), Lemke and Coughlin (1998), and Mselle (2012), who found that ICT has a significant potential to strengthen teachers' instructional tasks and accelerate and improve teachers' knowledge and skills. This is because ICT integration can support the renewal, nourishment, and improvement of teachers' knowledge and skills.

Teachers are regarded as the foundation of the educational system everywhere in the world and can play significant roles in the prosperity and long-term advancement of a country. Every country has distinct goals and objectives, and these cannot be met unless its students receive a top-notch education. In order to keep up with the rapid advancements in society, educators must broaden their knowledge and develop new skills. Conventional teaching methods, approaches, and strategies are impediments to progress because they do not meet the needs of stakeholders, students, or the educational system as a whole. Teachers' current knowledge and abilities must be updated in order to overcome these obstacles. However, this is only feasible if educators are personally committed, driven, and dedicated to learning new information and skills about contemporary technologies like ICT, which has been used in the classroom for the past few decades to enhance teachers' knowledge and abilities.

However, the study focused on how ninth-grade students' performance in the physics class was affected by ICT-based instruction. The outcomes showed that the experimental and control groups differed significantly. After three months of intervention, the experimental group performed better on the post-test. Similar findings were observed in the study conducted by Ishaq et al. (2020), which looked at the ICT resources that students used.

These students demonstrated more fundamental abilities, which enabled them to learn more successfully and see a bigger boost in their academic achievement. Furthermore, Basri et al. investigated the connection between student performance and ICT adoption. They discovered that student adoption of ICT led to an improvement in student performance and that there was a significant positive association. In their experimental study, Mohafa et al. (2022) discovered that, when compared to traditional teaching methods, ICT intervention significantly increased student achievement. Additionally, Simoes et al. (2022) looked at computer-related aspects that affect students' performance. According to the study, the majority of significant factors have a positive impact on students' performance. Additionally, the factorial analysis showed that there is no discernible difference between the students who received the pretest and the students who did not. The three-month duration of the intervention may have contributed to these outcomes.

#### **4.3 SUGGESTS:**

A few suggestions are made for educational establishments.

1. All students ought to have high-bandwidth internet access.
2. The online clouds ought to be accessible to them as well.
3. IT resources that can raise students' academic performance should be used by educators and administrators alike.
4. ICT-related training sessions ought to be included in the curriculum as a general study at all levels and ought to be required.
5. In order to achieve high-quality results, ICT centers should be established at all educational levels and outfitted with highly functional systems, efficient infrastructure, and human resources.



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