Effects of Technology on Science Student Towards Learning in Classroom at The Secondary Level in Islamabad

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Abstract

The goal of this study was to determine how technology influences student learning. Due to the fast-evolving technological world, technology is being added to classrooms and integrated into students' learning of science. While technology can aid in students' learning, it can also be detrimental to the teaching learning process. The development of fine motor skills and problem-solving skills can be negatively impacted by overusing them, even if they enhance many learning opportunities and make pupils more comfortable. Digital learning activities are heavily emphasized in the use of classrooms in the most recent educational policy of the Pakistani government. This study's main objective was to examine how digital learning activities are utilized in Pakistani schools. Students today have grown up in a society with ubiquitous digital communication tools. The information was gathered from ninth- and tenth-grade secondary school pupils using a survey questionnaire from Islamabad Model Colleges. To collect the data, a straitened random sample strategy was employed. 8072 science students made up the population, while 556 students made up the study's sample. The study's findings suggest that using communication technologies in the classroom may improve students' learning. The use of the digital learning model provided students with a range of opportunities. Among these strategies were ways to study that suited their unique learning preferences, pay attention in class, be more productive and creative, be more driven to learn, and enhance their grades. Learning-friendly educational technology methods can be improved and created by educational designers, making it easier for students and teachers to use them in the classroom. The conclusion reached is that digital learning benefits every classroom and school. There could be significant benefits. To foster a

technical catch-up, it is advised that considerably more work be done.

Keywords: - Digital Learning, Communication Technology, Motivation, Educational Technology, Fine motor skills, Digital learning Activities

INTRODUCTION

In our daily lives, we rely heavily on technology. Today, a wide range of vocations that did not previously require it must employ technology. Nowadays, more houses have computers than in years past, and more individuals are modifying their use of them. Web browsing, texting, social networking, interactive gaming, and other activities are just a few of the ways that both kids and adults utilize technology every day. As technology advances, our world is reliant on it more and more. Because of this, teaching pupils how to use technology effectively is now given top emphasis in public schools.

As they become older, today's youth have access to technology constantly. The growing number of social media sites and online communities has raised interest in kids. In addition, modern society is saturated in technology, including cellphones, computers, tablets, free Wi-Fi, video game consoles, and electronic toys. As pupils get older, technology has grown in popularity in our culture. According to Klopfer et al. (2009), numerous hours are lost each day by many students engrossed in well-known platforms like Facebook, My Space, World of Warcraft, or Sim City

Increasing student accomplishment via the use of technology is a common objective in education these days. Legislators, educators, and others repeat their commitment to projects and teaching methods that optimize student achievements and learning outcomes. Given the pervasiveness of technology in our culture and the need to make a long-lasting impression on students' learning, the integration of technology into teaching and learning is essential. Technology use in the classroom will gain even more significance with the implementation of the Common Core Standards and their emphasis on it (Cristen, 2009). Teachers now face a great deal of pressure to give kids an education that meets the demands of the twenty-first century.

According to Harris (2016), there is a lot of demand on today's educators to provide students with a high-quality education that meets requirements for the twenty-first century. Giving pupils the informational and technological skills they need to thrive in a world where technology is driving rapid change is part of satisfying these objectives. Teachers are always searching for new technological solutions to enhance their students' learning. Although technology has been praised as a wonderful aid in the classroom, there are a number of disadvantages that have a detrimental effect on students' learning.

One of these requirements is to equip students with the knowledge and abilities necessary to thrive in a dynamic, technologically driven workplace. Teachers are always looking for technological solutions to improve their pupils' learning. With the use of information technology, education is more accessible, convenient, and current in terms of time and place. For all students to achieve lifelong learning, they must be a member of a support system. The main goal of the school-to-work movement is to mobilize knowledge and support so that kids may pick up the routines, skills, and values necessary for success in every aspect of life (kinshuk et al. 2016).

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Technology has a huge impact on the lives of today's students. There are certain drawbacks even if integrating technology into the classroom has been beneficial. In turn, this has increased the effectiveness of learning (Fisher et al. 2014). Technology has increased student participation and willingness. Giving pupils options and immersing them in relevant activities are among the best ways to teach. Wankel, et al. (2013) explored how computers multimedia technologies video annotation technology could change basic psychomotor and cognitive abilities. The use of devices like laptops, electronic organizers, navigational aids, etc. is included in this.

Technology is all around today's pupils, giving them instant access to a tremendous amount of knowledge (Egbert, 2009). Technology integration is regarded by many in the pedagogy community as beneficial, significant, and essential for a school to run smoothly. However, a lot of teachers are reluctant to implement the change, and a lot of pupils lack the will to give it a shot.

Several tools can be used to access the vast amount of knowledge that is currently accessible on the planet. Affordability has increased dramatically for technology that was once expensive and only accessible to the rich few (Edwards, 2009). Teachers must adapt to this new way of life because children have been surrounded by technology their entire lives.

To employ these new technologies in the classroom for instruction as well as motivation, teachers who are adjusting to this new way of life must figure out how to do so.

It makes reasonable that the fast-changing digital technology environment of today's classrooms would reflect what is going on in society. The learning process can be given intrinsic meaning by demonstrating real-world technological applications, hence boosting student interest and motivation (Usher & Center on Education, 2012). The needs of all kids must be met in these classrooms as well. Technology helps to address the need for varied learning styles and also promotes a sense of community and a satisfying experience (Futurelab, 2009). Reading, social studies, math, and other subject areas can all be improved in the normal education classroom by using technology effectively (Heafner, 2004; Housand & Housand, 2012). In a conventional education classroom, children with learning difficulties can benefit from accessing knowledge and keeping up with their peers with the correct assistive technology device integration (Floyd and Judge, 2012).

Variables

1) Student learning (Dependent variable)
2) Technology (Independent variable)

Objectives:

1) To evaluate the science students observing the use of educational technology towards learning in a classroom at the secondary level
2) To expose the availability of Digital learning Activities in teaching-learning process in I.M.C. Boys.

Research Hypothesis:

H_1 There was a significant role between the science students viewing the use of educational technology towards learning in the classroom at the secondary level

Significance of the Study:

1) The study will provide a chance for the better use of communication technology among students.
2) Students could apply this technology to differentiate direction, motivate students, and include all ability levels.

Delimitation of study

Study will be delimited to

1) Islamabad Model college for boys and girls Islamabad.
2) Science group
3) Secondary level

LITERATURE REVIEW

There's a growing fear that children are becoming overly dependent on technology in the classroom due to its increasing prevalence. While technology may be a useful tool, are children equipped to handle technological problems? Some educators are adopting the flipped classroom approach because of technology. They may thus study the content at home and be prepared to participate in extra discussions, exercises, and activities in class. Few studies have been conducted on improving students' conceptual comprehension and problem-solving abilities in flipped classrooms for mathematical inquiry, claim Song and Kapur (2017). In this type of learning environment, students become more independent learners, but they also lose out on lecture time that might be used for in-depth topic discussions.

There is some controversy over whether the increased use of technology affects fine motor skills. There isn't much information available on this topic despite substantial research. A full analysis of how social media has affected writing may be found in the study of Purcell et al. (2013). Between professors and students, the definition of writing is disputed. Teachers frequently discuss the advantages and disadvantages of social media's impact on students' writing. Teachers "encourage their students to do at least some handwritten writing because they feel students engage in more active thinking, synthesis, and editing when writing by hand, and writing by hand discourages any temptation to copy and paste other people's work," according to the American Educational Research Association."

With the help of social media, students may write in groups, share their writing with more people, and express themselves more creatively. There are in fact noticeable changes in fundamental fine motor skills depending on how much time is spent typing and handwritten texts, claim Sulzenbruck et al. (2011). Both handwriting and general fine motor abilities are the subject of their research. Key behavioral factors are also impacted by computer use.

According to Fisher et al. (2014), teachers' roles have evolved as a result of the use of technology in classrooms for teaching and learning. Instead of 'teaching' the pupils, the teacher takes on the role of facilitator and joins them on their learning journey. Students must evaluate the information they gather and be able to determine its worth. Utilizing technology, learners are also self-evaluating. This supports the goal of "transforming learners from information consumers into information producers."

It is unclear how technological integration may affect sufficient motor skills in the future. Although some research has been done on this subject, it is still largely unknown. A thorough

report on the effects of social media on writing is provided by Purcell, et al. (2013). Writing is a topic of discussion between students and teachers. Teachers also talk about the benefits and drawbacks of social media for student writing. Teachers "encourage their students to do at least some writing by hand...because they feel students do more active thinking, synthesizing, and editing when writing by hand, and writing by hand discourages any temptation to copy and paste others' work" (source).

Social media has given students the opportunity to work together on writing assignments, share their writing with a wider audience, and express themselves more creatively. According to a 2011 study by Sulzenbruck et al., "there are in fact distinct differences in basic fine motor skills depending on the amount of time spent typing and handwriting texts."Both handwriting and overall fine motor skills are prioritized in their studies. Basic behavioral requirements are also impacted by computer use.

The use of contemporary pedagogical methods is being updated and replaced. Increasing use of information technology in the classroom has enabled instructors to create differentiated curricula in advance (Bebell, et al. (2004). Despite worries regarding the amount and usage of technology in the classroom as well as the potential that some of the equipment was not initially created with educational objectives in mind, many teachers continue to find ways to integrate it into their lessons. In order to evaluate how effectively they incorporated technology into their lesson plans, six master's level certification program graduates from the University of Alabama were watched at work (Zimlich, 2015).Although the amount and use of technology varies from institution to institution and even from classroom to classroom, more and more teachers are using it to support lesson planning, carry out administrative tasks, and deliver instruction.

Research Design/Method

For this study, a descriptive research design was employed. A descriptive study design seeks information to precisely characterize situations, events, or populations when conducting research. The research employed a survey methodology and utilized questionnaires. To participate in this survey, 556 college students were randomly selected from the six model colleges. This important quantitative study looked at how teachers felt about utilizing digital technology in the classroom, how it affected students' motivation for digital learning, and the challenges they faced applying their new knowledge. A simple quantitative survey method was used in this study by the researcher to verify reliable evidence of the advantages and uses of digital learning with communication educational technology.

In this chapter, researchers evaluate the study's justification, design, and researcher participation. In addition, the researcher describes the strategy, which includes methods for participant selection, instrumentation, data collection, and analysis. This section includes discussions about stability and moral behavior.

Data Collection

To make the respondents aware of digital communication learning, a questionnaire for teachers was personally administered, and a digital learning introduction was presented to the respondents. This study did not use a visual rating scale, which is a commonly used rating system. This study did not employ a widely established visual rating system. Each statement

had a level assigned, and the respondents were required to check the level they thought was most appropriate. Accord: A Disagree: D as by 1-1.5 To create a score, Neutral: As by 1.6-2.5 and As by 2.5-3 were multiplied. Data was acquired with the aid of a questionnaire. Due to their employment at Model Colleges of Islamabad, the researcher had access to the participants' personal data. In the scientific group at the higher secondary level, the colleges (IMCB and IMCG) together enrolled 8072 students, according to the Federal Directorate of Education in Islamabad, which reported this information to the authorities. Selected for the questionnaire-filling process were qualified volunteers who indicated an interest in taking part in the study.

Data Analysis

After tabulating the data, SPSS version 25 was used to examine and evaluate each questionnaire item before calculating the results. Frequencies, percentages, and a mean score were used in the analysis of the data. Based on the data analysis, conclusions, findings, and recommendations were developed. The mean score for all of the items was calculated. The mean score for each object was chosen to decide the general quality of the answers to each question.

Finding and Discussion

The findings and outcomes of the data gathered from the respondents form the basis of this chapter. The objectives of the project included "An analysis of the perception of science students about the use of technology in the classroom and its effects on motivation toward learning" and "Investigation of perception of science students about the use of technology the in classroom" from 6 colleges using the model-provided data. All the institutions included in the survey were mostly model colleges for boys and girls in Islamabad. To gain the necessary understanding of the study's research issues, it is necessary to review the obtained data. Data was described in its original form. The demographic profile of the applicants in the study is shown below.

Table1 Detail Availability of Digital Tools

Availability of digital tools

		class	ADT1	ADT2	ADT3	ADT4	ADT5	ADT6
N	**Valid**	557	557	557	557	557	557	557
Mean		1.5332	1.2478	1.2926	1.3357	2.0359	1.3752	2.6032
Std. Deviation		.49934	.59041	.57730	.59103	.41829	.66052	.74828
Variance		.249	.349	.333	.349	.175	.436	.560
Sum		854.00	695.00	720.00	744.00	1134.00	766.00	1450.00

Table 2 Detail Distribution of Classes

		class		
		Frequency	**Percent**	**Valid Percent**
Valid	**9th**	260	46.7	46.7
	10th	297	53.3	53.3
	Total	557	100.0	100.0

Table 3 Detail Distribution of Subject

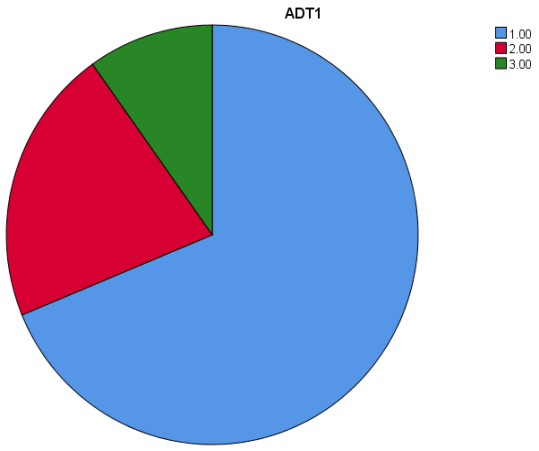
		Subject		
		Frequency	**Percent**	**Valid Percent**
Valid	**Physics**	173	31.1	31.1
	Biology	183	32.9	32.9
	Computer group	201	36.1	36.1
	Total	557	100.0	100.0

Table 4 Detail Distribution of Institute

		Institute		
		Frequency	**Percent**	**Valid Percent**
Valid	**IMSG,F-7/2**	94	16.9	16.9
	IMCB,F-8/4	63	11.3	11.3
	ICG,G-6/3	103	18.5	18.5
	IMSB,G-6/4	126	22.6	22.6
	ICG,I-10/4	62	11.1	11.1
	IMCG,GI0/4	109	19.6	19.6
	Total	557	100.0	100.0

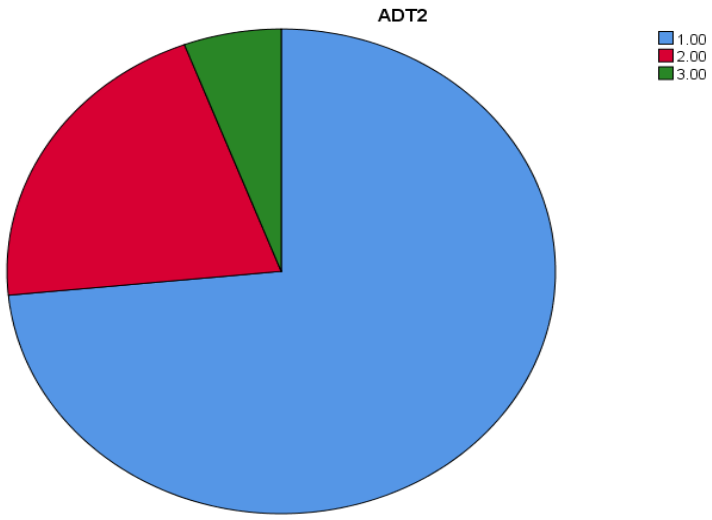
Frequency Table5

		ADT1		
		Frequency	Percent	Valid Percent
Valid	1.00	383	68.8	68.8
	2.00	119	21.4	21.4
	3.00	55	9.9	9.9
	Total	557	100.0	100.0



Frequency Table6

		ADT2		
		Frequency	Percent	Valid Percent
Valid	1.00	409	73.4	73.4
	2.00	116	20.8	20.8
	3.00	32	5.7	5.7
	Total	557	100.0	100.0



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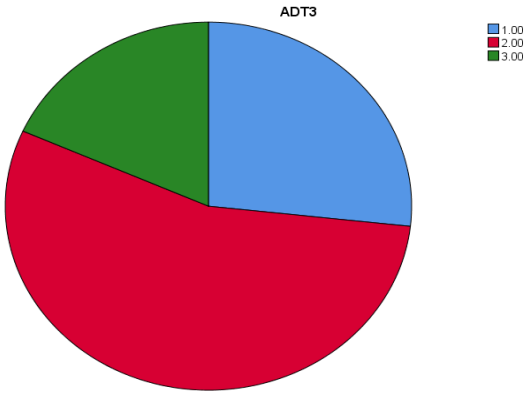
Frequency Table7

ADT3

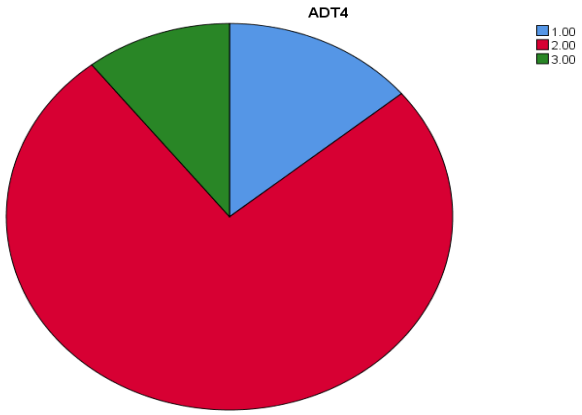
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	149	26.8	26.8	26.8
	2.00	306	54.9	54.9	81.7
	3.00	102	18.3	18.3	100.0
	Total	557	100.0	100.0	



Frequency Table8

ADT4

		Frequency	Percent	Valid Percent
Valid	1.00	78	14.0	14.0
	2.00	420	75.4	75.4
	3.00	59	10.6	10.6
	Total	557	100.0	100.0



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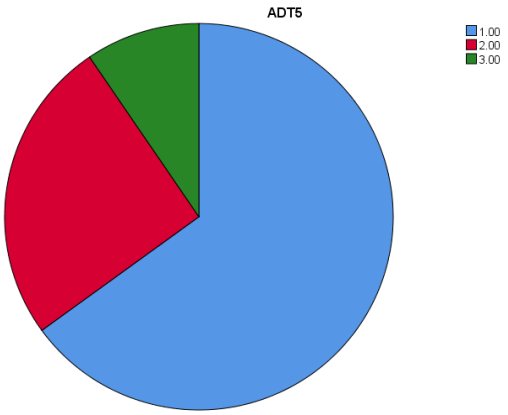
Frequency Table9

ADT5

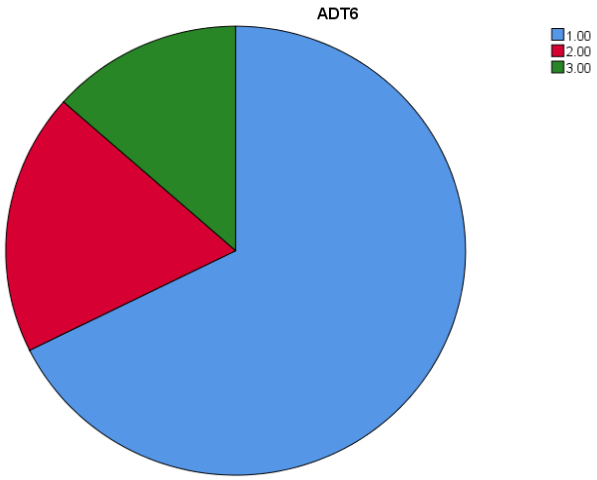
		Frequency	Percent	Valid Percent
Valid	1.00	362	65.0	65.0
	2.00	142	25.5	25.5
	3.00	53	9.5	9.5
	Total	557	100.0	100.0



Frequency Table10

ADT6

		Frequency	Percent	Valid Percent
Valid	1.00	377	67.7	67.7
	2.00	105	18.9	18.9
	3.00	75	13.5	13.5
	Total	557	100.0	100.0



Frequency Table11
Use of projector

Statement	Scales	Frequency	Percentage	Mean
Use of projector	Agree (1)	149	26.8	
	Disagree (2)	306	54.9	1.3
	Neutral (3)	102	18.3	

Table 11 Indicate that the Use Of projector, majority of respondents disagreed with Availability ofdigital tools in classroom and positive effect on teaching learning process.

Frequency Table12
Use of multimedia in classroom

Statement	Scales	Frequency	Percentage	Mean
Use of multimedia	Agree (1)	78	14.0	2.6
	Disagree (2)	420	75.4	
	Neutral (3)	59	10.6	

Table 12 Indicated that the use of multimedia, majority of respondents is agreed with availability ofdigital tools in classroom and positive effect online learning process.

Policy Recommendations
The second stage of this research was creating the policy draft in accordance with the goals of the study. This section was written following a thorough poll with 523 responses from model colleges in Islamabad, both males and girls. The following policy suggestions are listed:

1. Training sessions for students
When both teachers and students are able to learn the online system, the online teaching system is effective. Along with the teacher training program, the government should launch a program for students to learn how to take online classes effectively while lowering the likelihood of online teaching misunderstandings.

2. Announced Improved Methods of Student and Teacher Communication
Due to limited internet access and connectivity problems, communication is consistently seen as a barrier during online instruction. Communication needs to be channeled in new, simple ways to make online instruction effective. Programs on radio or television or other user-friendly technical platforms may qualify.

3.Ensure Internet Accessibility

School administrators, in collaboration with the government, have primary responsibility for the accessibility to the internet, internet-enabled devices, and other curriculum resources. One of the biggest obstacles that students have encountered is the acute shortage of curriculum resources, which has eventually resulted in a lack of engagement from both teachers and students in the most recent epidemic.

4.Technology Barriers

When teaching online during the COVID-19 pandemic, the language barrier and lack of technical skills were always seen as serious issues. In order to make the online teaching system efficient while removing these hurdles, all language and technological barriers should be addressed during teacher and student training sessions.

5.Effective Monitoring and Assessment

The inadequate execution of educational policies puts educational systems in danger, just like it does for other sectors. The monitoring and evaluation system ought to be conducted twice a year. It will guarantee effective implementation, follow-up, and accountability for every procedure that is guaranteed.

Future Research

First, Brewster admits the paucity of research on the effectiveness of various blended learning methodologies in middle school (Brewster, 2016). The literature on middle school settings is lacking, and further research on the various middle school instructional methodologies is needed. This additional research would support his claim that more sophisticated digital communication tools are possible to create utilizing methods learned in a secondary environment. However, numerous studies indicate that the usage of technology in the classroom leads to increased academic performance and motivation. Future research is necessary to understand why using instructional technology enhances academic achievement in some settings but not in others. A group could compare educational programs and delivery methods or assess which digital learning activities best utilize digital technology. The extensive use of technology to improve digital literacy in classroom management hasn't received much research. Digital learning activities may be significantly changed by research on how much time is spent using digital communication tools and achieving academic goals. Students learn with inadequate information due to research gaps.

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Final discussion of paper 4

Introduction

The way students learn and interact in the classroom has changed as a result of the introduction of technology into education. Technology is essential to science education because it helps students grasp difficult ideas, gives them practical experience, and makes it easier for them to access a multitude of knowledge that is not available in traditional textbooks. By utilizing digital tools like virtual labs, simulations, and multimedia materials, science instructors may now design more dynamic and engaging learning spaces. These developments could boost comprehension, encourage a greater interest in scientific investigation, and raise student engagement.

Technology does not, however, always have a favourable impact on science education. There are worries that students' basic learning skills may be compromised by an excessive dependence on digital resources, that the digital gap may impact equitable access, and that technology may divert attention. Therefore, for educators, legislators, and other stakeholders who hope to effectively use technological tools in the classroom, it is imperative that they comprehend how scientific students' learning experiences at the se

Thus, in order for educators, legislators, and other stakeholders to properly use technology in the classroom, they must have a thorough grasp of how it affects scientific students' learning experiences at the secondary level. This study sheds light on the advantages and difficulties of utilizing technology in scientific instruction by examining these effects within the framework of Islamabad's secondary school.

Goals of the Study

1. **To Analyze the Impact of Technology on Student Engagement**: This goal aims to explore how different technological tools and resources affect student participation and interest in science subjects within the classroom setting.
2. **To Evaluate the Effectiveness of Technology in Enhancing Learning Outcomes**: This involves assessing whether the use of technology contributes to a better understanding of scientific concepts, improved academic performance, and higher levels of critical thinking and problem-solving skills among students.
3. **To Identify Challenges Associated with the Use of Technology in Science Education**: This goal focuses on uncovering potential drawbacks, such as distractions, inequality in access to technology, and over-reliance on digital resources, which could hinder the learning process.
4. **To Understand Teachers' Perspectives on Technology Integration**: This includes investigating teachers' experiences, attitudes, and preparedness in incorporating technology into their science teaching practices.

Aim of the Study

The aim of this study is to investigate the effects of technology on science students' learning in classrooms at the secondary level in Islamabad. It seeks to provide a comprehensive understanding of how technology influences student engagement, learning outcomes, and teaching practices. The study will explore both the advantages and disadvantages of using technology in science education, providing evidence-based recommendations for optimizing

its use in the classroom. By doing so, the study aims to contribute to the development of more effective educational strategies that harness the potential of technology to enhance science education at the secondary level.

To design a research methodology for studying the effects of technology on science students' learning in the classroom, you'll need to outline several key components. Here's a detailed methodology structure to guide your study:

1. Research Design

Choose a suitable research design based on your objectives. Common designs for this type of study could include:

- **Descriptive Research**: To describe the current state of technology use in classrooms.
- **Correlational Research**: To explore the relationship between technology use and learning outcomes.
- **Experimental Research**: To assess the effects of a specific technology on learning by manipulating variables.
- **Mixed-Methods Research**: To combine quantitative and qualitative approaches for a comprehensive understanding.

2. Research Questions and Hypotheses

Define your main research questions and hypotheses. For example:

- **Research Questions**:

1. How does the use of technology in the classroom affect science students' learning outcomes?
2. What types of technology are most commonly used by science students, and how do they perceive their effectiveness?
3. Are there any differences in the impact of technology on learning based on student demographics?

- **Hypotheses**:
  - H1: The use of interactive technology (e.g., simulations, virtual labs) improves science students' understanding of complex concepts.
  - H2: Students who frequently use technology in the classroom have higher academic performance compared to those who do not.

3. Participants

Define the population and sampling methods:

- **Population**: Science students in a particular educational level (e.g., high school, undergraduate) or institution.
- **Sample Size**: Determine an appropriate sample size using statistical power analysis to ensure reliability.
- **Sampling Method**: Use either **random sampling** (if you want a representative sample) or **convenience sampling** (if there are limitations to accessing participants).

4. Data Collection Methods

Select appropriate methods to collect data. You may choose a combination of quantitative and qualitative methods:

- **Surveys/Questionnaires**: To gather quantitative data on technology use, perceptions, and academic performance.
- **Interviews/Focus Groups**: To obtain qualitative insights into student experiences and attitudes towards technology.
- **Classroom Observations**: To directly observe the use of technology and student engagement during lessons.
- **Pre- and Post-Tests**: To measure learning outcomes before and after the introduction of a specific technological tool.

5. Instruments and Tools

Specify the instruments you will use to collect data:

- **Survey Questionnaires**: Develop or adopt validated questionnaires that measure attitudes towards technology, self-reported technology use, and perceived learning outcomes.
- **Observation Checklists**: Create a checklist for classroom observations to systematically document the use of technology and student behavior.
- **Interview Guides**: Develop semi-structured interview guides with open-ended questions to explore students' experiences and perceptions in depth.
- **Academic Performance Data**: Collect students' grades or test scores as a measure of learning outcomes.

6. Data Analysis

Outline the statistical and thematic analysis methods you will use:

- **Quantitative Analysis**: Use statistical software (e.g., SPSS, R) to perform descriptive statistics, correlation analysis, regression analysis, or ANOVA, depending on your research questions and data.
- **Qualitative Analysis**: Conduct thematic analysis of interview transcripts and observation notes to identify common themes and patterns related to technology use and learning.

7. Ethical Considerations

Address ethical issues to ensure the protection of participants:

- **Informed Consent**: Obtain informed consent from all participants, explaining the study's purpose, procedures, risks, and benefits.
- **Confidentiality**: Ensure data confidentiality by anonymizing participant information.
- **Voluntary Participation**: Make it clear that participation is voluntary, and participants can withdraw at any time without penalty.
- **Minimize Harm**: Ensure that the study does not cause psychological or academic harm to participants.

8. Limitations

Acknowledge potential limitations of your study:

- **Sample Bias**: If using convenience sampling, acknowledge that results may not be generalizable.
- **Self-Reported Data**: Understand the limitations of self-reported data, which may be subject to bias or inaccuracies.
- **Technological Variability**: Recognize that different technologies may have different impacts, and results may not be uniformly applicable.

9. Timeline and Resources

Develop a timeline and resource plan:

- **Timeline**: Create a detailed timeline outlining each phase of the study, including participant recruitment, data collection, analysis, and reporting.
- **Resources**: List the resources needed, such as access to classrooms, technological tools, survey software, and data analysis tools.

By following this structured methodology, you'll be able to conduct a comprehensive study on the effects of technology on science students' learning in the classroom.

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