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Exploring the Effect of Technology on Academic Performance Among High School Students in Kathua District (J&K)

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Abstract

This study investigates the effect of technology on the academic performance of high school students in the Kathua district of Jammu and Kashmir. With rapid advancements in educational technology, there is growing interest in understanding its potential to enhance student learning outcomes. The research aimed to assess students' awareness of technological resources and examine how the use of such technologies influences their academic performance. A descriptive survey method was used, and the sample comprised 120 students purposively selected from six private high schools in Kathua. Data were collected through a self-structured opinionnaire consisting of 27 items, including both open and close-ended questions. The responses were analyzed using percentage-based statistical techniques. The results indicated a strong positive perception of technology's role in enhancing engagement, motivation, and academic performance, with tools such as computers, internet access, and audio-visual aids significantly motivating students, enhancing their comprehension, and improving overall performance. However, challenges such as lack of infrastructure, power cuts, and untrained teachers were identified as barriers to technology integration. The study concludes that with adequate resources and teacher training, technology has the potential to significantly make higher educational outcomes among high school students.

Keywords: Educational Technology, Academic Performance, High School Students, and Technological Resources.

Introduction

In the 21st century, with the world becoming increasingly digitalized, the use of technology in India is rapidly growing. Technology has gained significant attention in education due to its prevalence, its potential to provide low-cost education, and its ability to enhance participation, learning effectiveness, and enjoyment. The internet, one of the most advanced and popular technologies, is being used more and more by young people, reflecting a trend that is rapidly accelerating (Hargis, 2000; Johnson et al., 2020). Technology often referred to as the "science of craft," encompasses the techniques, skills, methods, and processes used to produce goods or services. It can also refer to the knowledge of techniques and processes or the embedded systems in machines that allow operation without a detailed understanding of their mechanics. Technology systems involve machines that take input, process it according to specific functions, and produce an outcome. Early technologies, such as the discovery of fire and the invention of

the wheel, significantly impacted human survival and advancement. Today, technology is integral to shaping societies and is essential in business, medicine, media, and entertainment (Schwab, 2016). It facilitates daily tasks, from banking and shopping to checking news and weather, making life more convenient (Brynjolfsson & McAfee, 2014).

The Role of Technology in Education

In traditional educational settings, technology enhances the efficiency and effectiveness of learning. Efficiency is measured by the speed at which knowledge is obtained, while effectiveness relates to how well the knowledge is mastered. When technology is incorporated into education, both students and teachers benefit, as increased teacher knowledge and use of technology positively impact student teaching and learning (Garrison & Kanuka, 2004). Technology can enhance educational achievement by removing physical barriers to learning and shifting the focus from simply retaining information to using it effectively (Siemens, 2005). Technology also allows teachers to form learning communities beyond the local school. For instance, science teachers can use wikis or content delivery systems to collaborate and share information with peers across schools and districts. Such platforms facilitate reciprocal teaching and mentorship within a larger informal learning community. Online learning environments foster discussions and socialization, adhering to constructivist learning principles, where knowledge is effectively learned through social interaction (Dempsey & Van Eck, 2007; Choi & Lee, 2017).

Technological innovations, such as mobile learning and distance education, have transformed the education sector. The internet enables teachers to reach students across geographical boundaries, allowing even students from developing countries to access advanced educational courses. The integration of educational technology has improved both teaching and learning, creating more opportunities for education and making learning more engaging for students (Cohen & Levinthal, 2019). Recent advancements in educational technologies have resulted in positive educational outcomes, supporting both teaching and learning processes (Bakia et al., 2013).

Academic performance

Academic performance or achievement refers to the knowledge and skills students acquire, typically assessed through tests, performance assessments, and portfolios (Santrock, 2006). It is a measure of understanding in specific subjects or areas of study, influenced by various factors, including cognitive abilities, affective factors, and school-home dynamics (Zimmerman, 2002). Research has shown that self-regulated learning strategies can significantly improve academic achievement (Schunk & Zimmerman, 2012). In the classroom, academic success is determined by students' competence in subjects they have studied, with grades or test scores reflecting their performance. Achievement involves active participation in knowledge development, motivated by cooperation, exploration, and teacher intervention (Driver, 1989; Anderson & Krathwohl, 2001). Effective learning occurs when students are provided with opportunities to solve real-world problems, ask questions, conduct investigations, and analyze and report data (Blumenfield, 1993). In education today, academic achievement is a key concern for students, teachers, and parents, often considered the end product of educational efforts (Balasubramanian, 1997; Tatum, 2019).

Review of the Related Literature

Numerous studies, both international and national, have explored the multifaceted influence of technolo-

gy on students' academic performance, highlighting its potential to both support and challenge learning outcomes. Khan, Khan, and Bhatti (2011) found that students in Pakistan were self-taught internet users with positive attitudes toward using digital tools for academic purposes, while Malamud and Eleches (2011) revealed that Romanian students with computer access improved in digital fluency but showed a decline in core academic subjects. Basturk (2014) showed a positive correlation between home internet access and academic success among Turkish students, and Potchelve (2014) emphasized the need for deliberate ICT integration into curricula. Kimberly (2017) noted that U.S. teachers observed improved student performance in reading and math through technology use. In India, Vijaykumar (2011) and Agrahari (2013) found that ICT enhances engagement and achievement, particularly in science subjects, and Hussain (2016) and Bhat (2016) emphasized responsible internet use and web technology integration in Jammu and Kashmir's higher education. More recent studies reflect a shift toward more strategic use of technology. Bhat (2023) highlighted improved engagement and achievement through thoughtful technology application, while Schindler et al. (2017) noted its role in promoting higher-order thinking and collaboration. Weng and Zhang (2025) showed that immersive virtual classrooms boost motivation, and Zhao (2025) demonstrated how smartphone-based labs improve science understanding. In the Indian context, Basargekar and Singhavi (2017) identified self-confidence and institutional support as key to teacher ICT proficiency, and Singh (2024) and Pandey (2024) discussed the growing impact of government initiatives like SWAYAM and the need for better infrastructure and teacher training. Reinforcing this, the Union Budget 2025 allocated ₹1.48 lakh crore to education, with emphasis on digital learning and teacher development, while the upcoming NEP 2025 aims to strengthen ICT under Samagra Shiksha through smart classrooms, teacher tablets, and ICT labs. Collectively, these findings underline that while technology holds transformative potential; its success depends on strategic implementation, robust infrastructure, and comprehensive teacher support.

Justification of the Study

As digital tools become increasingly integrated into educational settings, it is essential to evaluate their effectiveness in enhancing academic performance across diverse contexts. Numerous studies have illustrated both the benefits and challenges associated with technology use in education. For instance, Khan, Khan, and Bhatti (2011) and Malamud and Eleches (2011) provide insights into how technology can positively influence students' attitudes and digital skills, while also showing that its use may not always correlate with academic improvement in traditional subjects. This highlights the need for a deeper understanding of how technology, when applied strategically, can maximize academic outcomes. Studies by Basturk (2014), Potchelve (2014), and Kimberly (2017) emphasize that home internet access, integrated curricula, and teacher perspectives all play crucial roles in fostering a positive relationship between technology and academic success. Furthermore, the more recent studies of Bhat (2023), Schindler et al. (2017), Weng and Zhang (2025), and Zhao (2025) reflect a shift towards personalized, immersive, and mobile technology applications that have shown promising results in boosting engagement, motivation, and understanding, particularly in complex subjects like science. This indicates a trend toward evolving educational practices that better align with contemporary technological advancements.

The Indian context, as highlighted by studies from Vijaykumar (2011), Agrahari (2013), and Singh (2024), underscores the need for robust teacher training, infrastructure, and government initiatives such as SWAYAM to ensure equitable access to technology for all students. The inclusion of policy

developments like the Union Budget 2025 and the NEP 2025 further strengthens the rationale for this study. The allocation of substantial funds to digital learning and teacher capacity building reflects the government's commitment to integrating technology in education. However, as these findings collectively show, the success of technology in education hinges not only on its availability but also on its thoughtful and strategic implementation.

The study aims to explore how well technological interventions align with pedagogical goals, educators' capacity, and the infrastructural support required for optimal learning outcomes. To investigate this, the researcher will conduct a study on the Effect of Technology on Academic Performance among high school students in Kathua District. This research will provide valuable insights into how technology influences academic performance, highlighting its role in enhancing student achievement. Additionally, the findings will encourage the increased use of technology in education, offering recommendations for improving its integration into teaching practices and fostering better learning environments.

Statement of the study

The statement of the present study is "*Exploring the Effect of Technology on Academic Performance among High School Students in Kathua District (J&K).*"

Operational Definition of the Key Terms

Effect: A change which is a result or consequence of an action or other cause. In the present study effect refers to the effect of technology on the academic performance of high school students.

Academic Performance: Performance is the extent to which a student has achieved their short or long-term educational goals. In the present study academic performance refers to the performance of high school.

Objectives of the Study

The objectives of present study are:

1. To study the awareness of the students towards the accessibility of technological resources.
2. To study the effect of technology on academic performance of students.

Delimitations of the Study

The study was delimited to the private high schools students of the Kathua district (J&K).

Method

The Descriptive survey method of the research was used for the present study.

Population

In the present investigation, all high school students of the Kathua district (J&K) constituted the population.

Sample

The sample of the present study consisted of 120 high school students from the Kathua district. Out of 15 high schools in the district with a total of approximately 2200 students, 6 schools were randomly selected, and from these, 120 students were purposively chosen.

Table 1: Showing the sample of students drawn from different high schools of the Kathua district

S. No.	Name of the School	Number of Students
1	Indian Public School, Kathua	20
2	Mount Litera Zee School, Kathua	20
3	R. S. J. N School, Kathua	20
4	Cosmic Heart Sr. Sec. School, Kathua	20
5	S. R. M. School, Kathua	20
6	G. H. S. School, Kathua	20
	Total	**120**

Tool Used

For the purpose of data collection, a self-structured opinionnaire was used as the research tool.

Analysis and Interpretation of data

The present study was conducted with the help of an opinionnaire containing 27 items. The items were presented and analyzed one by one by the investigator and presented below:

Table No. 2- Shows the responses of the students whether Technology helps to make teaching and learning more meaningful and participative

Responses	Number	Percentage
Agree	116	97%
Undecided	3	2%
Disagree	1	1%

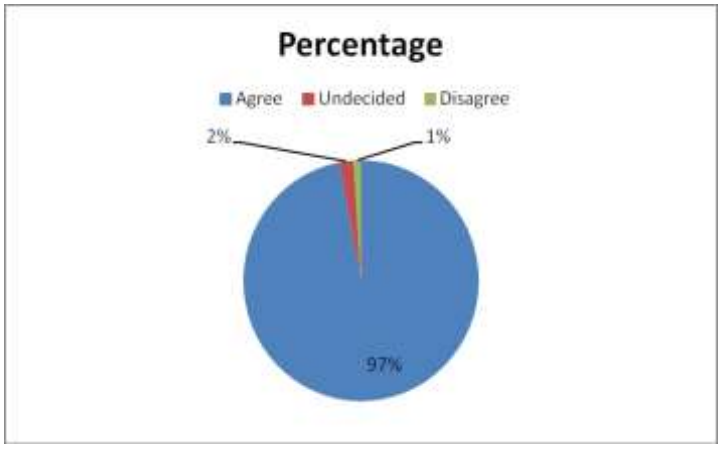


Table No. 3- Shows the responses of the students whether Teaching is an important part of school education

Responses	Number	Percentage
Agree	117	98%
Undecided	3	2%
Disagree	0	0

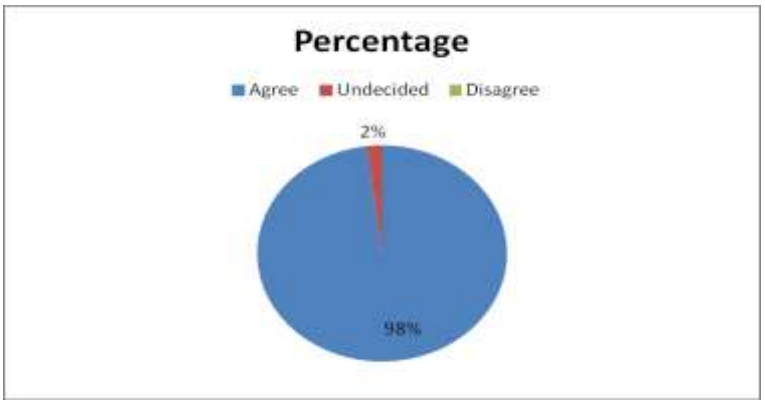


Table No. 4- Shows the responses of the students whether Technological resources should be available in the schools (technological resources like audio-visual aids, projectors, and computers)

Responses	Number	Percentage
Agree	117	98%
Undecided	0	0
Disagree	3	2%

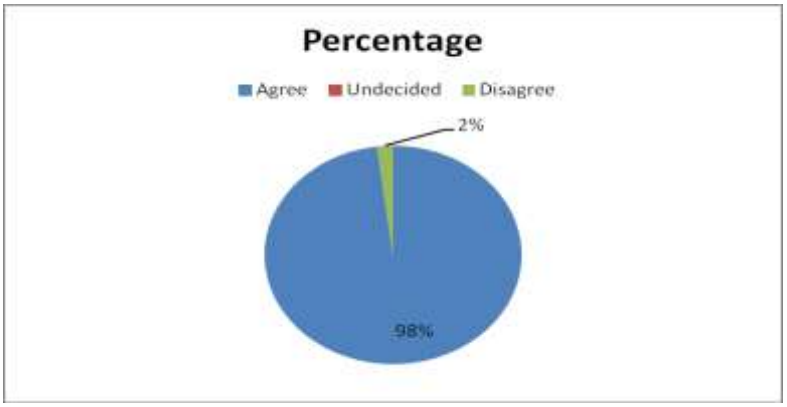


Table No. 5- Shows the responses of the students whether the Use of technology in the classroom makes learning better

Responses	Number	Percentage
Agree	116	96%
Undecided	3	2%
Disagree	3	2%

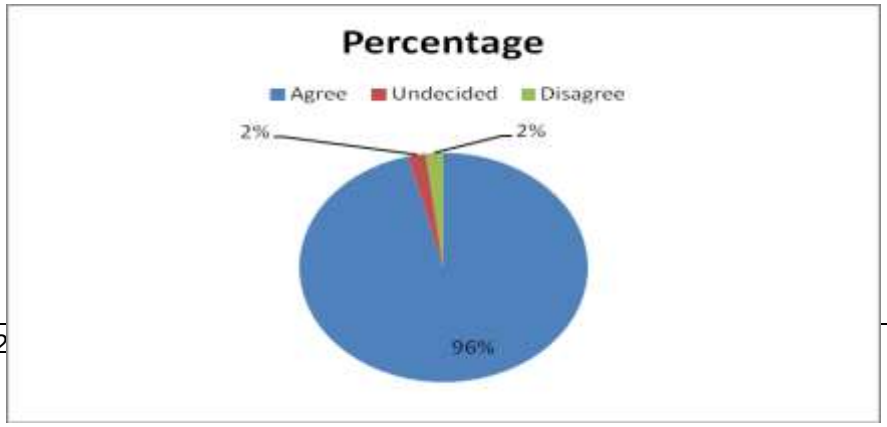


Table No. 6- Shows the responses of the students whether Traditional teaching methods rely mainly on textbooks

Responses	Number	Percentage
Agree	114	97%
Undecided	4	2%
Disagree	2	1%

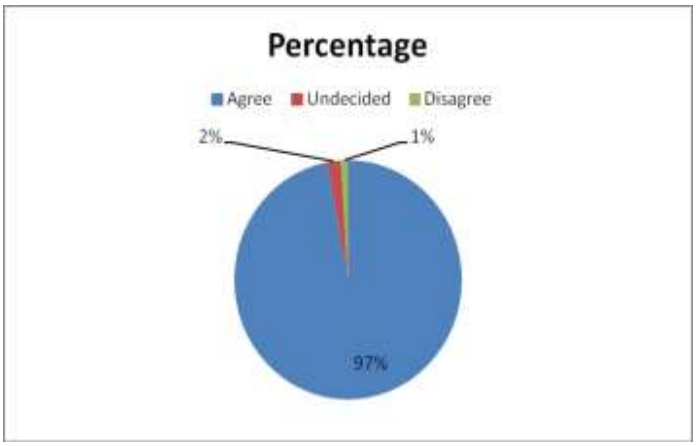


Table No. 7- Shows the responses of the students whether Students feel excited when they use audio-visual aids

Responses	Number	Percentage
Agree	116	97%
Undecided	4	3%
Disagree	0	0

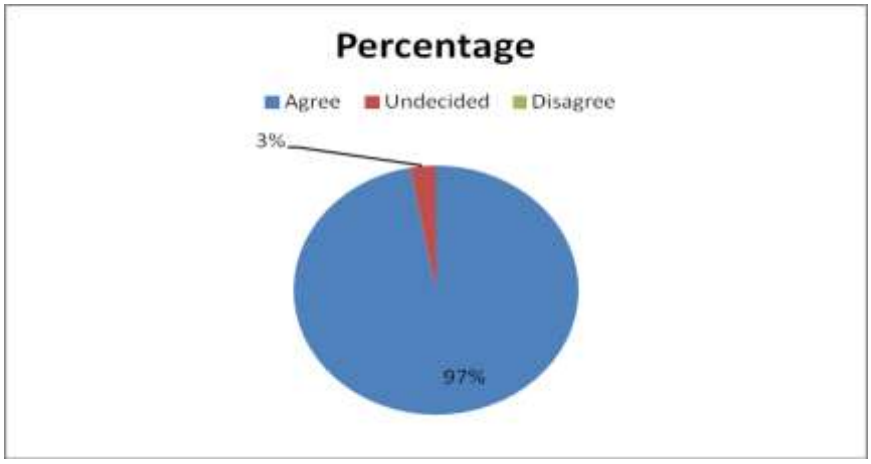


Table No. 8-Shows the responses of the students whether Students can early understand various topics through audio- visual aids

Responses	Number	Percentage
Agree	115	96%
Undecided	3	2%

Disagree	3	2%

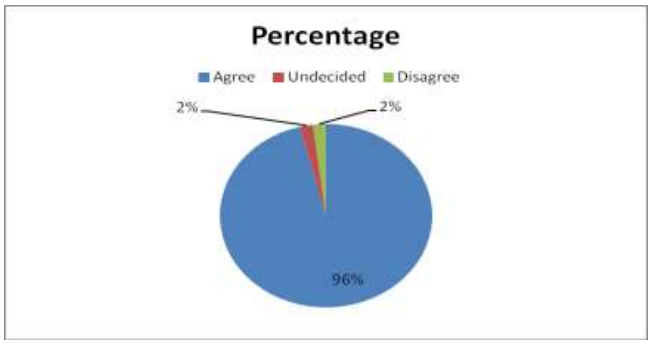


Table No. 9-Shows the responses of the students whether Students can understand content easily with the use of computer

Responses	Number	Percentage
Agree	104	87%
Undecided	9	7%
Disagree	7	6%

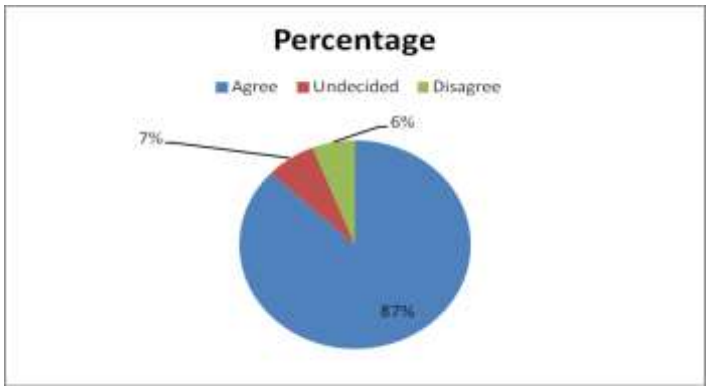


Table No. 10- Shows the responses of the students whether Students feel that learning by computer is interesting

Responses	Number	Percentage
Agree	110	90%
Undecided	3	4%
Disagree	7	6%

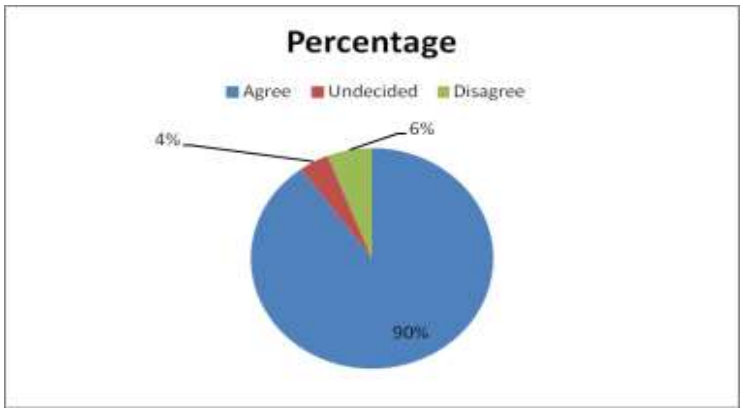


Table No.11 –Shows the responses of the students whether Students believe that computer motivates them to learn

Responses	Number	Percentage
Agree	110	90%
Undecided	3	4%
Disagree	7	6%

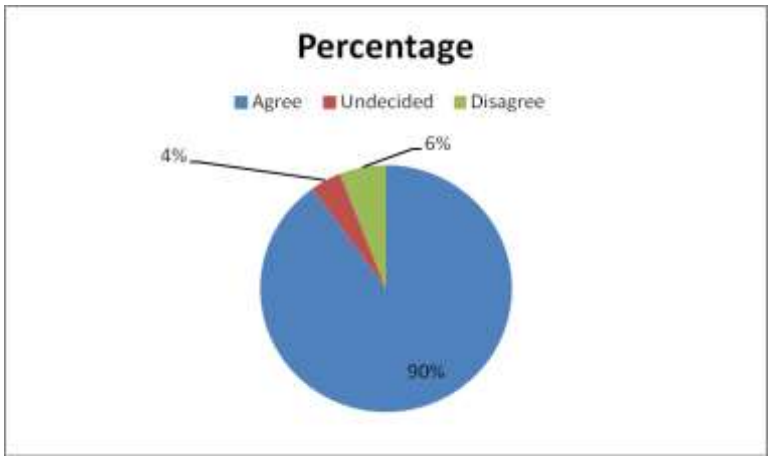


Table No. 12-Shows the responses of the students whether using computers and internet will help the students to score better in the exam

Responses	Number	Percentage
Agree	109	90%
Undecided	0	0
Disagree	11	10%

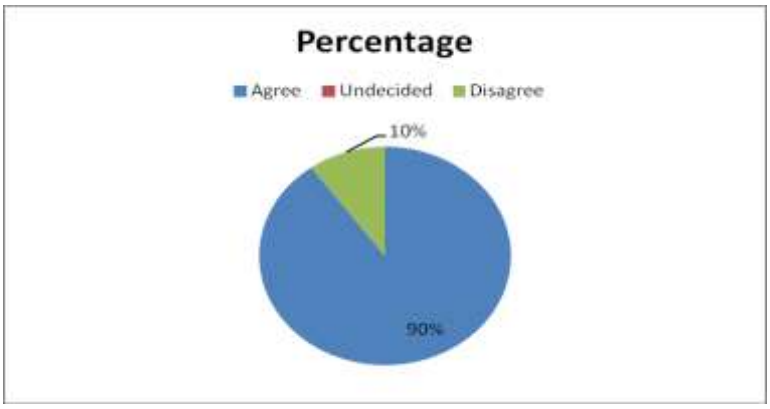


Table No. 13 –Shows the responses of the respondents whether Schools should have internet access for teaching learning purpose

Responses	Number	Percentage
Agree	117	98%
Undecided	0	0
Disagree	3	2%

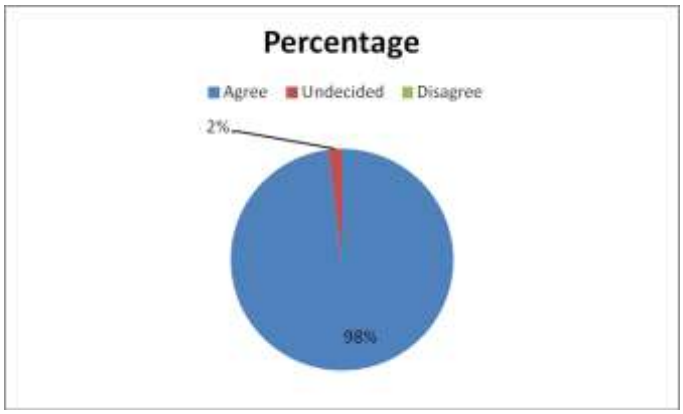


Table No. 14- Shows the responses of the students whether Classroom learning should include interactive communication technology

Responses	Number	Percentage
Agree	111	93%
Undecided	9	7%
Disagree	0	0

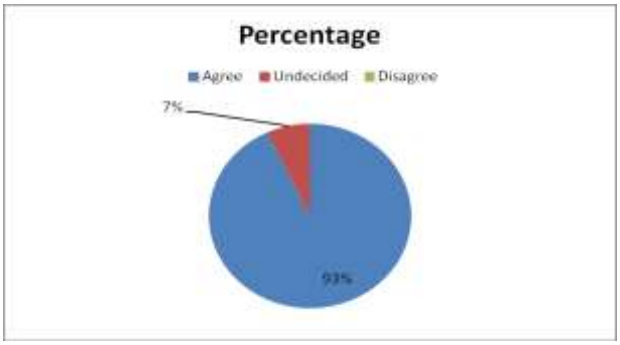


Table No. 15-Shows the responses of the students whether Students use internet when they wants to learn

Responses	Number	Percentage
Agree	119	99%
Undecided	0	0
Disagree	1	1%

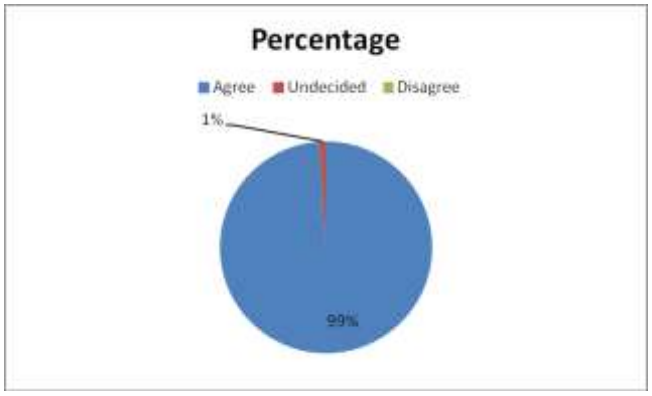


Table No. 16-Shows the responses of the respondents whether Students find internet useful in their studies

Responses	Number	Percentage
Agree	115	96%
Undecided	1	1%
Disagree	4	3%

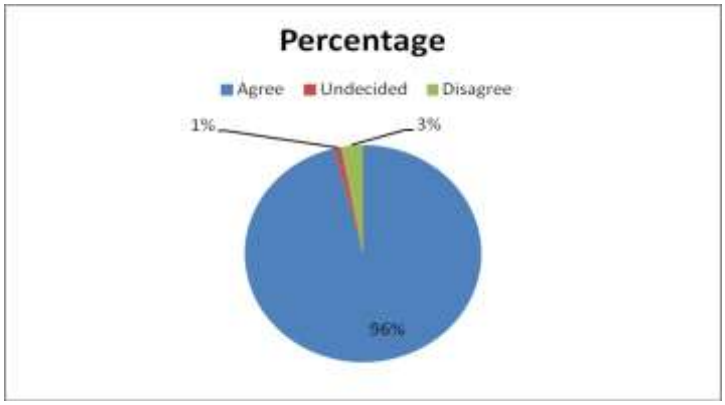


Table No. 17-Shows the responses of the students whether Use of internet will increase students' knowledge

Responses	Number	Percentage
Agree	119	99%
Undecided	0	0
Disagree	1	1%

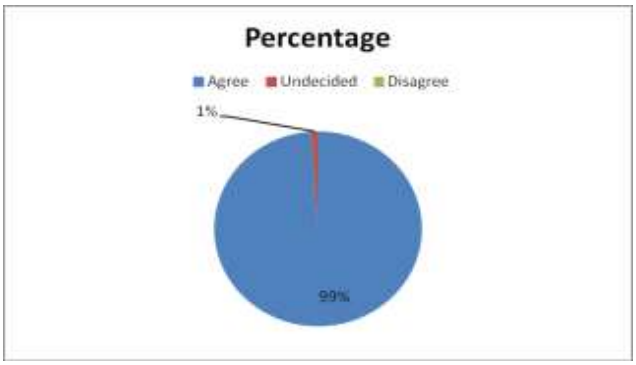


Table No. 18 –Shows the responses of the students whether Use of technology makes the students attentive in the classroom

Responses	Number	Percentage
Agree	115	96%
Undecided	5	4%
Disagree	0	0

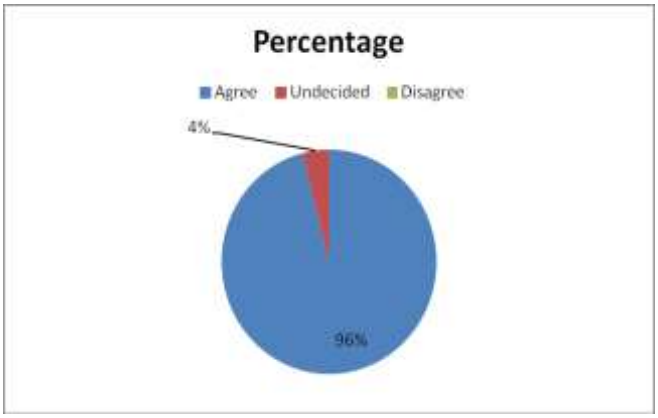


Table No. 19-Shows the responses of the students whether Use of technology enhances the creativity among the students

Responses	Number	Percentage
Agree	103	86%
Undecided	11	10%
Disagree	5	4%

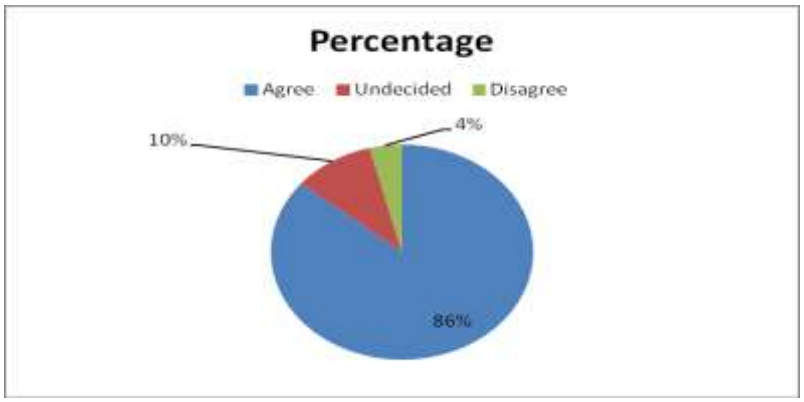


Table No. 20 –Shows the responses of the students whether Use of technology generates critical thinking among the students

Responses	Number	Percentage
Agree	78	65%
Undecided	24	20%
Disagree	18	15%

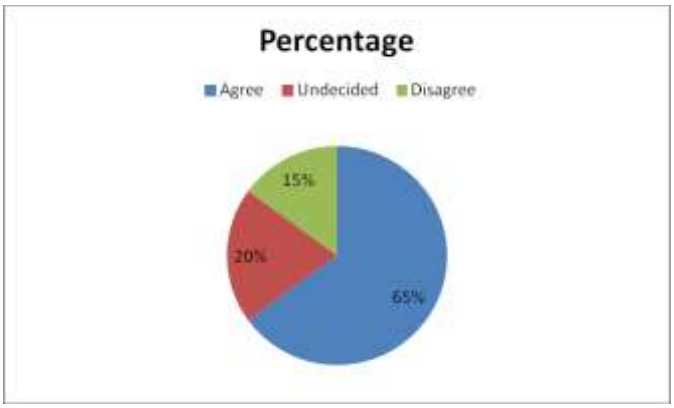


Table No. 21 –Shows the responses of the students whether Classroom environment can be very engaging when designed and integrated with the right technology

Responses	Number	Percentage
Agree	112	95%
Undecided	4	3%
Disagree	3	2%

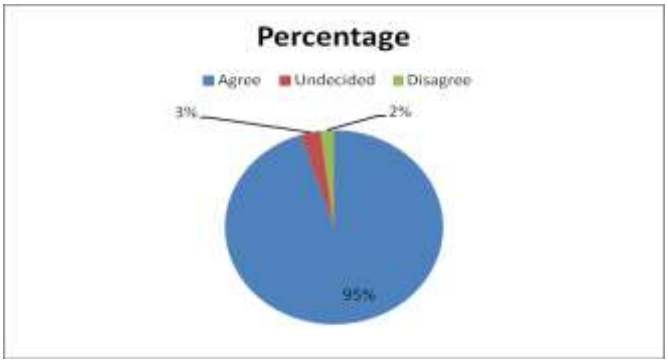


Table No. 22-Shows the responses of the students whether Use of technology enhances the technical skills of the students

Responses	Number	Percentage
Agree	84	70%
Undecided	23	19%
Disagree	13	11%

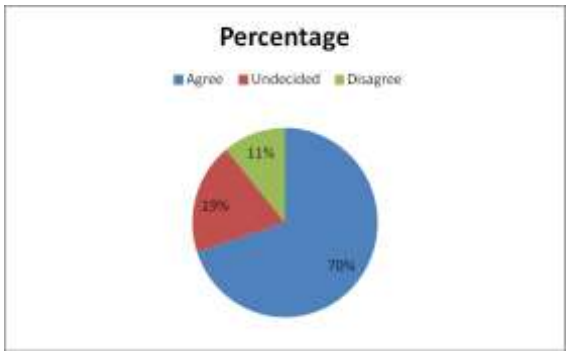


Table No. 23-Shows the responses of the students whether Use of technology helps the students to keep them updated

Responses	Number	Percentage
Agree	117	98%
Undecided	0	0
Disagree	3	2%

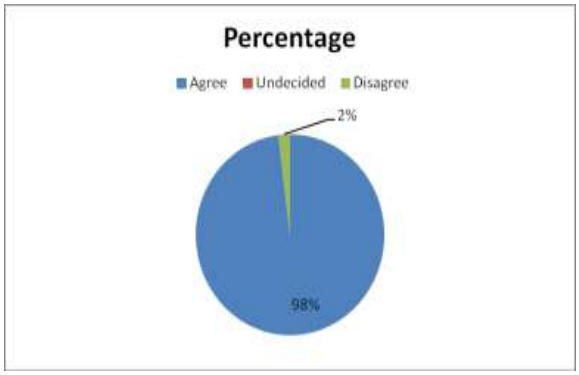


Table No. 24 –Shows the responses of the students whether Use of language laboratory enhances the communication skills of students

Responses	Number	Percentage
Agree	46	38%
Undecided	19	16%
Disagree	55	46%

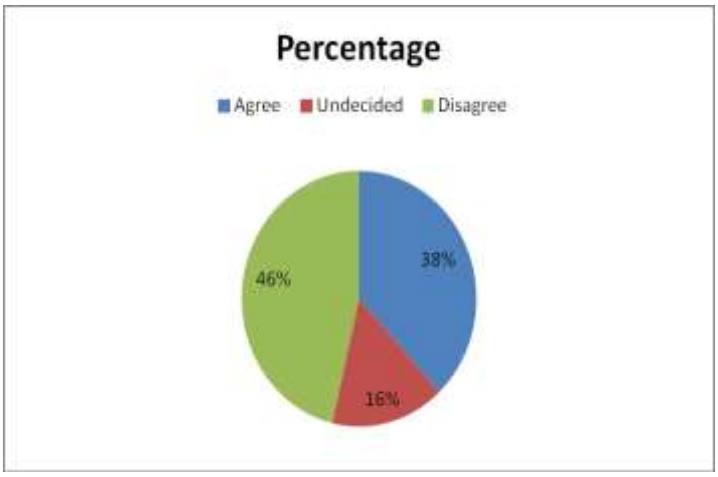


Table No. 25 –Shows the responses of the students whether excess exploration of technology diverts the students' attention the classroom

Responses	Number	Percentage
Agree	32	27%
Undecided	23	19%
Disagree	65	54%

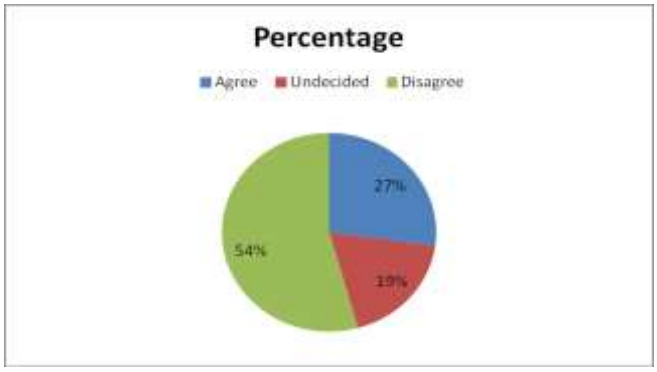


Table No. 26 –Shows the responses of the students whether Technology prepares the students for better academic performance

Responses	Number	Percentage
Agree	114	95%
Undecided	0	0

Disagree	6	5%

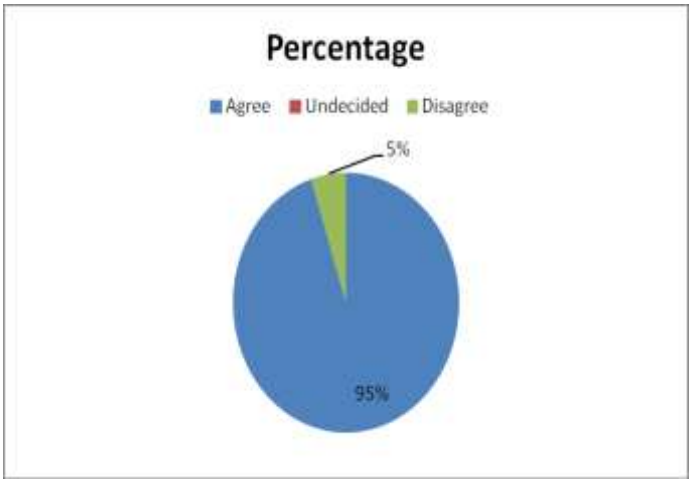


Table No. 27-Shows the responses of the students about problems which hinder the use of technology in their classrooms

S. No.	Problems	Percentage
1	Lack of technological resources	85%
2	Lack of professional Teachers	90%
3	Problem of power cuts	70%
4	Restrictions on students focusing technology in their schools	50%
5	Lack of Infrastructure	55%

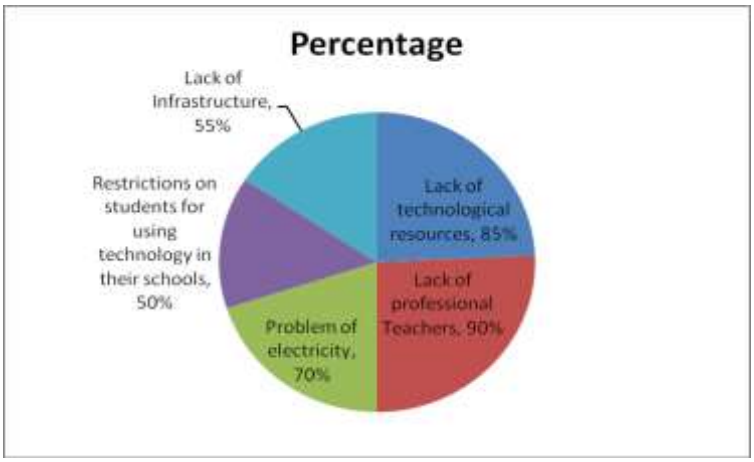
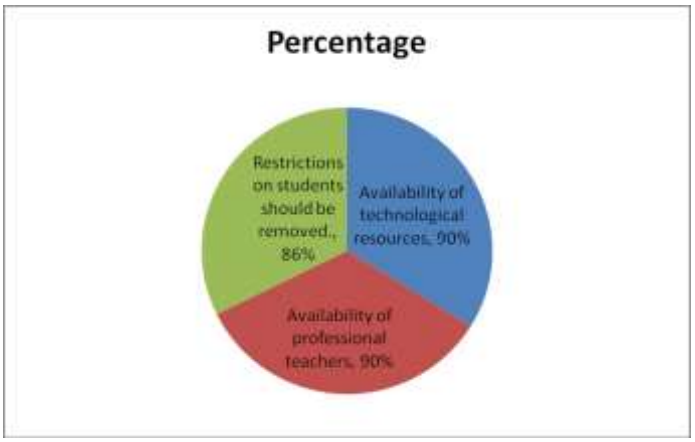


Table No. 28-Shows the responses of the students about the suggestions to overcome these problems

S. No.	Suggestions	Percentage
1	Availability of technological resources	90%
2	Availability of professional teachers	90%
3	Restrictions on students should be removed	86%



Major Findings of the Study

The findings of the study revealed that a significant majority of students strongly acknowledged the positive impact of technology on teaching and learning. Specifically, 97% agreed that technology made both teaching and learning more meaningful, while 98% emphasized that teaching was a vital component of school education. Furthermore, 98% of students believed that technological resources should have been made available in schools, and 96% agreed that the use of technology in classrooms improved learning outcomes. Traditional teaching methods, according to 97% of students, were primarily textbook-based, whereas 97% also noted that they felt excited when using audio-visual aids. Additionally, 96% stated that audio-visual aids helped them understand topics more easily, and 87% believed that computers enhanced content comprehension. A total of 90% affirmed that computers motivated them to learn, and the same percentage agreed that using computers and the internet led to better exam performance. Similarly, 90% supported the idea that schools should have had internet access for teaching and learning purposes.

Moreover, 98% of students advocated for the integration of interactive communication technologies in classroom learning. Around 93% reported that they used the internet when they wanted to learn something new, and 99% found the internet useful for academic purposes. A total of 96% agreed that internet use increased their knowledge, while 99% believed that technology kept them attentive in class. Also, 96% stated that technology enhanced their creativity, and 86% believed it promoted critical thinking. However, only 65% agreed that classroom environments became more engaging when integrated with appropriate technology. Additionally, 95% agreed that technology improved their technical skills, and 90% felt that it helped them stay updated. A notable 98% believed that language laboratories enhanced their communication skills.

On the contrary, 46% of students disagreed with the notion that excessive technology use distracted them in the classroom, and 54% disagreed that technology prepared them for better academic performance. Interestingly, 95% later agreed that technology indeed contributed to their academic preparedness. Regarding challenges, 85% of students reported facing a lack of technological resources, 90% cited a shortage of professionally trained teachers, 55% pointed to restrictions imposed by schools on the use of technological tools, and 70% highlighted power outages as a major barrier. To address these issues, 90% of students suggested improving the availability of technological resources and professional teachers, while 86% recommended removing usage restrictions for students.

Educational Implications of the Study

- Schools should integrate digital tools, audio-visual aids, and interactive technologies into regular teaching-learning processes to make education more engaging and meaningful.
- Curriculum designers should incorporate technology-based activities and project-based learning to foster creativity, critical thinking, and technical skills among students.
- Educational authorities need to improve infrastructure by ensuring reliable electricity, internet connectivity, and availability of technological devices in schools.
- Teacher training programs must be strengthened to equip educators with the necessary skills for effective technology integration in the classroom.
- Efforts should be made to ensure equitable access to technology so that all students benefit regardless of their socio-economic background.

Suggestions for Further Research

- This study was conducted on a small sample size; future research can be conducted using a larger and more diverse sample to enhance the generalizability of the findings.
- Since this study focused only on high school students, similar studies can be conducted at different educational levels, such as secondary school, undergraduate, and postgraduate students, where technology also plays a significant role.
- The current research examined only the effect of technology on academic performance; future studies can explore other variables such as motivation, digital literacy, critical thinking, or creativity.
- The geographical scope of this study was limited to the Kathua region of District Kathua; subsequent research could be expanded to include multiple districts or states for broader comparative analysis.

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