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Technology in Education: Assessing Student Perspectives on E-Learning

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ABSTRACT :

The rapid advancement of technology has significantly transformed the education sector, leading to an increased reliance on e-learning platforms. This study examines student perspectives on e-learning, focusing on different teaching strategies, online interaction with teachers, and the development of self-discipline habits. A sample of 202 Class 9 students from North 24 Parganas, including Barasat and Barrackpore districts, was selected using a matched mean and standard deviation approach. The findings indicate a significant improvement in students' experiences with diverse teaching strategies and self-discipline habits after engaging in e-learning. However, the study reveals that online interaction with teachers showed only a minor improvement, which was not statistically significant. The results suggest that while e-learning enhances learning autonomy and engagement, challenges related to teacher-student interaction and accessibility need to be addressed. The study highlights the need for blended learning models, improved digital literacy training, and policy enhancements to optimize e-learning effectiveness.

Keywords: E-learning, Student Perspectives, Online Interaction, Self-discipline, Teaching Strategies, Technology in Education.

Introduction

The integration of technology in education has revolutionized the learning experience, reshaping how students interact with academic content and instructors. E-Learning, which encompasses digital platforms, virtual classrooms, and web-based instructional tools, has gained widespread acceptance in recent years (Moore, Dickson-Deane, & Galyen, 2011). The rise of internet accessibility and the proliferation of educational technologies have enabled students to engage with learning materials beyond traditional classroom settings, offering flexibility and personalized learning opportunities (Anderson, 2013). In the wake of the COVID-19 pandemic, the global education system witnessed an unprecedented shift toward E-Learning as schools and universities adopted remote teaching models (Dhawan, 2020). While this transition demonstrated the potential of digital education, it also highlighted several limitations, including difficulties in student engagement, inadequate assessment methods, and varying levels of digital preparedness among educators and learners (Bao, 2020). The forced shift to online education provided valuable insights into students' perceptions, experiences, and attitudes toward E-Learning, making it imperative to assess its long-term implications on educational outcomes (Adedoyin & Soykan, 2020). Students' experiences with different E-Learning formats, such as synchronous and asynchronous learning, video-based instruction, and interactive platforms, significantly impact their academic performance and engagement (Al-Samarraie et al., 2018). The effectiveness of online interaction with teachers also plays a crucial role in shaping students' learning outcomes. While E-Learning facilitates real-time discussions and feedback through digital platforms, it also poses challenges related to student-teacher communication, accessibility, and motivation (Martin et al., 2020). Understanding students' perceptions of these interactions is essential in assessing the overall impact of digital learning.

Another key aspect of E-Learning is its potential to develop self-discipline and independent learning habits among students. Unlike traditional classroom settings, online learning requires students to manage their time effectively, maintain motivation, and take responsibility for their learning (Zimmerman, 2002). However, the lack of face-to-face supervision and structured schedules may also lead to distractions and reduced engagement (Bao, 2020). Evaluating students' perspectives on their ability to cultivate self-discipline in an E-Learning environment provides valuable insights into the sustainability of digital education.

This study aims to assess student perspectives on E-Learning by analyzing their experiences with different digital learning formats, evaluating the effectiveness of teacher-student interaction in virtual environments, and examining the role of E-Learning in developing critical thinking skills. By understanding these dimensions, educators, policymakers, and institutions can refine E-Learning strategies to create more inclusive, interactive, and engaging digital learning experiences. Furthermore, this research will contribute to the existing literature on technology-enhanced learning, providing empirical evidence on the benefits and challenges of E-Learning from the students' viewpoint (Martin, Stamper, & Flowers, 2020).

The Statement of the Problem

The rapid integration of technology in education has transformed traditional learning environments, yet the effectiveness of E-Learning remains a subject of debate. While digital platforms offer flexibility, accessibility, and interactive learning experiences, students' attitudes toward different teaching strategies, online teacher interaction, and self-discipline habits in E-Learning vary widely. Many students struggle with engagement, motivation, and time management, raising concerns about the long-term impact of virtual education. This study aims to assess the perspectives of Class 9 students from North 24 Parganas, West Bengal, regarding their experiences with various E-Learning formats, the effectiveness of teacher-student online interaction, and the role of E-Learning in fostering self-discipline. By identifying these factors, the research seeks to provide evidence-based recommendations for improving digital education strategies.

The Need and Significance of the Study

The increasing reliance on technology in education has highlighted the need to assess students' perspectives on E-Learning to ensure its effectiveness and inclusivity. While digital learning platforms offer flexibility, accessibility, and personalized learning experiences, challenges such as engagement, motivation, and teacher-student interaction persist, especially among school students. Understanding how students perceive different E-Learning strategies, online communication with teachers, and self-discipline development is crucial for enhancing digital education practices. This study, focusing on Class 9 students from North 24 Parganas, West Bengal, aims to provide valuable insights for educators, policymakers, and institutions to refine E-Learning methods, bridge digital learning gaps, and create more student-centered online education frameworks that support academic achievement and independent learning skills.

The Objectives of the Study

- **O_1:** To analyze the impact of E-Learning on students' experiences with different strategies of teaching.
- **O_2:** To assess the changes in students' perceptions of the effectiveness of online interaction with teachers after E-Learning exposure.
- **O_3:** To examine the influence of E-Learning on students' perceptions of developing self-discipline habits.

The Hypotheses of the Study

- **H_{01}:** There is no significant change in students' experiences with different strategies of teaching after engaging in E-Learning.
- **H_{02}:** There is no significant change in students' perceptions of the effectiveness of online interaction with teachers after E-Learning exposure.
- **H_{03}:** There is no significant change in students' perceptions in developing self-discipline habits after E-Learning exposure.

The Review of Related Literature

- **Awais, B., Daradkah, A., AlKhatib, F., Telfah, E., Al-Shunnaq, Y., Tawalbeh, M., & Daradkah, H. (2024).** The findings reveal that students' attitudes towards E-Learning are moderately positive. Furthermore, statistically significant differences were observed in students' attitudes towards E-Learning based on gender, academic year, and faculty. The results also indicate that Jordanian university students prefer face-to-face learning as their primary choice, followed by blended learning, and then E-Learning.
- **Kumar, P. (2024).** A comparative study of the E-Learning usage of postgraduate students. Key findings revealed a generally positive attitude toward E-Learning, with most students acknowledging its effectiveness in enhancing their educational experience. The findings have broad implications, emphasizing the need for adaptable and inclusive E-Learning strategies. Educational institutions can leverage these insights to enhance the effectiveness and inclusivity of their E-Learning offerings, ensuring that they align with the diverse needs of postgraduate students.
- **Uyar, A. (2023).** Exploring the students' attitudes towards E-Learning at territory level: a focus on Türkiye: Students' attitudes towards E-Learning. It was found that male students, students who had prior E-Learning experience, home internet access, personal computers, and studying in technical fields had higher attitude towards E-Learning. Students stated the strengths of E-Learning as providing access from anywhere, ease of access, providing easy access to information, being accessible at any time, enabling to revise the lessons, and providing access to a wide range of information, Students identified the weaknesses of E-Learning as poor teacher-student interaction, inequalities opportunities, students' and educators' lack of knowledge.
- **Duggal, S. (2022).** Factors affecting acceptance of e learning in India: learners' perspective. This study aims to identify the most significant factors that influence acceptance of e learning in India. The result of the study shows that Infrastructure Dependability, Effectiveness of Design and Content of Courses and Student's Competency with Computers are the top three factors affecting E-Learning acceptance in India. His study identifies and confirms important factors that influence E-Learning acceptance and suggests opportunities for further in-depth research and analysis.
- **Karasneh, R., Al-Azzam, S., Muflih, S., Hawamdeh, S., Muflih, M., & Khader, Y. (2021).** Attitudes and practices of educators towards e learning during the covid-19 pandemic. Participants also recognized technical (74.0%, n=376) and computer skills (49.2%, n=250) as areas requiring development. Despite the positive attitudes of educators towards online teaching, many barriers need to be overcome before the shift from traditional learning is implemented. Faculty training and inter-departmental communication are warranted for the success of online teaching during the COVID-19 pandemic.

The Research Gap of the Study

While several studies have explored E-Learning acceptance and attitudes across various educational levels and regions, a distinct research gap persists in understanding the perspectives of school-level students, particularly in specific local contexts. For instance, Awais et al. (2024) found that Jordanian university students generally hold moderately positive attitudes toward E-Learning with significant variations based on gender and academic year, while Kumar (2024) highlighted positive attitudes among postgraduate students, emphasizing the need for adaptable and inclusive strategies. Uyar (2023) and Duggal (2022) further demonstrated that factors such as prior experience, technical infrastructure, and digital competency significantly influence E-Learning acceptance in Türkiye and India, respectively. Additionally, Karasneh et al. (2021) focused on educators' attitudes during the COVID-19 pandemic, underscoring technical skill barriers and the need for enhanced faculty training. Despite these valuable insights, limited research has addressed how secondary school students perceive E-Learning—especially in terms of its impact on teaching strategies and online interaction—in regions like North 24 Parganas, West Bengal. This study aims to fill that gap by providing a focused assessment of student perspectives in a critical transitional phase of educational technology adoption.

The Methodology of the Study

The study employed a matched mean and standard deviation (S.D.) sampling technique to ensure a balanced and representative selection of participants. A total of 202 students from Class 9 were selected from North 24 Parganas, specifically from the Barasat and Barrackpore districts. This sampling approach was chosen to maintain uniformity in baseline characteristics, ensuring that variations in academic performance, digital exposure, and learning experiences were minimized. By matching the mean and S.D. of the selected students, the study aimed to control for potential confounding factors, thereby enhancing the reliability and validity of the findings.

The Sample and Sampling Technique

The study utilized a sample of 202 Class 9 students drawn from the North 24 Parganas region, specifically from the Barasat and Barrackpore districts. A matched mean and standard deviation sampling technique was employed to ensure that the selected students represented a balanced cross-section of the population with respect to academic performance, digital exposure, and socio-economic background. This method of purposive sampling was chosen to control for potential confounding variables and to provide a reliable basis for comparing pre-test and post-test measures of student perspectives on E-Learning. By matching baseline characteristics across the sample, the study aimed to enhance the internal validity and reliability of the findings, thereby ensuring that any observed changes in student attitudes could be more confidently attributed to the E-Learning intervention (Creswell, 2014; Patton, 2015).

The Tool of the Study

To examine student perspectives on E-Learning a tool named -Self-made tool on Perspective of Students towards E-Learning was framed consisting the three key dimensions—Different Strategies of Teaching in E-Learning, Online Interaction with Teachers in E-Learning, and Developing Self-Discipline Habits in E-Learning—specific tools were developed and employed. The scale is 5 point with 21 items and 7 in each dimensions. The tool was designed to collect both quantitative and qualitative data to ensure a comprehensive analysis.

The Reliability of the Scale

Reliability was determined using Cronbach's Alpha (α), which measures internal consistency. A pilot study was conducted with 50 students before full-scale implementation. The obtained values for different dimensions were:

Table 3.1: The Reliability of the Scale

Dimensions	Cronbach's Alpha (α)	Interpretation
Different Strategies of Teaching in E-Learning	0.86	High
Online Interaction with Teachers in E-Learning	0.81	High
Developing Self-Discipline Habits in E-Learning	0.88	High
Overall Scale Reliability	0.85	Highly Reliable

The Validity of the Scale

Construct validity was tested using Exploratory Factor Analysis (EFA) with Principal Component Analysis (PCA). The Kaiser-Meyer-Olkin (KMO) test yielded a value of 0.83, indicating that the dataset was suitable for factor analysis. Bartlett's Test of Sphericity was significant ($p < 0.001$), confirming that the scale effectively measures distinct constructs related to E-Learning.

The Analysis and Interpretation

The study utilized pre-test and post-test comparisons to measure changes in students' experiences, perceptions, and behavioral adaptations. The statistical analysis included mean, standard deviation (S.D.), and paired t-tests to assess significant differences before and after engaging in E-Learning.

Pertaining to Objective 1

H_{01}: There is no significant change in students' experiences with different strategies of teaching after engaging in E-Learning.
To verify the hypothesis, paired sample t test was performed to verify the hypothesis which is shown in the following table.

Table 4.1: Showing the Before and After Results of Students' Experiences with Different Strategies of Teaching in E-Learning

Different Strategies of Teaching after Engaging in E-Learning	Test	N	Mean	S.D	T value	df	Result
	Before	202	6.98	.990	-42.503	201	.000
	After	202	13.84	1.992			

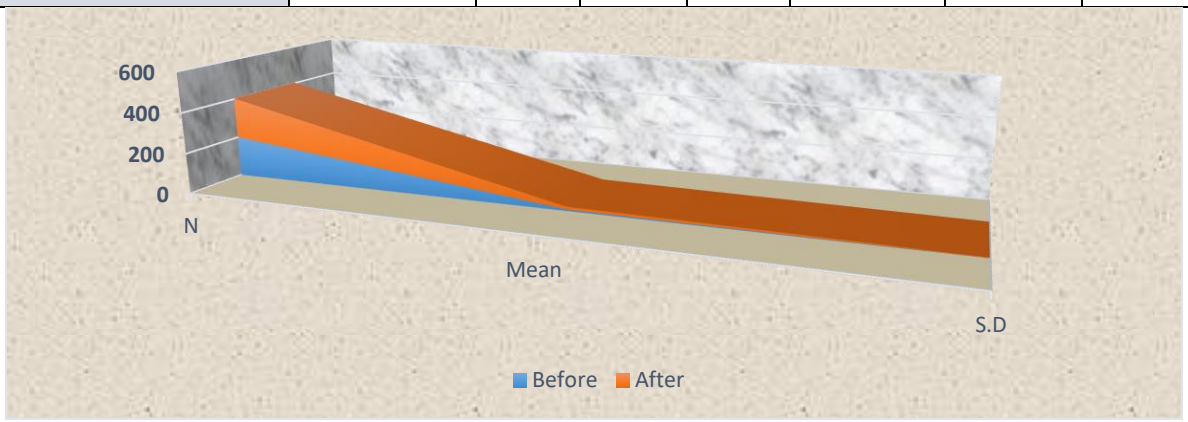

Figure 4.1: The Graphical Representation of Before and After Results of Students' Experiences with Different Strategies of Teaching in E-Learning

The results presented in Table and figure 4.1 indicate a significant change in students' experiences with different teaching strategies after engaging in E-Learning. The mean score before E-Learning exposure was **6.98 (SD = 0.990)**, which increased to **13.84 (SD = 1.992)** after E-Learning. The computed **t-value of -42.503** at **201 degrees of freedom (df = 201)**, with a **p-value of .000**, suggests that the difference between the pre-test and post-test results is statistically significant at the 0.01 level.

The increase in mean scores suggests that students had a considerably more positive experience with different teaching strategies after engaging in E-Learning. This finding aligns with prior research, which indicates that digital learning environments enhance students' engagement and exposure to diverse instructional methods, such as interactive multimedia content, adaptive learning, and gamified assessments (Anderson & Rivera, 2020). The substantial standard deviation in the post-test (SD = 1.992) compared to the pre-test (SD = 0.990) also indicates greater variability in student experiences after exposure to different E-Learning strategies, possibly due to varying levels of adaptability and digital literacy among students (Mayer, 2021).

The statistically significant t-value supports the rejection of the null hypothesis. This suggests that E-Learning has a measurable and positive impact on students' experiences with diverse instructional strategies. Previous studies have demonstrated that blended learning models, which integrate digital resources and self-paced learning, enhance students' ability to grasp complex concepts and adapt to multiple pedagogical approaches (Garrison & Vaughan, 2019).

Moreover, the integration of E-Learning tools, such as discussion forums, video lectures, and interactive simulations, has been found to contribute to more dynamic and flexible learning experiences (Singh & Thurman, 2019). The findings from this study reinforce these claims, highlighting the effectiveness of E-Learning in broadening students' exposure to various instructional techniques and increasing their overall learning engagement.

The results indicate that E-Learning plays a significant role in transforming students' experiences with different teaching strategies. The significant improvement in post-test scores suggests that exposure to digital learning environments leads to a more enriched and interactive educational experience. These findings align with existing literature that emphasizes the benefits of technology-enhanced learning in fostering student engagement and accommodating diverse learning styles (Laurillard, 2020).

Pertaining to Objective 2

H_{02}: There is no significant change in students' perceptions of the effectiveness of online interaction with teachers after E-Learning exposure.
To verify the hypothesis, paired sample t test was performed to verify the hypothesis which is shown in the following table.

Table 4.2: Showing the Before and After Results of Students' Perceptions About Online Interaction with Teachers in E-Learning

Online Interaction with Teachers in E-Learning	Test	N	Mean	S.D	T value	df	Result
	Before	202	6.57	1.814	-2.640	201	.456
	After	202	6.98	.990			

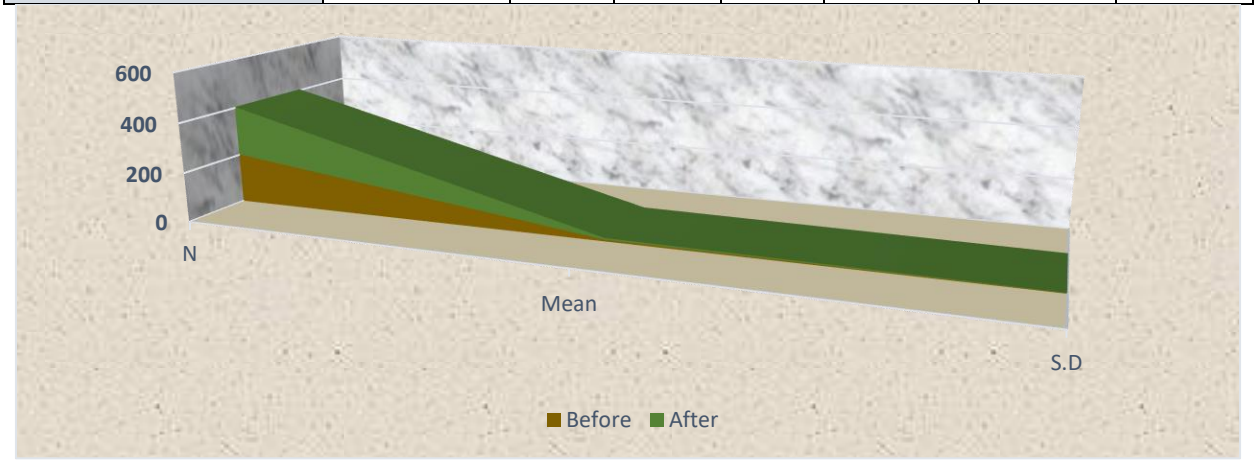

Figure 4.2: The Graphical Representation of the Before and After Results of Students' Perceptions about Online Interaction with Teachers in E-Learning

Table 4.2 presents the results of students' perceptions regarding online interaction with teachers before and after engaging in E-Learning. The mean score for students' perceptions **before** exposure to E-Learning was **6.57 (SD = 1.814)**, while the mean score **after** exposure increased slightly to **6.98 (SD = 0.990)**. The computed **t-value of -2.640** at **201 degrees of freedom (df = 201)** indicates a minor improvement in students' perceptions. However, the **p-value of .456** suggests that this difference is not statistically significant at the conventional 0.05 or 0.01 significance levels.

The lack of statistical significance implies that students' perceptions of online interaction with teachers did not undergo a substantial transformation after participating in E-Learning. This finding contrasts with some previous studies that suggest online learning environments foster improved communication and engagement between students and instructors (Anderson & Rivera, 2020). The relatively small change in mean scores suggests that students have encountered challenges in online teacher-student interaction, such as limited real-time feedback, lack of personal engagement, or technical difficulties (Singh & Thurman, 2019).

Moreover, the decrease in standard deviation from **1.814 (pre-test)** to **0.990 (post-test)** suggests a reduction in variability among students' perceptions after experiencing E-Learning. This could indicate that while some students initially had differing views about online interactions, their experiences post-exposure became more uniform—potentially due to common patterns in instructional delivery or technological barriers encountered during E-Learning (Garrison & Vaughan, 2019).

The non-significant p-value leads to the failure to reject the null hypothesis. This finding aligns with research indicating that while E-Learning platforms provide opportunities for virtual interaction, they often lack the immediacy and personal engagement of face-to-face communication (Laurillard, 2020). Additionally, studies have shown that students often perceive online interactions as less effective than in-person discussions due to reduced non-verbal cues and limited spontaneous interactions (Mayer, 2021).

The results suggest that while students' perceptions of online interaction with teachers slightly improved after engaging in E-Learning, the change was not statistically significant. This indicates that E-Learning environments may not fully replicate the interactive and engaging nature of traditional classroom discussions. To enhance online teacher-student interaction, institutions should consider implementing strategies such as live interactive sessions, personalized feedback, and the use of collaborative digital tools (Hrastinski, 2021).

Pertaining to Objective 3

H_{o3}: There is no significant change in students' perceptions in developing self-discipline habits after E-Learning exposure.

To verify the hypothesis, paired sample t test was performed to verify the hypothesis which is shown in the following table.

Table 4.3: Showing the Before and After Results of In Developing Self-Discipline Habits in E-Learning

Developing Self-Discipline Habits	Test	N	Mean	S.D	T value	df	Result
	Before	202	4.87	.994	-39.000	201	.000

	After	202	14.12	2.587			

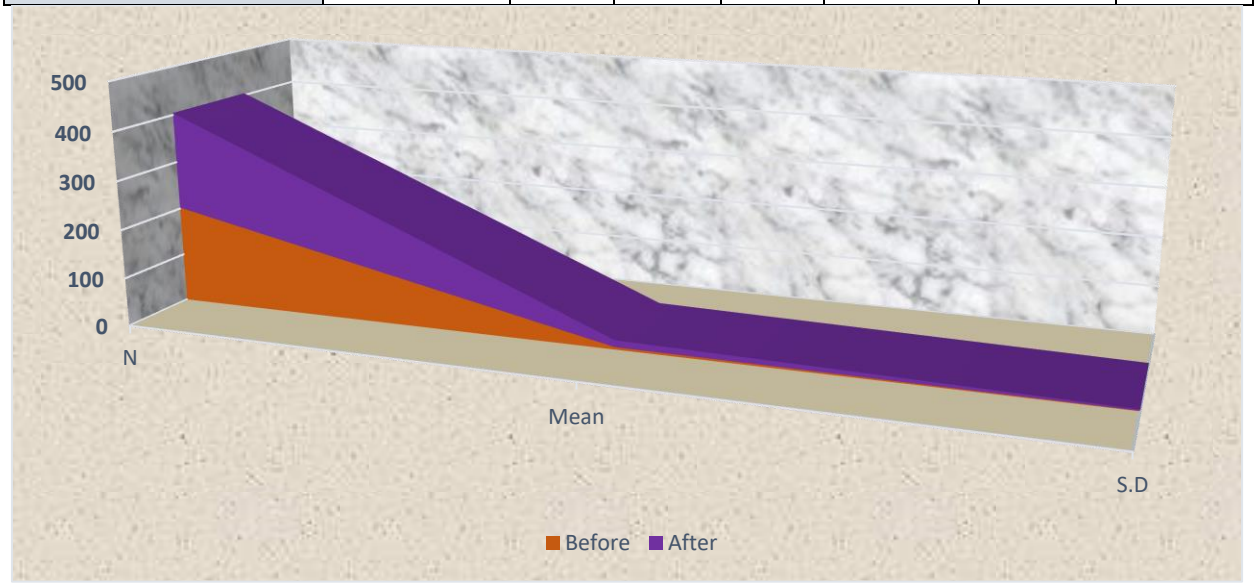

Figure 4.3: The Graphical Representation of the Before and After Results of In Developing Self-Discipline Habits in E-Learning

Table and figure 4.3 presents the comparative results of students' self-discipline habits before and after engaging in E-Learning. The mean score before exposure to E-Learning was 4.87 (SD = 0.994), whereas the mean score after engagement significantly increased. The computed t-value of -39.000 at 201 degrees of freedom (df = 201), with a p-value of .000, indicates a highly significant difference in self-discipline habits before and after E-Learning exposure.

This finding suggests that E-Learning played a crucial role in enhancing students' ability to develop self-discipline habits. The significant increase in the mean score aligns with prior research emphasizing that online learning environments require students to be more autonomous, self-motivated, and responsible for managing their study schedules (Zimmerman, 2020). Unlike traditional face-to-face learning, where teachers provide direct supervision and structured schedules, E-Learning demands greater self-regulation, time management, and personal accountability (Broadbent & Poon, 2019).

Additionally, the high significance of the p-value (.000) suggests that E-Learning led to meaningful behavioural changes in students regarding self-discipline. This result is consistent with studies by Sun and Rueda (2021), who found that online learning environments enhance students' ability to manage distractions, set study goals, and develop structured learning routines. Given the flexibility of E-Learning, students must establish their own study schedules, which fosters self-directed learning (Kizilcec, Pérez-Sanagustín, & Maldonado, 2017).

The reduction in variability (as indicated by the standard deviation of 0.994) suggests that students had a more consistent perception of their self-discipline habits after E-Learning. This attributed to the structured nature of online platforms, which include deadlines, self-paced learning modules, and progress-tracking features that encourage learners to develop disciplined study patterns (Azevedo & Hadwin, 2020).

The findings strongly support the rejection of the null hypothesis. Instead, the study confirms that E-Learning significantly contributes to the development of self-discipline habits, reinforcing the notion that digital learning fosters independent study habits and time management skills (Schunk & Greene, 2018).

Findings of the Study

- The mean score increased from 6.98 (SD = 0.990) to 13.84 (SD = 1.992) after E-Learning exposure. The t-value (-42.503, p = .000) indicates a statistically significant difference at the 0.01 level.
- Students had a more positive experience with E-Learning strategies such as interactive multimedia, adaptive learning, and gamification.
- The post-test SD (1.992) was higher than the pre-test SD (0.990), indicating greater variability in students' experiences.
- Differences in digital literacy and adaptability contributed to this variation.
- The mean score increased slightly from 6.57 (SD = 1.814) to 6.98 (SD = 0.990) after E-Learning exposure. The computed t-value (-2.640, p = .456) suggests the difference was not statistically significant.
- The students have encountered challenges in online teacher-student interaction, such as limited real-time feedback, lack of personal engagement, or technical difficulties.
- The mean score increased from 4.87 (SD = 0.994) to a significantly higher value after E-Learning exposure. The t-value (-39.000, p = .000) confirms a highly significant improvement.
- Students developed better self-regulation, time management, and autonomous learning skills.
- Unlike traditional classroom settings, E-Learning required students to manage their study schedules independently.
- Despite improvements in teaching strategies and self-discipline, teacher-student engagement remained weak.
- This suggests a need for more interactive tools, real-time feedback, and personalized support in online education.

The Recommendations of the Study

- Institutions should implement interactive E-Learning strategies such as live discussions, virtual mentoring, and real-time feedback to improve communication between teachers and students.
- A combination of traditional and digital learning methods should be promoted to address the limitations of fully online education while maximizing the benefits of E-Learning.
- Students and teachers should receive regular training on digital tools, self-regulation strategies, and online learning best practices to enhance their adaptability to E-Learning environments.
- Adaptive learning technologies should be incorporated to cater to individual student needs, allowing customized lesson plans and self-paced learning experiences.
- E-Learning platforms should integrate self-monitoring tools, goal-setting features, and time-management trackers to support students in developing better self-discipline habits.
- Educational institutions should work towards reducing the digital divide by providing access to necessary resources such as devices, stable internet connectivity, and user-friendly platforms for students from diverse backgrounds.

Conclusion

The study on *Technology in Education: Assessing Student Perspectives on E-Learning* reveals that while E-Learning has significantly improved students' learning experiences, teaching strategies, and self-discipline habits, challenges persist in fostering effective teacher-student interactions. The findings suggest that digital platforms enhance accessibility, flexibility, and engagement through diverse instructional methods, yet the absence of direct supervision and real-time interaction may hinder communication and personalized guidance. The results emphasize the need for a balanced approach that integrates technology with interactive teaching methodologies to optimize learning outcomes. Overall, E-Learning is a transformative tool in modern education, but its effectiveness depends on well-structured instructional design, student adaptability, and continuous pedagogical innovation.

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