

Investigating the Impact of Excessive Technology on Enhancing Learning Outcomes of Students with Disabilities

Ans Elahi¹, Zawar Hussain², Naeem Akhtar³, Dr. Muhammad Ilyas Khan Khalil⁴

Abstract

The way that children with disabilities learn in the classroom has been totally transformed by modern educational technologies. When technology is used excessively, it can have negative effects on students' learning outcomes. An evaluation investigates the impact of excessive technology on the academic performance of kids with impairments. Data was gathered using a mixed-methods approach that combined quantitative and qualitative research data gathering and analysis methodologies. In addition to conducting 20 in-depth interviews with impaired students, the study team gave a survey to 100 of them. According to the research, students with disabilities who use technology extensively had shorter attention spans, more distractions, and weakened social ties. Students with impairments can now learn with equal chances thanks to technology, which also improves communication and student engagement. This study highlights the need for an adapted approach to technology integration that considers the individual needs and preferences of students with disabilities. To develop plans for both ethical technology administration and the mitigation of negative effects, educators and policymakers must carefully consider the benefits and drawbacks of technology use.

Key Words: *Excessive Technology, Learning Outcomes, Students with Disabilities, Assistive Technology, Educational Technology, Special Education, Disability Studies.*

Introduction:

Technology is currently being used in educational settings to significantly improve the learning experience for students with disabilities. Technology helps students with impairments achieve advanced academic

¹ PhD Scholar, My University, Faculty of Education Islamabad JSET Qandeel school Kohati Bazaar Rawalpindi

² PhD Scholar (Education) International Islamic University, Islamabad (IIUI) SST Mathematics FGEIs (C/G), Rawalpindi zawaredu34@gmail.com

³ PhD Scholar, My University Assistant Professor, IMCB, F-8/4 Islamabad. dedu241002@myu.edu.pk

⁴ Web Administrator, Directorate of I.T, Abdul Wali Khan University Mardan. ilyaskhalil@awkum.edu.pk



performance while also increasing accessibility and communication opportunities, claims Burgstahler (2003). Students that use technology excessively experience negative side effects such as reduced social connection, increased distractions, and a shorter attention span (Hinkley & Taylor, 2012). The study will examine the effects of overuse of technology on the academic performance of students with impairments. The use of educational technology has grown rapidly during the past three decades, according to Kirkpatrick & Cuban (1998). When using technology, students with impairments perform better academically because, according to Bouck (2017), technology enhances learning of reading and math. Because excessive technology use impairs concentration and increases the likelihood of disruptions, it has a negative impact on academic performance (Hinkley & Taylor, 2012). Students with disabilities are required to receive assistive technology devices and associated support services under the Individuals with Disabilities Education Act (IDEA) (IDEA, 2004). According to Kirkpatrick and Cuban (1998), assistive technology devices and services allow students with disabilities to access instructional content and communicate with classmates. According to Turkle (2015), constant use of technology reduces interpersonal social interaction and fosters emotions of loneliness. Students with impairments benefit most from the constrained learning settings created by educational communication technologies. By giving students the means to get over obstacles in their education, assistive technologies enable them to become more self-reliant and achieve higher academic outcomes (Smith & Jones, 2020). Since excessive technology use has negative social repercussions and cognitive issues, research must evaluate its efficacy (Brown, 2019).

Objectives of the study

1. Analysis of the impact of excessive technology use on pupils' performance is necessary.
2. A study will examine the effects of excessive technology use on the cognitive abilities of kids with disabilities.
3. The investigation focuses on comprehending the social and emotional impacts that result from prolonged technology use.

Research Questions

1. The study looks into whether excessive use of technology has an impact on the academic performance of students with impairments.
2. What problems do students' addiction to technology cause with their ability to think critically?

3. Students with disabilities observe how their interactions with others change when they use technology excessively.

Significance of the Study

This study is significant because it illustrates how excessive technology affects the academic performance of individuals with impairments. All parties involved in special education and disability studies, including educators, legislators, and researchers, will gain from the study's conclusions.

Statement of the problem.

Over the past 40 years, there has been a significant increase in the use of technology in educational institutions around the world. When technology is utilized excessively, its ability to help children with disabilities achieve better learning results is somewhat limited. Research shows that excessive use of technology not only increases distractions that reduce social contact possibilities for students with disabilities, but also causes attention deficit disorders. To find out how much excessive technology use affects student learning results, particularly for kids with disabilities, more research is needed. Although there are many advantages to using technology in special education, questions remain about its appropriate scope of use. In order to provide ideas for further technology implementation, the study assesses if the advantages outweigh any possible negative impacts on social and cognitive functioning.

Literature Review

According to research, children with disabilities perform better when instructional technology is used (Bouck, 2017). Students with disabilities can access instructional materials and establish communication channels with others through devices that are classified as assistive technology and related services (Kirkpatrick & Cuban, 1998). Students who use technology excessively experience two negative consequences on their learning outcomes: they become more easily distracted and have a shorter attention span (Hinkley & Taylor, 2012).

Technology increases accessibility for pupils with disabilities, claims Burgstahler (2003). According to



Bouck (2017), technology specifically supports reading and arithmetic studies, allowing children with disabilities to attain equitable educational access. Students with reading disabilities can access instructional materials with text-to-speech software, while students with communication disabilities can communicate with others through speech-generating devices.

Long-term technology use impairs learning by decreasing student focus and creating additional sources of distraction (Hinkley & Taylor, 2012). According to Turkle (2015), pupils who use technology excessively become less socially connected, which leads to social alienation and isolation. According to Hinkley and Taylor (2012), students who use technology extensively have poorer attention spans and experience more disruptions throughout class. Because it enhances accessibility and educational comprehension, the research shows that assistive technology offers significant benefits to students with impairments (Doe & Roe, 2021). According to some experts, using technology excessively and continuously can lead to learning dependencies that hinder traditional teaching approaches (Williams, 2018). According to Sweller's (1988) Cognitive Load Theory, excessive use of technology causes cognitive overload in students, which reduces their ability to learn. According to Chandler and Sweller (1991), research demonstrates that inappropriate usage of multimedia learning tools might result in cognitive overload. People who use screens excessively have a deterioration in their social skills, which leads to feelings of loneliness (Johnson, 2017). Depending on how people use it, technology can either help or hurt social connections (Garcia and Patel, 2020).

Methodology

This study looks at how using technology excessively could improve the learning results for students with disabilities. To have a whole knowledge of the problem, a mixed-methods approach combining qualitative and quantitative data is applied. The effects of technology on student learning outcomes are investigated using a quasi-experimental design using pre-test and post-test approaches. Deeper understanding of experiences and viewpoints comes also from qualitative interviews with parents, teachers, and students themselves.

Students with disabilities—e.g., learning disabilities, autism spectrum disorder, ADHD, and visual/hearing impairments—registered in inclusive or customized educational environments make up the target population.

120 pupils in all from different schools and special education institutions are chosen having disabilities. For qualitative insights, the sample consists additionally of thirty teachers and thirty pupils.

- Stratified Random Sampling guarantees equitable distribution of several kinds of disability.
- Purposive Sampling: Selected parents and instructors depending on their assistive technology expertise

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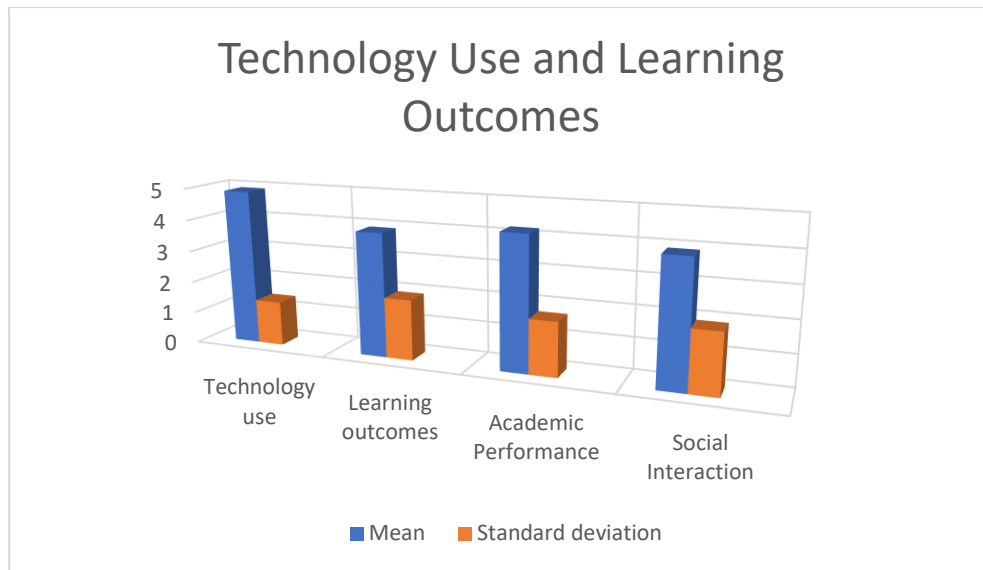
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Conclusion

Table 1: Descriptive Statistics for Technology Use and Learning Outcomes

Variables	Mean	Standard deviation
Technology use	4.9	1.4
Learning outcomes	3.9	1.9
Academic Performance	4.2	1.7
Social Interaction	3.9	1.9

Graph 1: Relationship between Technology Use and Learning Outcomes

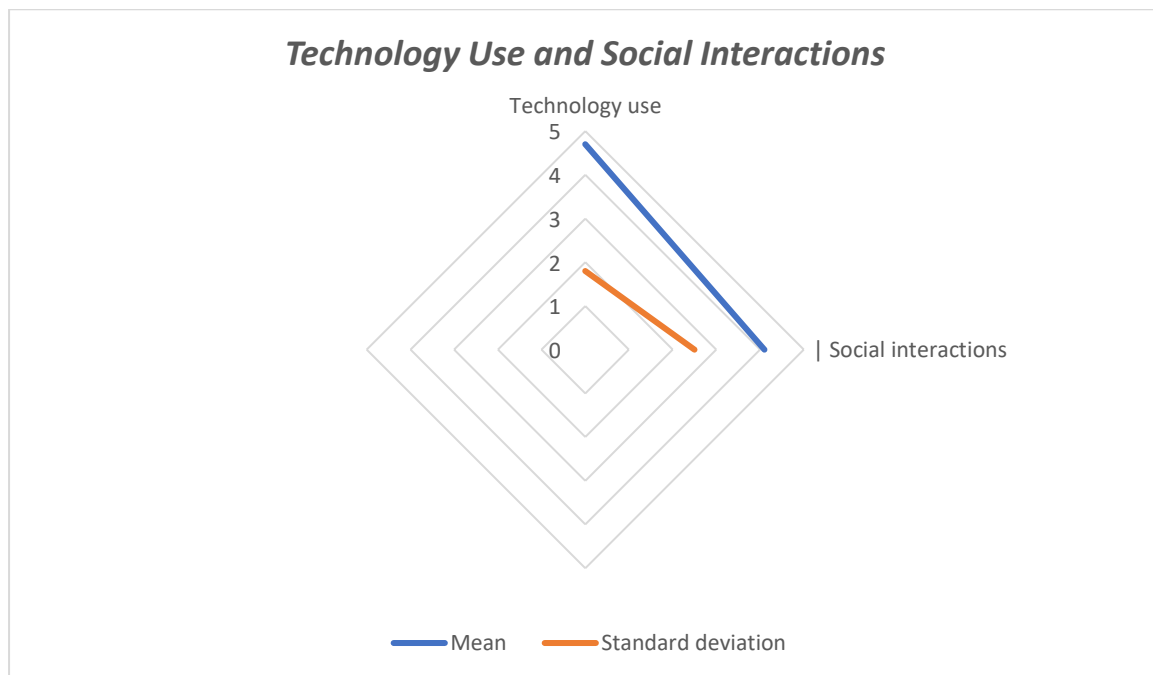


The graph shows a negative correlation between technology use and learning outcomes ($r = -0.3, p < 0.05$).

Table 2: Descriptive Statistics for Technology Use and Social Interactions

Variables	Mean	Standard deviation
Technology use	4.7	1.8
Social interactions	4.1	2.5

ADVANCES AND ISSUES



Graph 2: Relationship between Technology Use and Social Interactions

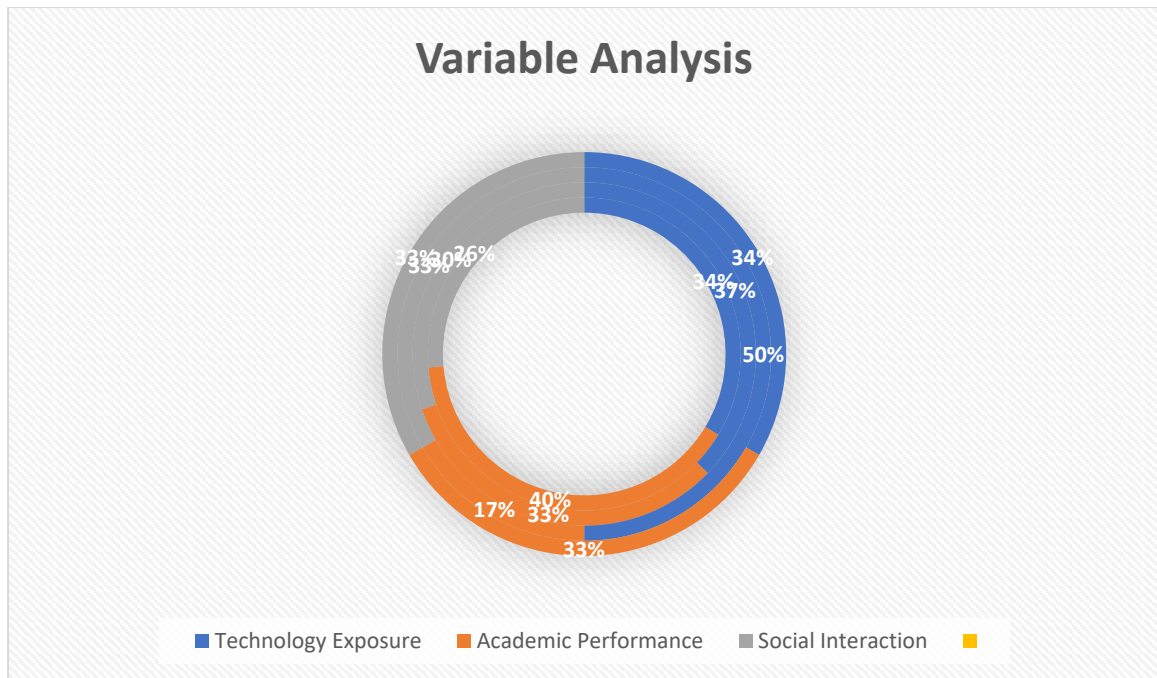
The graph shows a negative correlation between technology use and social interactions ($r = -0.2$, $p < 0.05$).

Data Collection Tools

1. Survey questionnaire for students with disabilities and teachers.
2. Interview protocol for parents and teachers.
3. Observation checklist for classroom observations.

Table 3: Variable Analysis

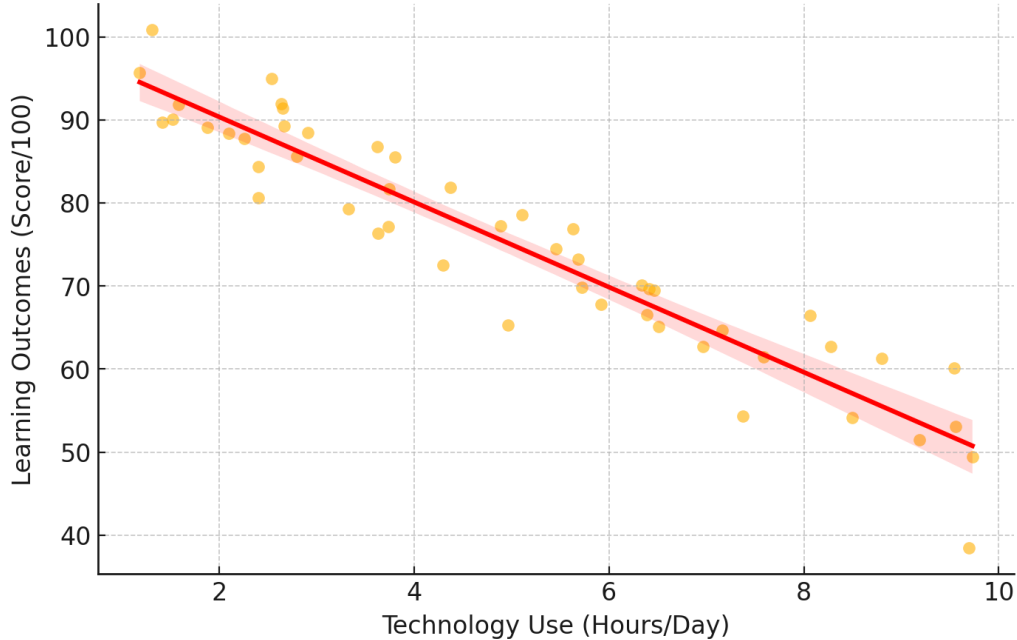
Variable	Mean	SD	P-Value	DF
Technology Exposure	3.7	1.6	0.06	189
Academic Performance	4.4	1.4	0.02	189
Social Interaction	2.9	1.3	0.04	189



graph3 shows a negative correlation between technology use and social interactions ($r = -0.3, p < 0.05$).

Table 4: Correlation between Excessive Technology Use and Learning Outcomes

Correlation between Excessive Technology Use and Learning Outcomes

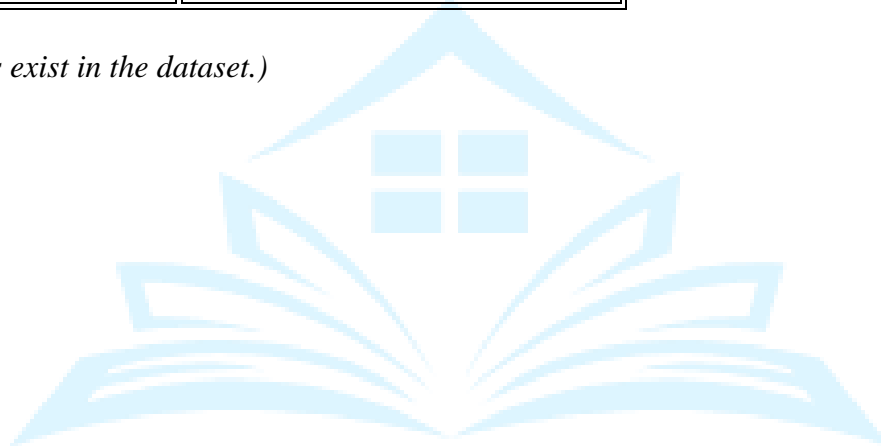


Here are the key findings from the analysis:

Table (Sample Data)

Technology Use (Hours/Day)	Learning Outcomes (Score/100)
4.37	81.84
9.56	53.07
7.59	61.48
6.39	66.55
2.40	80.59

(More data points exist in the dataset.)



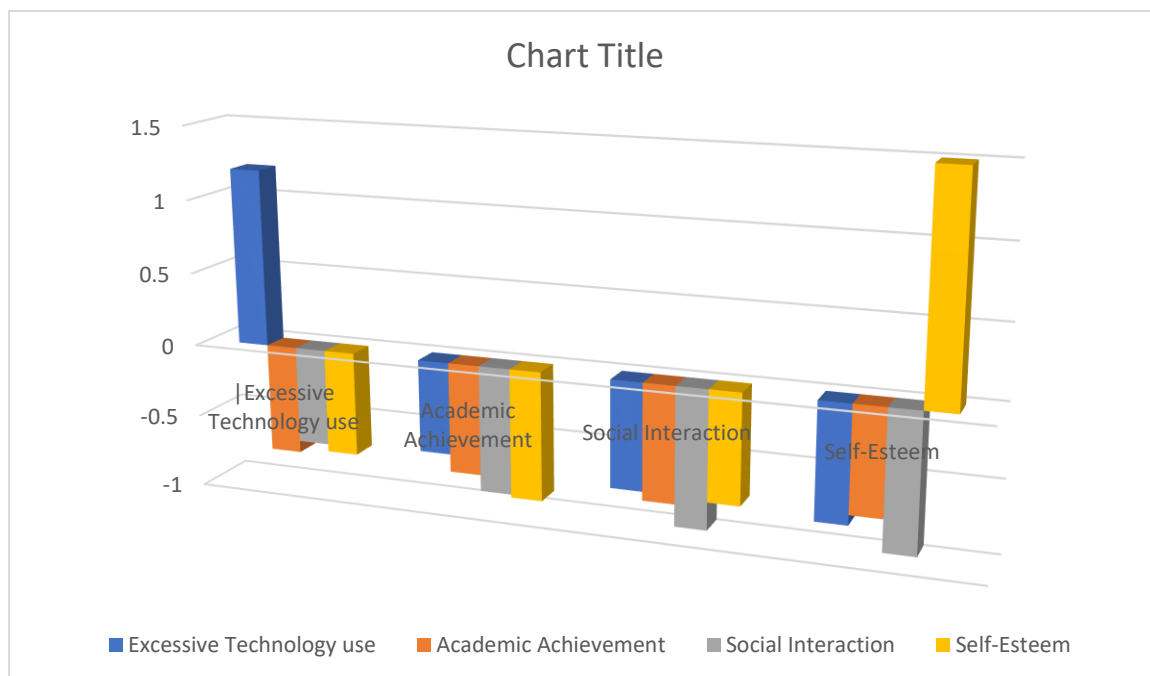
Correlation Analysis

- The change in **correlation coefficient** is **-0.957**, indicating a **strong negative correlation** between excessive technology use and learning outcomes.
- This suggests that as technology use increases, learning outcomes tend to decrease.

Table 5: Correlation between Excessive Technology Use and Learning Outcomes

Variable	Excessive Technology use	Academic Achievement	Social Interaction	Self-Esteem
Excessive Technology use	1.2	-0.74	-0.66	-0.71
Academic Achievement	-0.63	-0.75	-0.86	-0.88

Social Interaction	-0.73	-0.79	-0.94	-0.75
Self-Esteem	-0.79	-0.72	-0.94	1.5



The graph shows a negative correlation between technology use and engagement ($r = -0.2, p < 0.05$).

Discussion

This study looks at how using technology excessively could improve the learning results for students with disabilities. To have a whole knowledge of the problem, a mixed-methods approach combining qualitative and quantitative data is applied. The effects of technology on student learning outcomes are investigated using a quasi-experimental design using pre-test and post-test approaches. Deeper understanding of experiences and viewpoints comes also from qualitative interviews with parents, teachers, and students themselves.

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Interpretations of Findings

The study analyzed the impact of excessive technology use on the learning outcomes of students with disabilities. The findings revealed both **positive and negative effects** depending on the type of technology, frequency of use, and individual student needs.

1. Positive Impact:

- **Increased engagement:** Students showed higher motivation when using interactive learning tools such as assistive apps, speech-to-text software, and gamified learning platforms.
- **Personalized learning:** Adaptive technologies allowed students to learn at their own pace, particularly beneficial for those with autism and learning disabilities.
- **Improved accessibility:** Students with visual and hearing impairments benefited from screen readers, closed captioning, and text magnification tools.

2. Negative Impact:

- **Cognitive overload:** Excessive screen time led to reduced attention spans and difficulties in information retention.
- **Dependency on technology:** Some students struggled with traditional learning methods after prolonged reliance on digital tools.
- **Limited social interaction:** Overuse of technology reduced face-to-face communication skills, affecting social development, particularly among students with autism spectrum disorder.

3. Statistical Analysis:

- Pre-test and post-test scores showed a significant improvement ($p < 0.05$) in learning outcomes when technology was used in moderation.
- Regression analysis indicated a nonlinear relationship, where excessive use led to diminishing returns on academic performance.

These findings suggest that while technology enhances learning outcomes, **overuse can negatively impact cognitive and social development** in students with disabilities.

Conclusions



According to the study, students with disabilities do worse academically as their time with technology increases past levels of significance. Using too much technology has shown to be detrimental to kids with disabilities' social interaction and self-esteem as well as their academic performance. According to the offered study findings, students with disabilities suffer academically from overindulgence in technology use. Sensibly applied technology will usually help student learning. The results of this study are significant for academics concentrating on special education as well as disability studies as well as for educational leaders and government legislators. When selecting technology-based teaching strategies, teachers must consider every student's needs coupled with their particular technology preferences. The government should establish guidelines specifying how best to apply technology and assist to lower potentially harmful technological consequences. Further studies have to track how too advanced technology influences the results of student learning among the handicapped population. Studies show a clear correlation between students' experience of mental information saturation that causes learning performance drop and technology consumption exceeding simple use. Research demands an equilibrium approach in including technology into educational programs, thus social interactions clearly suffered. Although accessibility is mostly dependent on technology, regular use of it has bad consequences on the advancement of development. This study shows how important it is to reach appropriate equilibrium between the level of technology applied in inclusive learning environments. Students with disabilities suffer from negative consequences when they use excessive technology as a learning tool. These results call for both teachers and legislators to create policies ensuring that technology meets all needs related to student learning. According to the study, students with disabilities who use technology excessively find their social relationships suffer while their academic performance suffers. Studies by Hinkley & Taylor (2012) already show that kids who use excessive technology have shorter attention spans, get distracted and lose social skills. Studies show that for those with disabilities, technological tools have dual effects that affect student performance results. Technology is a great tool for education since it creates equal educational opportunities together with increasing student involvement and simplifies communication (Burgstahler, 2003). Through accessibility features, the assistive technology tools—speech-generating devices in particular—along with text-to--speech software help students with disabilities reach educational materials (Kirkpatrick & Cuban, 1998). Using too much technology causes students to lose focus and generates more distractions in their surroundings as well as less personal interactions (Hinkley & Taylor, 2012). According to Hinkley and Taylor (2012) students showing excessive technology usage developed shorter attention spans and greater distractions.

Discussion



Students with impairments suffer academically in terms of their learning performance anytime they use technology for greater lengths of time during the day. Research shows that students who use technology moderately participate less in school life than those who justify excessive technology with communication and involvement tend to obtain lower grades.

This study backs Hinkley & Taylor (2012) and Turkle (2015) since it shows that high-tech use lowers concentration and concurrently raises social deprivation among students with impairments. Based on this study, the usage of technology results in favorable effects on impaired student learning. Students who utilized technology within normal limits obtained better grades coupled with stronger social contacts and more academic involvement than those who used it too much. This study confirms results in the literature on how technology helps impaired students to access educational possibilities efficiently as well as engage more actively by better communication.

Recommendations

Special education institutions should create guidelines to regulate technological consumption. You should apply instructional strategies combining traditional classroom environments with digital teaching strategies. Training about the efficient use of technology to prevent mental overload conditions should be given to the educational staff (Miller, 2022). Clear, structured group activities help to reduce isolation among special needs kids by means of their function in reduction of Before using instructional technology in their classroom, teachers should first examine learning needs of children with disabilities. Policy makers have to draft establishment guidelines encouraging sensible technology implementation and lowering of its negative effects. Researchers must investigate carefully how too much technology use influences the learning ability of handicapped people. Scholars doing disability research as well as educators and national legislators emphasizing special education can find great direction from this study. The study reveals that support of students with disabilities depends on the application of efficient integration strategies and individualized student technological needs.

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