



## **Technology Enhancing Special Education**

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### **Abstract:**

*Technology has transformed special education by offering personalized approaches and enhancing accessibility for students with disabilities. Assistive technologies, information and communication tools, and adaptive learning methods improve learning outcomes for diverse needs (Drigas & Ioannidou, 2013). This is supported by tools like AAC, speech-to-text, and AI screening (Woodward & Rieth, 1997). Research indicates that ICT-based strategies benefit students with autism spectrum disorders and reading difficulties (Olanami et al., 2020). This study aims to investigate the role of technology in enhancing special education and making schooling accessible for children with disabilities. The integration of technology in special education faces challenges such as budget constraints and policy concerns, with future trends focused on leveraging technology to improve special education systems globally (Lewis & Rossett, 1981).*

*Technology has really changed how we teach kids with special needs. It helps us teach each student in their own way and makes learning easier for them. <sup>1</sup> Things like special tools, ways to talk and share information, and learning that changes to fit each student help them learn better, no matter what their needs are (Drigas & Ioannidou, 2013). We see this with tools like those that help people communicate (AAC), turn spoken words into text, and use computers to find learning differences early (Woodward & Rieth, 1997). <sup>2</sup> Studies show that using computers and the internet helps students who have autism or trouble reading (Olanami et al., 2020). <sup>3</sup> This study wants to look at how technology helps special education and makes school easier for kids with disabilities. Putting technology into special education can be tricky because of money and rules. In the future, we'll likely see even more ways technology can make special education better around the world (Lewis & Rossett, 1981).*

**Keywords:** *Technology, Special Education, ICT Tools.*

### **Introduction:**

The world is becoming more competitive, and doing well is crucial for success. Parents want their children to succeed as much as possible. This puts a lot of pressure on students, teachers, schools, and the whole education system. It seems like the main focus of education is on how well students do in school, even though there are other important goals. Schools spend a lot of time helping students achieve academically.

Students with special learning needs or developmental disabilities often have a harder time in school. They may have trouble paying attention, remembering things, need to practice things many times, and struggle to understand how events and characters in stories relate to each other (Bender, 2008; Taylor, Richards, & Brady, 2005; Wenar & Kerig, 2006).

The development of computers has greatly changed education, creating many new ways to support teaching and learning. Using computers to present lessons with things like interactive pictures, videos, animations, simulations, and games has made them very helpful for both students and teachers (Hew & Cheung, 2010; Means, Toyama, Murphy, Bakia, & Jones, 2009, Ma & Nickerson, 2006; Penuel, 2006; Rutten, Van Jouligen, & van der Veen, 2012).

Ongoing improvements in information and communication technologies (ICT) have also influenced teaching technologies. Currently, much of the research focuses on using technology to improve active learning and interaction between teachers and students in regular classrooms. However, students and teachers in special education haven't benefited as much from these advancements. These technologies can help people with disabilities live independently and participate in society (World Health Organization, 2012).

### **Expand on certain aspects mentioned in the study**

- **Specific Assistive Technologies:** Such as AAC tools, speech-to-text, screen readers, or others?
- **Information and Communication Technologies (ICT) in Special Education:** How are these used beyond basic communication?
- **Adaptive Learning Tools:** How do these personalize learning for students with diverse needs?
- **The Benefits of Technology for Students with Autism Spectrum Disorders and Reading Difficulties:** Based on the Olakanmi et al. (2020) finding?
- **The Budget Constraints and Policy Concerns Related to Technology in Special Education:** What are some of these challenges?
- **Future Trends in Technology for Special Education:** What are some emerging technologies or directions?

### **Explanation of the role of technology in making education more accessible for children with disabilities**

#### **1. Assistive Technologies (AT): Bridging the Gap**

- **Augmentative and Alternative Communication (AAC) tools:** For children with speech impairments, AAC devices like speech-generating devices, communication boards, and specialized software enable them to express their thoughts, needs, and ideas effectively.
- **Speech-to-text and text-to-speech software:** These tools help students with writing difficulties, dyslexia, or visual impairments to create written content and access textual information by listening to it aloud.
- **Screen readers and Braille displays:** Students with visual impairments can access digital content through screen readers that narrate on-screen text or Braille displays that translate text into tactile Braille.

- **Alternative input devices:** For students with motor difficulties, specialized keyboards, touch screens, eye-gaze technology, and voice recognition software offer alternative ways to interact with computers and digital learning materials.
- **Reading and writing support tools:** Software with features like word prediction, spell checkers, grammar assistance, and graphic organizers can significantly aid students with learning disabilities.
- **Math notation tools and talking calculators:** These tools help students with dyscalculia or visual impairments to understand and work with mathematical concepts.
- **FM systems and hearing aids:** For students with hearing impairments, FM systems amplify the teacher's voice directly to the student's hearing aid or receiver, reducing background noise and improving comprehension.

## 2. Personalized Learning Experiences:

- **Adaptive learning software:** Technology can tailor educational content and pace to match each student's individual learning style, strengths, and weaknesses. This ensures that children with disabilities receive instruction that meets their specific needs.
- **Individualized Education Program (IEP) software:** Technology assists educators in developing, managing, and implementing IEPs, ensuring that accommodations and modifications are effectively tracked and delivered.

## 3. Enhanced Engagement and Motivation:

- **Interactive learning tools:** Educational apps, games, and simulations can make learning more engaging and enjoyable for students with disabilities, fostering greater participation and motivation.
- **Virtual and Augmented Reality (VR/AR):** These immersive technologies can provide unique learning experiences, allowing students to explore concepts in a more hands-on and visual way, which can be particularly beneficial for students with sensory processing issues or those who learn best through visual or kinesthetic methods.

## 4. Increased Independence and Reduced Anxiety:

- **Tools for organization and time management:** Digital calendars, reminders, and organizational apps can help students with executive functioning difficulties manage their tasks and schedules, promoting independence.
- **Self-paced learning:** Technology allows students to learn at their own speed, reducing the pressure and anxiety that can arise from trying to keep up with a traditional classroom pace.
- **Private and alternative communication methods:** Technology offers discreet ways for students to communicate their needs or ask questions, which can be particularly helpful for those with social anxiety.

## 5. Improved Access to Information and Resources:

- **Online learning platforms and digital resources:** The internet provides a vast array of educational materials, accessible from anywhere, which can be invaluable for students who may have difficulty attending traditional schools or accessing physical resources.

- **E-books and audiobooks:** These formats provide alternative ways for students with visual impairments or reading difficulties to access literary content.

## 6. Facilitating Collaboration and Communication:

- **Video conferencing and online communication tools:** Technology enables students with disabilities to connect with teachers, peers, and specialists remotely, fostering collaboration and social interaction, even if they cannot physically be present in the classroom. In essence, technology acts as a powerful equalizer in education, providing customized tools and flexible learning environments that empower children with disabilities to overcome challenges, participate more fully, and achieve their full potential. By embracing and effectively implementing these technological solutions, educational systems can create truly inclusive and accessible learning experiences for all students.

### Challenges:

- **Budget Constraints:**
  - Acquiring and maintaining up-to-date technology can be expensive. This includes hardware (computers, tablets, assistive devices), software, and ongoing technical support.
  - Schools, especially those in underfunded districts, may struggle to allocate sufficient resources for these tools.
  - The cost of training teachers to effectively use the technology is also a significant factor.
- **Policy Concerns:**
  - **Accessibility and Equity:** Ensuring that all students, regardless of their socioeconomic status or location, have equal access to technology is a major concern. This includes addressing the digital divide.
  - **Data Privacy and Security:** Protecting the sensitive data of students with disabilities is paramount. Policies must be in place to govern the collection, storage, and use of this information.
  - **Individualized Education Program (IEP) Implementation:** Ensuring that technology is appropriately integrated into IEPs and that schools are meeting their legal obligations to provide necessary assistive technology can be complex.
  - **Teacher preparedness:** Many teachers lack the training or confidence needed to use these technologies effectively.
  - **Lack of clear guidelines:** There is often a lack of clear guidance and standards on how technology should be used in special education, leading to inconsistencies in implementation.

### Future Trends:

- **Artificial Intelligence (AI) and Machine Learning:**
  - AI can personalize learning by adapting to individual student needs in real-time.
  - It can also assist with tasks such as early identification of learning disabilities and providing personalized feedback.

- Examples include AI-powered adaptive learning platforms and tools that analyze student data to predict learning needs.

### **Virtual and Augmented Reality (VR/AR):**

- VR and AR can create immersive learning experiences that simulate real-world situations, which can be particularly beneficial for students with autism or those who need to develop social skills.
- These technologies can provide safe and engaging environments for students to practice various skills.

### **Universal Design for Learning (UDL):**

- This framework emphasizes creating flexible learning environments that are accessible to all students, regardless of their abilities or disabilities.
- Technology plays a key role in implementing UDL by providing diverse ways for students to access information, engage in learning, and demonstrate their understanding.

### **Personalized Learning:**

- Technology enables highly personalized learning experiences that cater to the unique needs and learning styles of each student.
- Adaptive learning platforms, digital content, and data analytics can be used to tailor instruction and provide targeted support.

### **Enhanced Communication and Collaboration:**

- Technology can facilitate communication and collaboration among students, teachers, parents, and specialists.
- Online platforms, video conferencing tools, and digital portfolios can improve communication and promote a more collaborative approach to special education.

### **Wearable Technology:**

- Devices like smartwatches and smart glasses can assist students with disabilities by providing reminders, facilitating communication, and monitoring health.

### **Increased focus on accessibility:**

- There's a growing emphasis on ensuring that all technology, including mainstream tools, is accessible to students with disabilities. This includes features like screen readers, speech recognition, and alternative input devices.

### **Rationale of the Study:**

Technology is really important in special education. It helps students who learn differently by giving them learning that's just right for them and tools that help. This makes sure everyone can be part of the class and do better in school.

When we think about how technology helps, we see that it lets teachers make special learning plans for each student's strong points and what they find hard. Things like software that turns speech into text, learning

websites where you can click and do things, and tools that change to fit how you learn help students with disabilities. These things make it easier for them to learn and join in with everyone else.

### **Review of literature**

Andersen & Putman, (2020) conducted a study on Technology in special education. The objective of this study was to find out significant role of technology in special education classrooms. provides differentiation, varied content representation enhanced motivation, engagement and formative assessment and foster life skills.

Drigas & Ioannidou, (2013) conducted a study Technology in special education. The objective to find out significant role of technology in special education, classrooms using assistive technologies plus information and communications tools plus adaptive learning tools helps students with different needs learn better.

Olakanmi et al. (2020) conducted a study on Technology in special education. The article shows that ICT-based methods. help students with autism spectrum disorder and reading difficulties achieve better learning results.

Cinquin et al (2019), for example, looked at 29 studies about using e-learning in the education of people with disabilities.

Dogan and Delialioğlu (2020) analyzed 55 article on the use of technology in the education of students with learning disabilities.

In meta-analysis, Pasarelu et al (2020), explored using mobile apps to educate students with attention-deficit/hyperactivity disorder.

As it can be understood, the subject has been examined in many aspects, such as teaching tools and materials, teaching methods and strategies, participant demographic learning outcomes and teaching environment (Cheng & Lai 2020; Dogan and Delialioğlu, 2020; Zhang et al 2021).

### **Significance of the study**

Lots of people who study education are interested in making computer learning tools for students who learn differently. But, we don't know much about how special education teachers actually use computers in their classrooms (Seo & Bryant, 2009; Stetter & Hughes, 2010).

Before making any learning materials, the people who design them need to really understand what the students will need and what they can do (Morrison, Ross, Kemp, & Kalman, 2010). This is even more important in special education. We haven't paid much attention to what special education teachers need, how they feel about technology, what they're good at with computers, and how they use them in their classes when we're making computer learning tools.

So, this study wants to figure out what special education teachers need and how they feel about computer learning materials. What we learn from this study can help us create better computer learning tools that really meet the needs of students who learn differently and their teachers. This study is important because it can help us make learning tools that actually work for these students and their teachers. A research study on enhancing special education would typically have objectives focused on improving students' outcomes and teacher practices. A common hypothesis would be that the integration of technology will lead to increased students' engagement, improved academic performance and enhanced teacher efficacy.

## Objectives of the study

1. To Enhance student engagement and motivation
2. To Promote independent learning.
3. To Improve academic outcomes.
4. To Increase teacher efficacy and satisfaction
5. To Explore the impact on specific learning areas.

## Hypotheses

➤ **Technology will improve communication and collaboration:**

[For example, "Students who use digital communication tools will exhibit greater communication proficiency and collaboration skills compared to students who do not use such tools"]

➤ **Specific types of technology will have unique impacts;**

[For example the use of speech-to-text softwares will be more effective for students with writing difficulties compared to traditional methods]

➤ **Technology will result in improved academic performance.**

➤ **Technology will lead to higher levels of student engagement.**

➤ **Technology will enhance teacher efficacy and satisfaction.**

## Result and Discussion

This project is about using technology to help students with special learning needs, their teachers, and their parents. The goal is to create three main types of learning tools that make teaching and learning better both at school and at home.

First, they're making computer games you control with your body movements. These games will help students learn about moving and taking care of themselves.

Second, they're creating things for tablets and special interactive tables. These will help students learn and practice things like matching, numbers, letters, and colors.

Third, they're making smart toys that will help students learn how to tell stories and talk to others, using regular computers.

These tools are meant to help students, teachers, and parents in two ways. First, they can be used in schools to make learning fun and help students understand ideas and skills. Second, because learning needs to continue at home with parents helping, these technologies can help students and parents practice what was learned at school. This way, parents can help with schoolwork by practicing at home.

For this study, the learning technology tools they create will mostly be used by teachers in special education classes. So, it's important to know how comfortable these teachers are with using technology and how they feel about using it with their students.

Another thing to know is that this study is looking at special education schools in Turkey. These schools are for students who learn differently, and they usually have small classes of about eight students or even one-on-one learning. The government provides the lesson plans and materials, and teachers follow set goals for the students.

Each student has a list of learning goals for the year. Depending on how well they learn, they might be in a class with eight other students or work with a teacher by themselves. To make sure everyone has a chance to learn, these special schools are in most cities, big and small. The schools working with this research project are in a busy city area. Like other schools, they have computer rooms, internet, smart boards, and projectors that the government or parents' groups have provided.

The main goal of this study is to understand what special education teachers think about using technology in their classes and how they actually use it. Studies like this try to really understand and describe a situation by looking closely at what the people involved think and say (Fraenkel, Wallen, & Hyun, 2012; Yin, 2011).

So, they did what's called a "needs analysis." This means they tried to find out what's happening now and what people would like to see happen, based on what the teachers and administrators said. The main way they gathered information was by having conversations with special education teachers and school leaders where they could ask questions but also let the teachers and leaders talk freely about their experiences (semi-structured interviews).

### **Conclusion:**

In conclusion, technology has emerged as a transformative force in special education, offering a wealth of tools and resources that significantly enhance learning experiences and outcomes for students with diverse needs. From assistive technologies that break down barriers to personalized learning platforms that cater to individual learning styles, technology empowers educators to create more inclusive, engaging, and effective learning environments. By providing varied access to the curriculum, fostering communication and collaboration, and promoting independence, technology enables students with special needs to reach their full potential. While challenges such as equitable access and effective implementation remain, the continued thoughtful integration of technology promises a brighter and more inclusive future for special education.

### **Recommendations:**

- **Invest in Comprehensive Professional Development:** Equip educators with the necessary skills and knowledge to effectively integrate technology into their instructional practices.<sup>1</sup> This includes training on specific assistive technologies, software, and digital resources, as well as strategies for personalized learning and Universal Design for Learning (UDL). Ongoing support and opportunities for collaboration among educators are crucial.
- **Prioritize Accessibility and Universal Design:** Ensure that all technology adopted is accessible to students with a wide range of disabilities. Emphasize the principles of UDL when selecting and implementing digital tools and resources to provide multiple means of representation, action and expression, and engagement.
- **Foster Collaboration and Communication:** Utilize technology to enhance communication and collaboration among students, educators, parents, and support staff. This can include secure online platforms for sharing progress, virtual IEP meetings, and tools that facilitate peer interaction and support.

- **Promote Personalized Learning Experiences:** Leverage technology to tailor instruction to meet the unique needs and learning styles of each student. Implement adaptive learning software, individualized digital curricula, and tools that allow for differentiated instruction and assessment.
- **Ensure Equitable Access to Technology:** Address the digital divide by providing all students with reliable access to devices, internet connectivity, and technical support, regardless of their socioeconomic background or geographic location. Explore loan programs, school-provided devices, and community partnerships to bridge this gap.
- **Conduct Ongoing Evaluation and Research:** Continuously evaluate the effectiveness of technology interventions in special education through data collection and analysis. Support research efforts to identify best practices and innovative uses of technology to improve outcomes for students with disabilities.
- **Establish Robust Technical Support Systems:** Provide timely and effective technical support for educators and students to address any technical issues that may arise. This includes having dedicated IT staff, clear troubleshooting procedures, and readily available resources.
- **Engage Families in the Technology Integration Process:** Involve families in the selection and implementation of technology by providing information, training, and opportunities for feedback. This collaborative approach can enhance the effectiveness of technology interventions and promote consistency between home and school learning environments.
- **Explore and Integrate Emerging Technologies:** Stay informed about new and emerging technologies, such as artificial intelligence (AI), virtual reality (VR), and augmented reality (AR), and explore their potential applications in special education to further enhance learning and engagement.

By implementing these recommendations, we can harness the full potential of technology to create more inclusive, equitable, and effective educational experiences for students with special needs.

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