Perspectives of Special Education Teachers on Infusing ICT in Special Education Classrooms: A Mixed-Methods Investigation

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Abstract

The primary motivation behind this mixed-methods study was to learn how Pakistani special education teachers feel about integrating technology into the classroom. A total of 428 Pakistani teachers working in special education institutions were included in the study. There were 250 teachers in charge of kids with hearing impairment, 90 for those with intellectual disabilities, and 88 for those who were visually impaired. The survey takers were asked to share their thoughts on computers by completing an in-depth questionnaire. The special education teachers who participated in the qualitative portion of this study were interviewed in a series of semi-structured focus groups. The group included 15 teachers with expertise in teaching students with hearing impairments, 15 teachers with expertise in teaching students with intellectual disabilities, and 15 teachers with expertise in teaching students with visual impairments. In addition, the teachers answered seven questions centered on computers and other digital tools utilized in the classroom. The survey showed that special education teachers had a generally positive outlook on using computers. Positive responses were most frequently found in the areas of "special education," "staff development," "computer use in society," and "computers and the quality of instruction" on the subscales. The findings from the analysis of variance revealed that there was no statistically significant impact of experience and kind of impairment on instructors' attitudes towards technology.

Keywords: Special Education, Teachers, ICT, Classroom, Professional Development.

Introduction

The use of computers has become an integral part of the curriculum for students with special needs (Edyburn, 2013). Implementing ICT into classrooms allows teachers to tailor lessons and provide more malleable course materials to students. Students with hearing impairment (HI) can gain the independence they need to pursue higher education and successfully integrate into a traditional professional setting by making use of information and communication technology (ICT) (Adam & Tatnall, 2017). According to Lewandowski et al. (2016) computers serve the dual aim of facilitating the transfer of educational material and increasing active student participation in technology. However, data show that many disabled people in developing countries lack access to information and communication technology services (World Health Organization, 2015).

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When technology is used as part of a classroom's pedagogical approach, it benefits teachers and students with disabilities. Belson (2003) argues that computers help people learn because they allow for independent study at their own pace and integrate visual and auditory stimuli. Word processors are one tool that students can use to complete their work and ensure it is grammatically correct (Montgomery & Marks, 2006). For students with impairments, using technology in the classroom has been linked to improved academic outcomes (Michaels & McDermott, 2003; Schlosser & Wendt, 2008).

Teachers generally need to use more technology for instructional purposes (Lamber et al., 2008; Ma et al., 2008), despite the widespread use of computers for various administrative activities like lesson planning, grading, and research support. Elder et al. (2006) note that teachers sometimes miss the chance to fully harness technology for improving reading skills and providing necessary resources, even though students can benefit from reading interventions and improved literacy skills through the incorporation of computers in the classroom. Children with disabilities have improved their reading comprehension when digital and aided texts are used (Stetter & Hughes, 2010). Furthermore, incorporating technology into the classroom has demonstrated several beneficial outcomes, such as improved motivation and access to more objective data (Gulbahar, 2007). It has been linked to higher student productivity in written work (Puckett, 2004).

Several instructional models have been developed to fully realize the promise of technology in meeting the educational needs of students with impairments. The Matching Person and Technology Model (MPT; Scherer, 2005) examines how students' needs, preferences, and capabilities relate to computer technology in particular situations. Individual differences are included in this framework, which provides for things like goals, age, gender, and the availability and cost of selected technology, in addition to cultural and economic effects. In line with well-established theories of learning, such as Vygotsky's (1962) framework, technology integration enables scaffolding in several areas, such as writing assistance, behavioral sequences, mathematical operations, and electronic literature (Engestrom, 2009).

The effectiveness of special education hinges on various elements, including educators' attitudes and the quality of their teaching practices (Damore & Murray, 2009). Factors like stereotypes, notions of success, and low expectations for academic performance shape teacher attitudes toward disabled students. Persistent myths about children with disabilities being lacking in self-confidence and unable to meet academic requirements continue to influence educators, as argued by Dupoux, Wolman and Estrada (2005). Teachers' perspectives on students with special needs impact their use of technology in the classroom (Parette et al., 2004). When working with students with disabilities, teachers may exhibit resistance and reduced engagement. Teachers' confidence in using computers to assist students with disabilities is crucial in determining actual implementation (Connor, 2005-2008). Challenges in incorporating technology in the classroom are exacerbated by school-level difficulties such as negative attitudes about computers, a lack of support, a lack of time, and a lack of resources imposed by school leadership (Schoepp, 2005). Lack of staff training and support, negative attitudes, poor evaluation and planning processes, inadequate funding, difficulties in acquiring and managing equipment, and a lack of time are significant barriers to technology integration in educational settings identified by Copley and Ziviani (2004).

When expanding access to education for students of all backgrounds and abilities, utilizing cutting-edge computing technologies is undeniably advantageous. To overcome teachers' challenges in using technology, one must have a solid grasp of those impediments (Schoepp, 2005). The difficulties encountered by those in need of assistance in this area are highlighted by the works of Dissinger (2003), Michaels and McDermott (2003) and Smith and Allsopp (2005). One barrier to

the widespread use of technical solutions is the expense involved in their initial purchase, maintenance, and eventual replacement (Edyburn, 2006). According to Puckett's (2004) study, many individuals majoring in education needed to improve their abilities to analyze and utilize classroom technology effectively, leading to uninformed decision-making and inadequate implementation. According to a study by Billingsley et al. (2006) teachers who specialize in educating children with emotional and behavioral issues have expressed feelings of insufficiency when incorporating technology into their instructional approaches. According to Bausch and Hasselbring (2004) more adequate training about this matter needs to be provided in teacher preparation courses.

Literature Review

This study uses a wide range of theoretical frameworks and conceptualizations as its knowledge basis. The Technology Acceptance Model (TAM) sheds light on how people's perspectives significantly impact the spread of new technologies. This is particularly significant when analyzing the predisposition of exceptional education instructors to accept information and communication technology (ICT). For a theoretical framework to analyze these teachers' use of technology, we might go to Everett Rogers's Diffusion of Innovations Theory. Theories in Special Education, such as the Social Model of Disability, highlight the significance of removing and resolving societal barriers and modifying technology to foster inclusion. Active engagement, enabled by technological tools, is emphasized in constructivist learning theories. The Inclusive Education Framework provides a wide-ranging view, using ICT as a catalyst to expand educational opportunities for all students. Sociocultural viewpoints illuminate the impact of cultural nuance on technological adoption. Human-Computer Interaction (HCI) principles help tackle critical issues of usability and accessibility in special education. These theoretical foundations offer a complete conceptual framework that allows for a nuanced understanding of how ICT is implemented in special education classrooms.

Special Education within the Context of Punjab; Pakistan

The Punjab Government in Pakistan focuses on increasing school enrollment to improve literacy and workforce skills. They have implemented social protection initiatives, including free education for children aged 5-16 and a cash transfer program for females. However, they must also address the educational needs of disabled children, who face significant barriers (Hussain et al., 2021).

The Punjab Special Education Programme, initiated by the Government of Punjab in 2003, established 288 educational institutions, including Special Education Centers, primary and secondary schools, and vocational institutes throughout the province (Ali, 2021; Government of Punjab, 2020). With an enrollment of approximately 33,000 predominantly male students, the program offers various privileges such as free education, complimentary meals, textbooks, braille books, transport services, monthly stipends, and skill development and training courses (Government of Punjab, 2020b; International the News, 2020; Dawn, 2020).

According to Ali (2020), the Provincial Government of Punjab provides a monthly allowance of Rs 800 to students with disabilities and a health card covering their medical needs. Additionally, they allocate books valued at Rs 10 million to 147 exceptional education establishments (Dawn, 2020; International the News, 2020). These establishments provide educational and rehabilitative services, including physiotherapy, speech therapy, play therapy, and forensic and information technology courses (Student's E-Café, 2020; Punjab Higher Education Commission, 2022). In 2019, the Punjab government implemented a Special Education Policy to increase the number of

special education facilities and improve the identification of disabilities among youngsters (Ali, 2020). The policy classifies disabilities into four categories—mild, moderate, severe, and profound—to facilitate the inclusion of children with mild to moderate disabilities in the mainstream education system and establish specialized institutions for severe and profound disabilities (Government of Punjab, 2023b).

Despite these programs aiming to provide educational opportunities for children with impairments, they need to be equipped to meet the comprehensive demands of the entire challenged population in the nation. Most programs for individuals with special needs are concentrated in urban areas, creating accessibility obstacles for children in rural or remote regions (UNDP, 2021). Unfortunately, a significant number of children in these areas experience educational deprivation due to insufficient facilities and programs accommodating their disabilities.

This study, utilizing a mixed-methods methodology, aims to examine the perspectives of special education teachers regarding the incorporation of computer technology in classroom environments in Pakistan. Additionally, the research seeks to investigate potential differences in these attitudes based on educators' experience levels and the specific categories of disabilities they encounter.

Research Questions

1. What is special education teachers' perception regarding technology utilization within classroom environments?
2. Is there substantial variation in teachers' perspectives on the application of technology in classrooms based on their level of experience and the specific types of disabilities they encounter?

Methodology

This study used a Sequential Mixed-Methods Design, combining quantitative and qualitative research methodologies. The sample consisted of 428 exceptional education instructors in Punjab, Pakistan, who provide instruction to children with hearing, intellectual, and visual impairments, specifically focusing on three common categories—Hearing Impairment, Intellectual Disabilities, and Visual Impairment—out of five categories. The sample size of 428 teachers was obtained with the Stratified Random Sampling approach. The process of stratification involved categorizing individuals based on their disability categories. From each type, teachers were picked randomly using the formula $Nh=(n/N) \times N$, where Nh represents the sample size for each stratum, n is the desired overall sample size, and N is the total population size. This method guarantees both effectiveness and inclusiveness, enabling a focused examination of the educational dynamics within the context of high-enrollment special needs categories in Punjab.

The research used a standardized assessment tool to evaluate attitudes toward computers, consisting of 55 items on a Likert-type scale. The scale was translated into Urdu and back-translated into English to ensure linguistic accuracy. The scale's reliability was high, with a Cronbach's alpha coefficient of 0.81. However, the reliabilities of the subscales exhibited variability. The reliability coefficient for the computer influence subscale was 0.62, while the computer in society subscale had a reliability value 0.76. The understanding of the role of the computers subscale had a reliability coefficient of 0.80, while the special education considerations subscale had a reliability coefficient of 0.74. The staff development issues subscale had a reliability coefficient of 0.83, and the motivational factors subscale had a reliability coefficient of 0.85.

A poll on technology in education was also included, using questions from the US National Centre for Educational Statistics (Grey et al., 2010). The poll initially measured American teachers'

classroom technology use—three portions of 16 questions collected data on demographic characteristics, physical access, and technical resources. Seven new questions were included to increase the study's qualitative component. Researchers obtained qualitative data using the Survey for Educational Technology, a modified Grey et al. (2010) questionnaire. The continuous comparative approach (Ely et al., 1997) was used to analyze data. This analysis identified common themes and trends and considered each case's contextual information. The author agreed on quotations that fit the queries' pieces. In agreement with Brantlinger et al. (2005) exceptional education colleagues were given a collection of themes and quotes to verify the findings. Participants were then requested to categorize the material by handicap category for a thorough and reliable data analysis.

Table 1 Descriptive Results of Scale Used

Subscale	HI		ID		VI	
	M	**SD**	**M**	**SD**	**M**	**SD**
Effect of Computers	3.47	0.74	3.78	0.76	3.66	0.70
Computers in everyday life	3.72	0.53	3.90	0.53	3.91	0.49
The Importance of Comprehending the Computer	3.41	0.56	3.48	0.59	3.31	0.57
Comprehending the nature of the computer	3.21	0.61	3.20	0.80	3.51	0.68
Concerns for Special Needs in the Classroom	4.18	0.47	4.22	0.56	4.39	0.33
Influences on motivation	3.80	0.52	3.84	0.45	3.69	0.38
Effect of Computers	3.92	0.52	3.95	0.54	4.26	0.67
Computers in everyday life	3.73	0.59	3.80	0.64	3.74	0.49

Table 1 presents quantitative data on the perspectives of Special Education Teachers in Pakistan. Significantly, the subscale known as the "Effect of Computers" exhibits mean scores ranging from 3.21 to 3.92 across the three impairment classes, namely hearing impairment (HI), intellectual disability (ID), and visual impairment (VI). It is worth noting that there is considerable variety in the standard deviations of these scores. The subscale titled "Computers in Everyday Life" had mean scores ranging from 3.73 to 3.91, accompanied by slightly greater standard deviations. The subscale titled "Concerns for Special Needs in the Classroom" exhibits the highest mean score, ranging from 4.18 to 4.39, accompanied by somewhat lower standard deviations. The scores on the "Influences on Motivation" subscale exhibit a range of 3.69 to 3.80, indicating a favorable disposition.

Table 2 Inferential Results

Subscales	**t-value**	**t-value**	**t-value**
Computers in everyday life	8.03	10.04	10.47
Concerns Regarding Inclusive Education	14.80	12.85	12.85
Problems with Computers and the Quality of Education	9.15	11.15	10.06
Staff development issues.	10.43	10.39	10.47

Table 2 presents the quantitative data about "Computers in Everyday Life," specifically the t-values of 8.03, 10.04, and 10.47 for the HI, ID, and VI variables, respectively. The subscale under "Concerns Regarding Inclusive Education" exhibits notable t-values of 14.80, 12.85, and 12.85, indicating statistically significant impairment-related disparities. The t-values for "Problems with

Computers and the Quality of Education" and "Staff Development Issues" are 9.15, 11.15, 10.06, 10.43, 10.39, and 10.47, respectively. These values suggest considerable variations in the perspectives of instructors who serve different impairment categories. The aforementioned numerical data illustrates the diverse and significant perspectives held by Special Education Teachers across other subscales and types of disabilities.

What is the perception of special education teachers regarding the utilization of technology within classroom environments?

Special education teachers raised significant worries about special education and the potential detrimental impact of computers on overall instructional quality. This emphasizes the importance of overcoming specific challenges and ensuring that the use of technology is consistent with the goals of special education while also maintaining and improving the standard of learning. Furthermore, it was discovered that exceptional education instructors consistently expressed positive attitudes toward using computers in their professional development. This indicates they recognize the importance of ongoing training and skill development in effectively utilizing technology for special needs education. The study's findings show that special education teachers have a generally positive attitude toward using computers in educational settings. Nonetheless, the study draws attention to complex difficulties and disparities in viewpoints within distinct subcategories, emphasizing the need for targeted help and instruction to address specific challenges associated with including technology in unique education settings.

Is there variation among special education teachers of different experience levels and working with varying types of disabilities?

To investigate this issue, a two-way analysis of variance (ANOVA) was used to examine differences between teacher groups. Researchers evaluated the respondent's experience level and the impairment they were living with when computing the dependent variables. The results of the two-way ANOVA revealed that neither experience nor disability type had a statistically significant impact.

Utilization of Computers in Instructional Activities for Students with Disabilities

Several basic themes arose during discussions about how students use computers in the classroom. The majority of teachers in the field of special education have come to agree that their kids must get additional computer instruction. The authors emphasized the benefits of regular education to students with special needs in using computers and the Internet for academic purposes. Although students use computers, parental engagement is crucial in encouraging students to use technology at home. A teacher who works with students who are hard of hearing expressed their concerns, saying, "On some occasions, I experience a sense of powerlessness as I aspire for my students to employ computers or technology effectively; however, a significant number of them encounter limitations in accessing technology within their households, and our educational institutions frequently confront insufficiencies in essential resources." According to the data, the rate of computer use in Hawaii classrooms is 68.57 percent among students and 91.42 percent among teachers and staff. The percentage of time that computers were used by students with ID in classrooms was determined to be 71.42%, while the rate of time that they were used was 80% outside of the school. Teachers working with students with visual impairments reported using computers 51.61 percent of the time in the classroom and 90.32 percent of the time elsewhere in the school.

The Accessibility of Technological Equipment within Educational Institutions

The study Centered on strategies that teachers may employ to improve the inclusivity of their classrooms for students with disabilities, including individuals who experience hearing difficulties or have cognitive problems. The investigated technologies include LCD projectors, video conferencing systems, interactive whiteboards, digital cameras, portable media players (such as iPods), and tablet devices. The predominant technical tools employed by teachers in instructing pupils with hearing impairments are LCD projectors, video conferencing, smart boards, digital cameras, media players, and tablets, as indicated by the most commonly reported practices. Likewise, teachers who engage with students possessing intellectual disabilities reported the utilization of diverse technological tools, including LCD projectors, video conferencing systems, smart boards, digital cameras, media players, and tablets, with various degrees of prevalence. The presence of LCD projectors, video conferencing, smart boards, digital cameras, media players, and tablets in classes with students facing hearing problems exhibited variability, suggesting that educators' adoption rates of technological aids varied based on the specific needs of their students and the resources at their disposal.

The application of state-of-the-art technology

Teachers have admitted that they need to utilize cutting-edge technology widely. Other elements contribute to this phenomenon, encompassing a lack of familiarity with technology, inadequate availability for attending training workshops on rising technological trends in teaching, and time limitations resulting from instructional obligations. Although teachers have generally displayed favorable attitudes towards the use of technology, various problems hinder their capacity to leverage technology in their instructional practices effectively. As an illustration, a teacher engaged in instructing pupils with intellectual disabilities expressed genuine enthusiasm for incorporating technology into their teaching practices. However, they lamented the lack of resources available at their school to provide the necessary assistance for this endeavor.

The Integration of Technology in Classroom Preparation, Teaching, and Administrative Tasks

The discourse encompassed a range of subjects about teachers' use of diverse technological applications within the framework of classroom organization, instructional delivery, and administrative tasks. The consensus among teachers was unequivocal regarding implementing a more organized framework to enhance their acquisition of novel technological tools and applications. The individuals acknowledged the significance of technology, although they identified a scarcity of time as a barrier to its utilization, predominantly due to their limited familiarity or instruction inaccessible applications. A teacher instructing pupils with hearing impairments expressed that they own a smart board in the designated resource room. The teachers noted that the smart board's educational materials are only available in English.

Additionally, my expertise with the accompanying software is limited, yet I am ready to support my students in realizing their full potential. Word processors, spreadsheets (like Excel), graphing software, wikis, social networking sites, and gadgets like intelligent boards are widely used in educational settings. In contrast, apps like blogs, simulation programs, student record management software, desktop publishing software, and online resources see far lower usage rates. One educator who works with HI kids described their unique problems: "My teaching background predominantly involves working with deaf students, as I initiated my career in this field." Occasionally, the burden of creating my own course materials has left me feeling downhearted.

Table 3 The Extent to Which Teachers Utilize Technology for Lesson Planning, Student Assessment, And Classroom Management

Technology Applications	HI (%)	ID (%)	VI (%)
Microsoft Word	48.57	42.86	35.48
Database administration tools	28.57	60.00	48.39
Software for creating tables and charts	37.14	42.86	54.84
File-management software for schools	14.29	08.57	19.35
Computer programs for making books	14.29	14.29	41.94
Presentation-creation software	08.57	11.43	19.35
Assessment tool software	08.57	22.86	32.26
Software for modeling and visualizing scenarios	05.71	14.29	22.58
Programs for training and drills	05.71	20.00	25.81
Application-based training	11.43	25.71	38.71
Internet	11.43	11.43	19.35
Blogs	14.29	11.43	22.58
Wikis	11.43	08.57	19.35
Online social media platforms	48.57	42.86	35.48
Different Uses	28.57	60.00	48.39
Microsoft Word	37.14	42.86	54.84

Table 3 results indicate that teachers recognized disparities in the technological aptitude of students, explicitly highlighting distinctions observed among individuals with Hearing Impairment (HI) and Intellectual Disabilities (ID). While students with hearing impairment (HI) showed proficiency in computer usage, individuals with intellectual disabilities (ID) faced difficulties understanding the procedures required to access particular software or apps. Nevertheless, it was observed that students with intellectual disabilities demonstrated proficiency in utilizing word processing software, graphics, and drill practice apps, as detailed in Table 4. A teacher who specializes in working with kids with intellectual disabilities has noted that while some of their pupils may have difficulties when using computers, they nevertheless derive enjoyment from interacting with technology in ways that align with their cognitive capacities. For example, individuals possess proficient skills in utilizing drawing and word-processing tools. However, they face challenges when confronted with complex activities requiring higher-order cognitive abilities such as sophisticated thinking, reasoning, and problem-solving skills.

Email has evolved as the prevailing method of contact between teachers and parents. However, certain teachers faced difficulties in this regard. The instructor responsible for instructing pupils with hearing impairments expressed that their primary contact mode is with the student's mother. However, it was noted that the mother's means of communication are limited to telephone use, without any alternate methods available.

Table 4 Statistics on How Many Students Are Using Devices in Class

Technology Applications	HI (%)	ID (%)	VI (%)
Initial Content Creation	48.57	42.86	35.48
Create or use visual aids and graphics	28.57	60.00	48.39
Carry out research endeavors	37.14	42.86	54.84
Talk to your other students.	14.29	08.57	19.35
Add to online diaries and encyclopedias	14.29	14.29	12.94
Use your social media accounts	08.57	11.43	19.35
Perform data analysis and problem-solving tasks	08.57	22.86	32.26
Perform tests or take measurements	05.71	14.29	22.58
Create and present multimedia documents	05.71	20.00	25.81
Create works of visual, aural, or visual media, including webcasts.	11.43	25.71	38.71
Create and run experiments, simulations, or models	11.43	11.43	19.35
Make something (with the use of computers, for example)	14.29	11.43	22.58
Initial Content Creation	01.43	08.57	19.35

Table 4 shows how frequently and for what purposes students utilize technology in the classroom. One area where there is widespread consensus among experts is in the initial content production (48.57-35.48%). Sixty percent of people also agree that making or using visual aids and graphics is something they do frequently. Most students participate in research activities (37.14-54.84%), and the vast majority use technology for social purposes and to contribute to online communities. Some effort is put into solving problems, analyzing data, and creating multimedia documents, with agreement levels ranging from modest to high. Students also engage in creative and exploratory activities, such as running simulations or models, and provide positive feedback. By demonstrating students' participation in content creation, research, social interaction, and multimedia presentation, the table offers a comprehensive use of devices for varied instructional tasks that emphasize the complex function of technology in the educational process.

At times, it is necessary to transmit vital student-related information via email or other technological platforms, which presents itself as a formidable undertaking. A limited number of teachers engage in the exploration of alternate communication channels. A teacher specializing in pupils with Hearing Impairment (HI) said they manage an online discussion forum. However, they find the level of involvement, particularly from parents, insufficient compared to their desired level.

Table 5 Percentages of Instructors Using Technology to Communicate with Parents, Their Preparation, And Educational Technology Professional Development

Technology Applications	HI (%)	ID (%)	VI (%)
Participation of Parents			
Spreading group news via email or a mailing list.	11.43	08.57	22.58
Concerns of individuals can be addressed by email.	05.71	11.43	25.81
Discussion board for use in the virtual classroom	11.43	20.00	16.13
Website for a class or instructor	02.86	11.43	12.90
Blog for lecturers or students	02.86	17.14	12.90
Communication Instantly	08.57	31.43	22.58

Contributions to Teacher Education			
College-level training for educators	60.00	51.43	64.52
Education for teachers at the graduate level	14.29	20.00	22.58
Staff members who are in charge of assisting students- with school technology will conduct training.	42.86	57.14	25.81
Self-directed education	45.71	42.86	29.03
Effects of Continuing Education on the Field of **Educational Technology**	80.00	65.71	61.29
It was a perfect fit for my wants and needs.	74.29	60.00	35.48
It bolstered my school district's aims and expectations.	57.14	57.14	64.52
It was relevant to the equipment in my school.	54.29	37.14	61.29
It was easily accessible whenever and whenever it was needed.	42.86	54.29	61.29

Table 5 exhibits a favorable attitude towards using technology in educational settings, as seen by significant percentages expressing agreement and efficacy. Parent participation activities, such as disseminating group information and resolving problems using electronic mail, are generally well-received by Higher Institutions (HI), Individuals (ID), and Virtual Institutions (VI). The value of college-level training in contributions to teacher education is shown by a notable 60-64.52% consensus among various perspectives. The data consistently indicates that continuing education in educational technology has a significant beneficial influence, particularly on school resources, availability, and alignment with the objectives of school districts. The percentages reported range from 65.71% to 80.00%, further supporting this observation. In general, the data emphasizes the widespread recognition of the excellent impact of technology in education, particularly in promoting parental involvement and improving teacher training and professional development initiatives.

Teachers' preparation for and training in the use of technology in the classroom

Regarding the training, professional activities, and teacher preparation in utilizing technology for instructional purposes, teachers universally recognized the impact of their undergraduate education programs, as seen by the data presented in Table 5. The authors emphasized a notable decrease in the provision of technology training throughout their postgraduate education. Despite including professional development opportunities, their availability could have been more consistent and frequently held at inconveniently remote places from instructors' houses. Teachers who instruct kids with hearing impairments (HI) have reported obtaining training from the school's technology support personnel. Conversely, teachers dealing with students who have intellectual disabilities (ID) have not expressed a similar viewpoint. Significantly, teachers placed a strong emphasis on the significance of self-directed learning during their technological training. The professional development received by teachers of hearing-impaired (HI) kids was reported to be satisfactory, as it effectively corresponded with their specific goals and needs. Furthermore, it supported the goals and standards established within their respective school districts. Conversely, teachers responsible for instructing pupils with intellectual disabilities (ID) and visual impairments (VI) reported that their professional development primarily focused on the technological resources accessible within their educational institutions.

Discussion

Examining how teachers in special education feel about using computers in the classroom was the primary focus of this study. The study also aimed to explore how instructors' perspectives about technology changed over time and how they responded to students with a range of disabilities (including those with hearing impairment, intellectual disability, and vision impairment). The survey results show that special education teachers have generally positive attitudes towards technology, showing exceptionally high levels of enthusiasm in particular education concerns, staff development concerns, societal computer use, and issues related to computers and the quality of instruction. These findings are consistent with the existing literature, suggesting that teachers have a positive attitude towards technology and can overcome barriers to its use in the classroom. Previous scholarly investigations have demonstrated a prevalence of technology utilization among special education teachers, with a reported percentage exceeding 26% (Quinn et al., 2009; Wahl, 2004); the present study observed that students predominantly interacted with technological applications for tasks such as generating written content, producing or employing visual aids and presentations, and engaging in instructional exercises involving repetition and skill-building, such as reading or mathematics.

Nevertheless, alternative applications were used to meet the anticipated levels as indicated by the stated percentages. This underscores the need to provide students with mild disabilities access to various electronic resources to augment their educational experience. In order to accomplish this objective, teachers must receive adequate assistance and training to effectively integrate technology into their instructional practices, as it is now not an inherent component of their everyday pedagogical activities. Various factors, including inadequate expertise, time constraints for training workshops, and heavy instructional workloads, hinder the seamless incorporation of technology into daily teaching practice, notwithstanding instructors' favorable attitudes toward its use.

The study underscored the importance of effectively resolving primary and secondary obstacles to incorporating technology. Primary hurdles encompass challenges associated with technology accessibility, proficiency, assistance, and time allocation. In contrast, secondary barriers involve educators' pedagogical convictions, reluctance to embrace innovation, and the congruence between technological implementations and the educational environment. This study highlighted both types of hurdles, highlighting the significance of addressing these challenges to facilitate the incorporation of technology in special education.

The findings from the qualitative analysis indicate a pressing requirement for the training and development of instructors. Teachers must be informed about the newest advancements in educational technology specifically tailored for students with disabilities. Additionally, there is a need to make structured strategies for conducting training workshops. Teachers have also articulated apprehensions over kids' utilization of technology and the need for more proficient communication with parents. Professional development opportunities must prioritize the inclusion of reflection and self-examination, enabling teachers to engage in a rigorous assessment of their instructional approaches and behaviors, hence leading to positive impacts on student results. Providing teachers with the necessary skills and abilities to effectively utilize information and communication technology (ICT) in educational settings is imperative. Moreover, incorporating technology should meet students' specific demands and learning objectives.

It is of utmost importance to confront the obstacles posed by technology and advocate for its integration into special education. Administrators and school principals possess significant influence in motivating and providing guidance to teachers regarding the successful incorporation

of technology. Establishing an inclusive educational environment enriched with technology necessitates several vital components: access to technology, comprehensive teacher training, research on technology integration challenges, and ample professional development opportunities. The study is subject to certain limitations, including the potential impact on technology usage percentages among teachers and pupils. This influence may arise from the disparity in the number of teachers who are Hearing impaired (HI) or intellectually disabled (ID) compared to those who are visually impaired (VI). Obtaining a more extensive and diverse sample from multiple regions would be beneficial to address this constraint. Furthermore, the self-report measure employed in this research may have failed to capture detailed data regarding the utilization of technology inside educational settings. Further investigation is warranted to examine the variables associated with the utilization of technology within specialized educational environments.

This study has examined the perspectives of special education teachers about the use of technology within the context of special education, with a specific emphasis on children with disabilities. The study encompassed three cohorts of special education teachers operating within classroom settings, uncovering predominantly favorable dispositions towards technology, which remained consistent regardless of teaching tenure or the specific disability category. Nevertheless, the research also underscored the necessity for extensive instruction in computer technology for both teachers and learners, underscoring the significance of structured approaches to enhance the efficient utilization of equipment. Ongoing research and innovations are crucial in addressing the difficulties and opportunities within the evolving field of unique education technology.

The study highlights that special education teachers have generally positive views towards technology, but effective technology integration is only improved with thorough training and professional development. The results highlight the significance of tackling both primary and secondary hurdles, including issues of accessibility, competence, and time limitations, as well as those associated with pedagogical beliefs and innovation resistance. Providing direction and resources by administrators and school principals is crucial in ensuring an inclusive learning environment enhanced by technology. Continuous research and innovation are essential to overcome these restrictions and advance technology's involvement in special education, which will positively impact student results.

Conclusion

This extensive investigation examines the complex viewpoints of three specific groups of special education teachers responsible for delivering customized technological solutions for students with various sensory disabilities, such as deafness, blindness, or other difficulties. The research reveals a widespread positive attitude towards technology and a significant level of excitement, especially about topics related to special education, professional growth, societal computer use, and improving the quality of instruction. Although favorable feelings are expressed, our research highlights ongoing obstacles such as restricted availability, insufficient knowledge, poor support structures, and time limitations, which require focused actions to be addressed.

Moreover, the study highlights the importance of administrators and school principals in advocating for a technology-enhanced, inclusive educational setting. The text emphasizes the significance of tackling core challenges, such as accessibility, proficiency, support, and secondary hurdles, including educators' educational beliefs and opposition to change. Our analysis emphasizes the importance of continuous research initiatives to address the changing problems and opportunities in education technology. It emphasizes the importance of offering thorough instruction to teachers, arming them with the essential abilities to effectively use information and

communication technology (ICT) in specific educational environments. The approach for organized workshop processes seeks to guarantee efficient execution, addressing challenges from insufficient proficiency, time limitations, and demanding instructional burdens. Our study offers valuable insights into the viewpoints of special education teachers and presents a strategic plan for improving technology integration in the dynamic field of special education.

Recommendations

1. Create ICT training courses tailored to the needs of students with disabilities, including instruction in cutting-edge tools and effective methods for incorporating them into everyday life. This is done so that all students have equal access to a high-quality education regardless of their circumstances.
2. Create a system of continual education for educators, with a focus on pedagogy and educational technology. This effort fosters a dynamic and adaptable learning environment by encouraging reflective practices and keeping teachers abreast of developments, aiming to integrate technology into classrooms better.

Future Directions

In the future, investigations are needed on the obstacles discovered and to create specific strategies to help special education teachers. It is necessary to establish customized professional development programs that prioritize technical proficiency and address the issue of time restrictions. Efforts should be made to investigate novel accessibility solutions for kids with sensory impairments, promoting cooperative endeavors among educators, administrators, and technology specialists. Longitudinal studies can monitor the development of perspectives over time, while it is essential to prioritize tactics for engaging parents and establishing successful communication channels. It is essential to advocate for legislation prioritizing technology in special education, global comparative studies, and the assessment of interventions. Sharing optimal methodologies through various platforms and conferences promotes a collaborative endeavor to foster an inclusive and enhanced educational setting.

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