CHAPTER TWENTY TWO

CHALLENGES OFTECHNOLOGY USE IN SPECIAL NEEDS EDUCATION

Osaretin, Gladys Onyebuchi. M.Ed.
Department of Special Education, Ignatius Ajuru University of Education
Port Harcour, Rivers State.
&
Nneka Uzoamaka Mbakwe
Elnathan Learning Centre, Amachi Ama
Port Harcourt – Rivers State.

Introduction

Whenever the word "technology" is mentioned, it is hard not to visualize hardware, however, this chapter dwells more on the subtler form of technology — process. According to the Oxford Languages Dictionary (2022), technology is defined as the application of scientific knowledge for practical purposes, especially in industry. It is also the machinery and equipment developed from the application of scientific knowledge(The Oxford languages dictionary, 2022). We deduct from the above definitions that technology is not just the product, but also the process of applying pragmatic scientific knowledge. Education, also according to the Oxford languages, is the process of receiving or giving systemic instruction, especially in a school or university, or it can be defined as an enlightening experience. Technology in special needs education therefore is all about the enlightenment gotten from the dispensation or reception of systemic instructions with the use of technologies in the processes and products for the care and learning of people with disabilities (PWDs).

However, technology will be used throughout this chapter to refer broadly to both hardware that enables connectivity and devices (including television and handheld devices such as smart phones and tablets), content (including digital media such as apps, games, software and television programming), and assistive technology devices. The term "assistive technology device" stems from the Assistive Technology Act of 1998 and is specifically defined in Section 602(1) of the Individuals with Disabilities Education Act (IDEA) as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a child with a disability. The term does not include a medical device that is surgically implanted or the replacement of such device."

Over the years, the advent of technology has effected a massive shift in the processes of all facets of the human life, consequently, things that were once obscure and presented themselves almost impossible to comprehend or/and

achieve are now revealed to us just by the application of technology and assistive technology. Now we can peer into the human mind without cutting open the cranium and disentangling the brain matter; decipher the possible prognosis, alleviation methods or treatment for challenges faced by PWDs; and people with disabilities are no longer deemed impotent or deviants but are now able to not only contribute to the society but also to science and technology. Good news is, scientific advancement results to technological advancement which brings about more scientific knowledge and in turn, more technological advancements- it is a virtuous cycle; this means things can only get better for the processes of educating PWDs. As a matter of fact, some of the greatest tech being used right now in special needs education and care at large were innovations of PWDs.

All around the world, technology has made its positive mark on virtually every sphere of life, special needs education—Its process and product—not excluded. What seemed to be incomprehensible to those with special needs and all caregiving parties are now made unclad to them, and as technology advances more and more, it is becoming glaring that the improvement of technology for the education of PWDs cannot be left in the hands of researchers alone, as a matter of fact, not on one caregiving party's table alone. Truthfully, the other caregiving parties have to know as much to participate and contribute successfully to the development of technologies that will foster effective learning process for PWDs;technologies that can meet individualized learning requirements for every student with special needs at their own pace, are affordable, accessible and are easily manipulated to meet the educator's needs in assessment and delivering of knowledge to their students.

How in the world has technology come to be so important in the education for PWDs? Simplest answer, it has made it possible. Special needs disabilities can broadly be classified into physical, developmental, behavioral/emotional and sensory impaired groups, and everyone who has a disability in any of these groups is dependent on at least one technology, not because they cannot do without it, but because living, and especially learning, will be difficult without it. According to the IDEA report (2022) from the U.S Department of Education, one-third (33%) of students with disabilities who received special education services under IDEA in school year 2020–21 were those with "specific learning disabilities." A specific learning disability (LD) is a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.

Research into developing technology for special education was originally to resolve the issue of truly individualized instruction that attends to a student's specific deficits – the focal point of IEPs; one of the most troubling logistical and pedagogical dilemmas being faced in the field. This directly places the outcome and products of such researches as concerns for the teachers as the primary users of such technologies. Woodward and Rieth (1997) posited that arguably, technology

research in special education became more distinctive when researchers began examining ways in which technology could simplify the diverse, if not overly complex, roles required of public-school special educators. The day-to-day activities of these individuals was (and remains) more than instructional. Special education teachers, particularly resource room teachers, were charged with diagnostic responsibilities (i.e., determining eligibility for special education services), as well as documenting student progress toward the goals enumerated in individualized educational programs, or IEPs. Researchers also began exploring how unique applications of technology could be applied to the needs of "low-incident" populations such as students with hearing and visual impairments, mental retardation, and physical disabilities.

This topic draws attention more to the technological needs of the special needs educator than those of PWDs because most, if not all, of the students in this set cannot self-learn. If the educator is uneducated technologically, the students, as much as they want to be educated and helped, cannot receive much. Consequentially, this chapter discusses the technological challenges of special needs educators and PWDs and suggests ameliorative ways to handling them. Embedded in this chapter are some of the benefits of the use of assistive technologies (AT)in conjunction with traditional teaching practices as well as suggestions to take technology in special needs education to the next level in research and applications.

The technological challenges of special needs educators and PWDs and possible solutions.

Challenges of special educators:

The use of assistive technologies for children with disabilities has greatly encouraged inclusive education to becoming a possible reality, balancing the playing field for all students. This does not translate to, as misconstrued by some teachers, all students learning at the same pace, it only means that PWDs can now have access to and experience what other students are experiencing on their own terms—personalized learning experience. As a matter of fact, technology has now made it possible for all students, PWDs inclusive, to marshal and direct their own learning for the rest of their lives, only if they know how, and knowing how is the teacher's job. Instructional adaptations should be more of a teacher's instruction techniques and materials than of the technology itself. As a result, there are two major problems special needs educators face with technology; adaptability of technological instructional materials and cost of training and purchase of technologies (however, this delineation is based on the assumption that the educators themselves are interested in and internally motivated to using technology for instructional purposes).

In their historical review of technology research in special education, John Woodward and Herbert Rieth (1997) posited that for special education

technologists, productive future research could be conducted in the areas of school culture and professional development. Still, the argument that teachers resist technology because of fundamental and conflicting visions of technology is complex in special education because the special educator has multiple and competing roles. In addition to teaching, the special educator helps assure that students are eligible for services rendered by the government for them and monitors progress toward IEP goals. Effectively implementing and managing technology presents significant challenges for a single teacher who often designs and provides services for a wide range of students with disabilities. These demands, may actually lead to significant uses of technology because of the need to make one or more dimensions of the practitioner's job more efficient, if not more sensitive to the highly individualized nature of special education services.

Cuban (1993) had cogently argued that claims about the underuse of technology in schools because of logistical difficulties or a lack of funds, for example, are only partial explanations of a deeper problem. The research community's view of how technology should be used by special needs educators are perpendicular with core visions of teaching. As a result, comprehensive approaches to instruction, such as those that attempt to encode direct instruction techniques within software that cannot be tampered with or manipulated, conflict with the more informal and spontaneous instructional decision making that occurs in a classroom; even the most optimally designed software can be of limited benefit because of the everyday conditions of teaching.

Instructional technologies that are of great value for special needs children can either be assistive (as seen with text-to-speech) or adaptive (for example, CAT). Some of these technologies are exclusively a type while others are hybrids. Blackhurts (2005) described some examples of the technology used to teach students with special needs that are directly pertinent to LD, while others have the potential to assist those with LD. The first type of those having to do with the technology of teaching––this refers to systematically designed and applied approaches with precise instructional procedures using small units of carefully sequenced units. They also involve active teacher and student involvement, heavy use of reinforcement, and a careful monitoring of performance by students. Although, computers are not necessarily used in all procedures, "technology" as used here merely denotes instruction in an organized format.

The second type is instructional technology––the systematic process of learning and teaching using specific objectives based on research on human learning and development. Applications include videotapes and computer-assisted instruction, electronic books, network-based learning, etc. Thus, any technology is a device that is a means to an end, not an end in itself, which means that unless the instruction is well designed and properly implemented, it is of little positive value. Bringing forward again the necessary usability by teachers.

Third is assistive technology––this technology (AT) uses various devices and services to help people with LD function better in their environment. It includes a large variety of equipment: mechanical, electronic and non-electronic, microprocessed, non-mechanical, specialized materials and strategies. The purpose of these services and devices is to assist people with LD to learn to manage and make their environment more accessible as well as enable them to compete in the school and workplace, and enhance their independence, all of which implies an improved quality-of-life. Special communication aids, alternative keyboards, homemade devices, etc., are part of the AT––"specially designed to meet the idiosyncratic needs of a particular person".

The final type focuses on technology productivity––these are tools that include software and hardware to help both students and staff be more effective and efficient. For example, computer programs can be used with educational placements for students with special needs, while students with LD can use specialized writing tools, word prediction software, multimedia composing tools, etc., to help them with their learning needs. Finally, information technologies (IT), such as the Internet and the World Wide Web, allow equal access to resources on a wide range and variety of topics. For professionals in the LD field, Web access can increase special education services; for people with LD, the web can be used to facilitate learning (e.g., online tutorials).

All of these have spurred a growing interest towards developing computer-based instructional materials for students with special learning needs in educational research community yet our knowledgebase about how special education teachers integrate the computer technologies in special education classrooms is very limited (Stetter & Hughes, 2010). Therefore, special education teachers should be consulted so as to understand what they need to make the best use of instructional materials. As the potential consumers of these technologies, it is even more important to understand their needs, attitudes, competencies, and utilization of instructional technologies in their classrooms in terms of designing computer supported instructional material.

The second major problem special needs educators face is cost of training and purchase of technologies. One of the well documented barriers in technology integration is lack of access to the technological infrastructure and technology itself (Pittman & Gaines, 2015). Contrary to the common belief about fast development of and wide access to the technology, lack of access to a functional technological infrastructure and technological devices persists as a barrier factor for technology integration for teachers in special education. Even right now as I write, some teachers do not even possess a smart phone, not because they do not want it, but because they cannot afford it. With their meagre salaries, especially in Nigeria, teachers may be eager to learn new technologies especially if that technology would help them in their job or daily life. However, due to financial limits and time constrains, they do not feel compulsion to purchase or learn new technologies unless it is inevitable.

In addition, obtaining and maintaining technology for schools are financial-intensive projects and public schools almost entirely depend on funds from government to operate and pay teachers' salaries. Therefore, in addition to teachers having insufficient salary to obtain technology with their own funding, public schools are financially unable to equip the classrooms with technology. Private schools that have the resources to purchase such technology and train their staff thoroughly on their use have such exorbitant school fees, causing a big divide in accessibility—giving only the rich access to quality education for their special children.

Challenges of PWDs:

As is the case with most PWDs, they often present with more than just LDs. Aside LDs, some major but often neglected sources of problems include, but are not limited to, lack of respect for their personal needs and desires and lack of non-cognitive competencies. Other glaring problems include region, race, government policies and available care provided by the government for PWDs, infrastructure and technological availability.

Some of the factors that inhibits cognitive functions in PWDs include short attention span, low capacity of working memory, need to repeat practice and feedback sessions, and difficulties in making connections between events and characters in the same story. Typical instruction for these students is highly structured, provides strict guidelines, progresses with small steps, repeats practices and feedback sessions as many times as students need (Kirk et al., 2011). This type of instruction can be developed with educational technology tools such as computers, tablets, or game consoles. Generally, video based, or keyboard-mouse interaction type computer-based technologies have been utilized in special education cases, which have very limited student interaction and feedback capacities.

However, computer technologies that allow students to interact via alternative channels such as body gestures or touch screens have potential to produce better learning results for students (Hwang et al., 2013). This is because these relevant learning technologies actually showed respect for special needs children's personal needs, desires, and interests—learning the way they want, and as is common with them. This was exemplified at Bartholomew Consolidated School Corporation, a Columbus, Indiana public school district with approximately 12,000 students. According to a U.S. Department of Education report (2017), students in that district who were hesitant to communicate face-to-face became engaged in class discussions in the online setting. After the school district implemented universal design for learning (UDL), an approach that incorporates digital books, specialized software and websites, screen readers with a text-to-speech feature, and other technology tools, graduation rates increased 22% for special education students. PWDs react positively to you if they sense that you have

respect for their personal needs and desires, this should not be taken for granted and should be employed properly.

Asides the students wanting their needs and their personal desires respected, another challenge faced by PWDs is their lack of non-cognitive competencies; psychomotor skills and emotional and socialization skills (the affective domain). For the psychomotor skills, these children sometimes face the dilemma of coordinating their muscles, especially during self-care, cleaning the face and other parts of their body may present to be difficult. In the affective domain, technologies to improve non-cognitive competencies abound, especially via games and specialized app interfaces such as The Social Express and Ripple Effect (for social skills);Breath, Think, Do with Sesame and Digital Problem Solver (for emotional skills).In their research, Cagiltay et al. (2019) reported that teachers emphasize that it is important to teach self-care skills and behavior control in public areas. A teacher stated this as"...as I said it is not important to know tons of concepts for the kid if that kid cannot go to toilet by himself or cannot eat his meal. If his mom cannot take him to a movie theater or shopping center because of behavioral problems, it is not important for him to use technology." More and better technologies should be developed to be used by teachers and parents in assisting students in the learning of psychomotor skills.

Major benefits of use of technology (especially assistive technologies) in conjunction with traditional teaching practices

Although this chapter focused more on the challenges that educators face with technology, they are only a means to an end—educating people with LD. The primary users may be the teachers but the main beneficiaries of technologies still remain the students. In light of the recent corona pandemic, hybrid/blended teaching (teaching onsite and online) is fast becoming the order of the day, with some learning institutions now fully indulging in the latter. This is no different for special needs education. Students can now sit in their houses and take full-course lectures at their pace. A major implication of this for the education of PWDs are that they get to learn at convenience with the active involvement of parents or caregivers at home. Continuation of education at home by parents is a present goal worldwide for special needs education, and technology has made this activity more interesting, affording parents the escape from the somewhat boring traditional book and ink experience.

Like teachers, parents also have to be given orientation on the use of technological instructional materials, at least the basics. In line with this, the vision of the U.S. Department of Education (ED) and the U.S. Department of Health and Human Services (HHS) (2016) is that: all young children will have adults in their lives who are well-informed on how to use technology to support learning at various ages; and all young children will have opportunities to learn, explore, play, and communicate through a multitude of approaches, including the use of technology.

Another major benefit of using technology with traditional instruction procedures is motivation. Meyen et al. (2006) noted that children with special needs do well in a school that uses a Computer Adaptive Test (CAT) for science that contains multiple measures throughout the year to assess and demonstrate students' growth. They indicated that CAT has some distinct aspects that seem helpful. For example, if the student fails one item, the test automatically selects an item that covers the same content but at a lesser difficulty level. "In essence, the CAT tests the same content for all students but tailors the assessment to each examinee's knowledge level," they said. The net result of this CAT program is that children showed more interest and were more motivated to take the tests and even finished the assessment test in a shorter time.

In their research into the perceptions of teachers in the use of educational technology in special education, Cagiltay et al. (2019) reported that all teachers mentioned that when a classroom technology is introduced to teaching activities such as an animation movie, a computer game, or interactive graphics, students are more motivated to stay in the classroom and obey the teachers' instructions. Educational technology in the classroom improves students' motivation and their eagerness to do learning tasks. According to their report, a teacher stated that "...it is even higher. Because they quickly get bored with paper. But computers are more motivating so they are eager, they can learn faster. Since it is visual, their cognition expands, and attention span lengthens". Also, rewards that are carried with technology helps students to stay focused on their learning tasks and they become more obedient to teachers' instructions. This was exemplified in another teacher's statement, "...for example when I said to one of my students that he could watch an animation movie next week, we finished a 40-minute class easily without any problem."

With the achievement of parental involvement and motivation, the third major benefit—generalization and transfer—becomes more feasible. Generalization and transfer refer to the engagement of newly learned concepts and skills; it means they get to generalize concepts and skills, and transfer them to real life situations that require their application. Although the students may show a variety of skills for generalization and transfer, they usually need many varieties of examples and repeated practice-feedback sessions in real life contexts. Research has shown that using technology for repeated practices with variety of examples helps students to generalize the knowledge and skills and transfer them into new contexts. Also, technology can provide these varieties for examples and contexts to teach concepts and skills and that students' training needs to be continued with help from his/her family in the house as well with real life contexts (Cagiltay et al., 2019).

Implications of these technological challenges in special needs education

Some of the implications of the aforementioned challenges, if not handled properly are:

1. Most imminently, special needs children in regions with these issues will end up with substandard education. As inferred initially, special needs educators cannot give what they do not have. If they are maladroit at handling technology or find the technologies hardly adaptable to their teaching styles or goals, the children ultimately suffer substandard education.
2. In line with the first implication, inability of special needs educators to make themselves adept to the use of instructional technology by training further increases the rift of equity and accessibility for the children they cater for; what other special needs children have access to, the children under their tutelage do not, so they fall behind and are not up to their peers in learning, not because tools and information are inaccessible but because their teachers cannot use them.
3. Finally, the height of productivity we see from special needs children in other regions who are on track with the use of technologies in education cannot be seen here, in Nigeria, if every important party—teachers, parents, administrative bodies of education, researchers and the government—do not play their roles properly. Our special children can make impactful contributions to the society, only if we take their education, in school and at home, seriously, and make provisions available, affordable and easily accessible by the main users.

Conclusion

As we move further into the AI revolution, this is the best time to harness the power of technology to enable and improve learning at all levels for PWDs everywhere. As emphasized throughout the chapter, the educator and the one who is to be educated are to be foremost considered when developing technologies for special education. These technologies should be made available everywhere at affordable prices; this will drastically reduce the rift of equity and accessibility for all students, regardless of the region, race, available infrastructure, government policies and available care provided by the government for PWDs.

Technological researchers should consult the main consumers—teachers and special students—to know their technological needs. Teachers should be asked their instructional style, their technological capabilities and how adaptable they want the technology to be. They should be made to understand that technology is indispensable in this era and suitable trainings should be organized for them at little or no cost. Students specific learning needs should be respected, and good technologies should be produced for parents to continue their special needs children's education at home, especially education of non-cognitive competencies. Finally, parents should be more involved in the education of their special children, their interest will make the generalization and transfer process faster.

Suggestions

Firstly, adaptations-based technology (software) is needed with all curricula used in teaching students with special needs and should be made available with little or no cost to special needs teachers and parents.

In addition, due to the advent of blended education, more training programs should be designed and provided to teachers who work with students with special needs. These programs should focus on using technology efficiently in order to deliver instruction in a manner that meets the needs of students with special needs whether it is online or face to face.

Thirdly, creating and/or maintaining IT departments in special education schools and inclusive schools is important for technical support. Ministries/Departments of education in conjunction with their government should provide grants for these projects and ensure that proper authorities are set up for their maintenance.

Finally, more researchers and technology developers should be urged to delve into the special education sector for the production of better technologies that will promote young children's healthy development and learning.

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