FACTORS INFLUENCING STUDENTS' CHOICE OF ASSISTIVE TECHNOLOGIES IN GHANA NATIONAL INCLUSIVE BASIC SCHOOL

Michael Nyavor[i],
Philemon Amaniampong
Methodist College of Education,
Akim-Oda, Ghana

Abstract:
This study investigates factors that influence the choice of assistive technology of students with visual impairment at Ghana National Inclusive Basic Schools. The study discussed the available assistive technologies in the school, the preference of a particular assistive technology to others and challenges students faced in the use of assistive technology. The study is grounded on the human function model. The case study designed was adopted for the study. The sample size is 10 where participants were selected through the purposive technique. The main instrument used for data collection is interview. Results were analysed and discussed based on the key themes raised in the research questions. The study revealed that students' choice of assistive technologies hinged on the availability of technology, parents' ability to buy such technology, knowledge from rehabilitation centres and limited knowledge of students and teachers in operating them. The study recommended the provision of training for teachers and students, supply of assistive technology to schools, rehabilitation homes should expose students to newer technologies which will transcend to their use in classrooms. Assistive technology should match the unique needs of students.

Key words: assistive technology, students, disabilities, inclusive schools

1. Introduction

The inclusion of students with disabilities in regular schools will be more effective when supported with assistive technologies to enhance their full participation. Students with disabilities are one of the user groups benefitting from the opportunities provided by this technology explosion. Assistive technology can provide many possibilities for students with disabilities to experience opportunities which had previously been nonexistent or, at best, limited to them. These students rely on their teachers to provide the necessary

---

[i] Correspondence: email nyamicky2014@gmail.com, philemonamaniampong@yahoo.com

assistive technology devices and services to access the available resources. The importance of assistive technology cannot be over-emphasised to enhance participation and performance of students with disabilities.

The use of assistive technologies by students in schools have been endorsed by many countries in the world. Some of the countries have Conventions and Acts in support of its use. For instance, in United States of America, the passage of the Technology Related Assistance for Individuals with Disabilities Act (The Tech Act) in 1988, has made the general education curriculum accessible to students with disabilities. Other countries also have policies such as inclusive education as in the case of Ghana that endorsed the use of assistive technology and the government course in the supply of these technologies. One of the strategies to achieving policy goal 2 of the inclusive education policy is "*ensure relevant equipment and assistive devices are made available to school children where needed to enable them access quality education*" (Ministry of Education, 2015 p.7). Another strategy to achieving Policy goal 4 is; "*review all instructional materials and assistive devices for the teaching and implementation of inclusive education in schools to keep abreast of current trends; and new ones developed, printed and made available to schools as appropriate*" (Ministry of Education, 2015 p.9). This is a clear indication that each country in the bid of practicing inclusive education recognises the relevance of assistive technology. There are many assistive technologies for the range of exceptionalities. However, this paper focused on the assistive technologies for individuals with visual impairment at Ghana National Inclusive Basic School.

2. Statement of the problem

Many studies have been conducted on assistive technologies for individuals with disabilities in Ghana. For instance, barriers to the use of assistive technologies, parental perceptions of assistive technologies among others. However, much has not been done on the factors that influence students' choice of assistive technologies in an inclusive setting. Students with visual impairment in Ghana National Inclusive basic school use different forms of assistive technology. The study sought to investigate factors that influence their choice of assistive technologies.

2.1 Purpose of the study
The study was to investigate factors that influence the choice of assistive technology of students with visual impairment at Ghana National Inclusive Basic Schools. By this, the study discussed the available assistive technologies in the school, the preference of a particular assistive technology to others and challenges students faced in the use of assistive technology.

2.2 Research questions
1) What assistive technologies are available in the school?
2) Why do students prefer a particular assistive technology to the other?

3) What challenges do students faced in the use of assistive technologies?

3. Assistive technology

Assistive technology for students with learning disabilities are "*devices meant to scaffold students' cognitive processes in order to enhance each individual students' unique processing abilities and maximize learning outcomes*" (Marino, Sameshima, & Beecher, 2009, p. 188). Individuals with Disabilities Education Act (IDEA) 2004 view assistive technology 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 children with disabilities*". However, assistive technology does not remove learning deficits, but help students achieve their potential by allowing them to take advantage of their strengths and evade areas of difficulty. Assistive technology compensates for a student's skill deficits or areas of disability.

Dell, Newton, and Petroff (2012) identified a common mode of categorizing assistive technology to include low-tech, mid-tech, and high-tech devices. Low-tech devices may include non-electric devices, mid-tech may include non-complicated mechanical devices, and high-tech may include devices that incorporate sophisticated electronics or computers as tools for students with disabilities. Mid-tech devices generally only require basic instruction or minimal ability to use and are not overly complicated to operate. This includes, tape recorders, talking calculators, visual timers and wheelchairs (Evans, Williams & Metcalf, 2010). High-tech devices are more complicated and cost more. They also require training or guidance from the user, such as adaptive equipment, voice recognition software, or word prediction software (Watson & Johnston, 2007). In contrast, low-tech is low-priced equipment, as it costs less than high-tech, it is simply designed, and requires limited training. Examples of low-tech devices include but are not limited to talking watches, pencil grips, highlighting marker tape, eyeglasses, and ear plugs to reduce distraction (Watson & Johnston, 2007).

The quality of education and the quality of life potentially improve with the utilization of technology for students with disabilities. One of the greatest benefits of assistive technology may be its capacity to enable students with disabilities to access a task that could not have been done before, or reach a specific ambition that otherwise would not have been possible (Copley & Ziviani, 2004). Therefore, assistive technology allows students with a disability to perform tasks and assignments that they would not typically be able to do without the necessary supports to be successful in the general education classroom (Netherton & Deal, 2006; Sze, 2009). Assistive technology devices and services offer a variety of potential opportunities for students with disabilities by enhancing their educational opportunities.

Universal Design for Learning (UDL) "*…provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone-not a single, one-size-fits-all solution but rather flexible approaches that can be customized and adjusted for individual needs*" (Center for Applied Special Technology (CAST), 2010, para. 2). UDL

provides students with multiple means of representation of information (textually, graphically, verbally), multiple means of expression (video, text, voice, picture), and multiple means of engagement with the materials (novelty, similarity), depending on their individual needs and learning strengths.

Despite the benefits of assistive technology to students with disabilities in support of their learning, some could demonstrate positive or negative attitudes towards the use of assistive technology due to many factors. For instance, in the United States, a national survey on abandonment of technology by adults with various disabilities showed that almost one-third of the assistive technology devices were unused due to multiple factors: (a) lack of consideration and willingness to use the devices from the individuals with disability needs; (b) technology tools selected by family members, not the users; (c) complicated design; (d) unreliable equipment; (e) insufficient funding for the assistive technology devices; and (f) lack of technical support (Scherer, 1993; Todis, 1996).

Johnson (2011) on the attitude of students with disabilities towards the use of assistive technology concluded that a lack of knowledge and awareness among people with disabilities, reluctance to use the devices, poor device performance, changes in needs or priorities, and feelings of stigmatisation were the main reasons for underused or non-use of assistive technology devices. Extending the argument that students feel stigmatized, Hemmingsson, Lidström, Nygård, (2009) were of same view that students refuse to use or abandon assistive technology because of their desire not to look "different" from their typical peers. Many students have stated emphatically that they feel conspicuous using assistive technology that they do not want to be singled out, and therefore, that they will not use any "special" technology. In another study, it was reported that lack of appropriate training among teachers, high cost of the assistive technology devices, insufficient devices produced, and lack of information about the devices were all barriers to effective use of assistive technology in education. These factors also contributed to high rates of abandonment of assistive technology tools among students (Hasselbring & Glaser, 2012).

Kapperman, Sticken, and Heinze (2002), in their study both at elementary schools and high schools in Illinois, showed that between 59 and 71 percent of the students with visual impairments who had potential to use reading devices did not have opportunities to adopt the assistive technology devices. The lack of opportunities was due to insufficient provision of assistive technology devices, insufficient time to provide training for students, insufficient funds to purchase the assistive technology devices, and lack of appropriate teacher training. This corresponds with a study conducted by Leporini in 2007, where the results revealed that students with visual impairments faced problems when using assistive technology in seeking information, which included lack of context, that screen readers or magnifiers show small portions of content at any one time; overload of information that slows down content exploration; and excessive sequencing, such as long tables making reading distracting. As a result, these barriers caused abandonment or rejection to the innovation.

Students with disabilities can reject the use of a particular assistive technology when students experienced shortcomings of the devices to use. Rogers (2003) describes two types of rejection: (a) active rejection, which occurs when students consider adopting use of a technology after a trial period, but then decide not to use it anymore and (b) passive rejection, which occurs when students do not consider using the technology. Discontinuance occurs when students make a decision not to use devices after previously adopting them, as a result of dissatisfaction with the performance. The students then choose to use other learning resources, which may replace the assistive technology though new and faster than the previous. This finding is consistent with a study by Holcombe (2000), who concluded that an innovation with less complexity has a higher possibility of being adopted than an innovation with complicated features. Rogers (2003) suggested that although the complexity may not be as important as the other attributes of the innovation, such as relative advantage or compatibility, it is an important barrier to adoption and may influence its implementation and rate of adoption.

The other important factor that affects students' adoption of assistive technology in learning is their own personal characteristics, including patience, self-motivation, personal priorities, self-confidence, expectations, and acceptance of their disability (Goodman, Tiene, & Luft, 2002). This finding is consistent with the findings from studies when some students reported they adopted these technologies due to their self-driven behaviour. Students' self-motivation in using a particular assistive device comes from the awareness and knowledge of the benefits of the technology, which is in accordance with their interests, needs, and existing attitudes as described by Rogers (2003).

The study is influenced by the theory of Human Function Model. Poel (2007) outlined the switch from the medical model to the Human Function Model, which emphasized what an individual could do instead of focusing on the limits of their disability. The purpose of this model was to look at the individual and figure out how assistive technology could enhance the capability of a student with disabilities to function within the environment. The components of this model includes: existence; communication; body support, protection and positioning; travel and mobility; environmental interaction; education and transition; and sports, fitness and recreation. These components provide the key areas that assistive technology could be applied. The components are espoused below with its implication for teachers and those working with students with special educational needs.

Students with communication needs have difficulties associated with the functions needed to receive, internalize, and express information, and to interact socially, including oral and written expression and visual and auditory reception. Solutions may include hearing amplifiers, magnifiers, pointers, alternate computer input, augmentative communication devices and services, social skills training, and speech/language therapy services (Poel, 2007).

Body support, protection and positioning issues are associated with the functions needed to stabilize support or protect a portion of the body while sitting, standing, or

reclining. Assistive technologies may include prone standers, furniture adaptations, support harnesses, stabilizers, head gear, and physical therapy services.

Travel and mobility needs are associated with the necessity to move horizontally or vertically, including crawling, walking, navigating, stair climbing, and transferring either laterally or vertically. Technologies to assist with travel and mobility include wheelchairs, scooters, hoists, cycles, walkers, crutches, and orientation-and mobility-training services.

Difficulties in environmental interaction are associated with the functions needed to perform activities across environments, including operating computer equipment and accessing facilities. Assistive-technology solutions may include the use of switches to control computers, remote-control devices, adapted appliances, ramps, automatic door openers, modified furniture, driving aids, and rehabilitation services.

Problems in education and transition are associated with the functions needed to participate in learning activities and to prepare for new school settings or post-school environments. For individuals with visual impairment to effectively participate instructions, there is the need to provide them with assistive technologies. Assistive technologies may include educational software, hardware, software, and web-based resources like touch-screen technologies, large-screen monitors, optical scanners, light boxes, specialized keyboards, and headsets with microphone, screen readers, speech-to-text converters, and browser add-ons with easy access to magnification or talking dictionaries (Burgstahler 2011; Cummings 2011; Ennis-Cole and Smith 2011).

Visually impaired students in accommodating them for instructions require other materials such as Optical Braille Recognition (OBR). This software can enable users having visual impairment to read Braille documents on a standard A4 scanner, scan the Braille document, analyze the dot pattern, translate the text, and present it on the computer screen. Refreshable Braille displays allow line-by-line translation of screen text into Braille, which can help in detailed editing. The Braille printers provide the 'hard copy' output for the visually impaired users. Scanners with optical character recognition can read printed material, which can then be stored electronically on computers, and be read using speech synthesis, or printed using Braille translation software and Braille printers. Such systems provide independent access to journals, syllabi, and homework assignments for the visually impaired students. Speech output systems can be used to read screen text, while the screen readers or the text-to-speech software like JAWS (Job Access with Speech) can help the user in adjusting the volume, pitch and speed of reading, and in choosing or adjusting to a male or female voice according to their preference (Petty, 2012).

Screen readers including navigation tools allow users to skip from headline to headline, or category to category while reading. Using the synthetic speech, the computer can read text passages, analyze the phonetic structure of words and attempt re-constructing words by putting together a string of synthetic phonemes, ensuring easy understandability of the message by the student. The use of earphones for individuals

using speech output systems can reduce and limit the distractions for other individuals present (Petty, 2012).

Audio materials like talking books and audio cassettes of recorded lessons can be used by students with visual impairment. The use of sophisticated audio devices, CD players, cassette players, and recording machines can be used to record lectures, books and other study materials and help students in submitting their assignments in audio formats. The descriptive video service with a narrative verbal description of the visual elements displayed on the screen enables the students to automatically hear the descriptions of all the visual elements, providing the students with visual impairment an opportunity for better socialization and knowledge building (Petty, 2012).

Persons needing assistive technology for sports, fitness, and recreation require assistance with individual or group sports, play, and hobbies and craft activities. Those individuals may benefit from modified rules and equipment, adapted aquatics, switch-activated cameras, and braille playing cards, and may participate in adapted physical education services (Blackhurst & Lahm, 2000).

The model illustrates interrelationships of component factors and their potential for influencing each other. Although the model does not define cause-and-effect relationships, it does help people realize that many factors are involved and that they interact in complex ways. The model provides direction for those making referrals of children for assistive technology services. Those who make referrals should be aware of the model and its components. Furthermore, they should be encouraged to obtain as much information as possible about the various factors and provide data about them as part of the referral process (Blackhurst & Lahm, 2000).

4. Methodology

The study was to investigate students' attitude towards the use of assistive technology at Ghana National inclusive basic school in Cape Coast. The study is located in the qualitative paradigm of research. This is due to the methodology employed for the study.

4.1 Research design
The research design adopted for the study is case study. A case study is an in-depth study of a particular research problem rather than a sweeping statistical survey or comprehensive comparative inquiry (Gerring, 2004). It is often used to narrow down a very broad field of research into one or a few easily researchable examples. The case study research design is also useful for testing whether a specific theory and model actually applies to phenomena in the real world. It is a useful design when not much is known about an issue or phenomenon. Yin (2009), view case study as a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence. A case study is a type of ethnographic research study that focuses on a single unit, such as one individual, one group, one organization, or one program. The goal is to arrive at a

detailed description and understanding of the entity (the "case") (Ary, Jacobs, Sorensen & Razavieh, 2010). The choice of case study design rest on the research questions formulated for the study and the focus on a single unit, *"attitude of students with visual impairment towards the use of assistive technology"*.

4.2 Population

The population for the study is 25 students with visual impairments from Ghana National Inclusive Basic School. This comprised 15 students from the Primary School and the rest 10 from the Junior High School.

4.3 Sample and Sampling technique

The sample size for the study is 10 participants. These are participants drawn from the Junior High School. The reason for selecting sample from Junior High School instead of the entire students with visual impairment was that these students have more experiences in the use of assistive technology due to their long stay in the school. The participants were selected purposively because they possess characteristics of interest of the study. Purposeful sampling was used because it economizes time and specific information can be obtained at a much reduced cost and time.

4.4 Instrumentation

A semi-structured interview guide was used to obtain data from the participants. The choice of this interview was to offer sufficient flexibility to approach different respondents differently while still covering the same areas of data collection. The researcher conducted the interview in a focus group of 10 participants. The items were developed to cover key issues raised in the research questions such as: availability of assistive technologies, preference for a particular assistive technology, and challenges in using of assistive technologies. Interviews were used in the study because according to Cohen, Manion and Morrison (2018), interviews enable participants to discuss their interpretations of the world in which they live, and to express how they regard situations from their own point of view. Interview was considered due to the level of education of the students as this could give them the opportunity to give details on the problem under consideration.

4.5 Procedure for data collection

The researcher sought permission from the head and staff of the school understudy. After the permission was granted, the researcher arranged with the respondents the day of responding to the items. This is consistent with what Creswell (2012) says, that it is important to respect the site where a research takes place.

The researcher went to the schools of study to conduct a focus group interview personally to ensure maximum response. The researcher explained the purpose of the study, and re-assured the participants of the necessary confidentiality on the information

to be gathered. Forty-five (45) minutes was allotted for the interview. The interview session was tape recorded and notes taken to aid in the analysis.

4.6 Procedure for data analysis

Thematic analysis was used to analyse the data collected from the interviews. The process of analyses began with the reading through the interview notes. Data was then transcribed and reviewed for accuracy. Minor adjustments to some specific language were made. Each transcription was coded by the interviewer based on the key themes of the study.

5. Results and Discussion

5.1 Assistive technologies available in the school

In finding out assistive technologies available in the support students with visual impairment in their academic work, the participants had this to say:

> *"We have CCTV, embosser, recorders, handframe and stylus, Perkins brailler, computers. These assistive technologies are available but with some broken down. For instance, recorders, Perkins brailler and computers. We know of other assistive technologies such as talking calculators, talking watches, adapted computers with JAWS, iPad, Livescribe smartpen but do not have them in the school* (all participants).*"*

From the results, it is evident that the school understudy has limited assistive technology for use by students with visual impairment. Few available technologies are not in very good conditions therefore obsolete. Participants are aware of advanced technologies but have not had the opportunity to see and use them. Most of the technologies used in the school are obsolete.

5.2 Factors influencing choice of assistive technologies

The participants outline the following as factors that influence their choice of assistive technology:

> *"We are influenced by the available assistive technologies in the school. In this case our school do not have much of these technologies."*

The school understudy has inadequate assistive technologies and students are obliged to use those that are available. This therefore means students are influenced to choose a particular assistive technology on the grounds of its availability.

> *"Some of us are influenced by our parents on the type of assistive technology to use. This is because the technology they can buy is what we should use. Parents mostly buy us*

handframe and stylus because the cost is lower than other technologies that could support us."

One of the participants remarked:

"my parent cannot afford to buy computer, iPad because they are expensive though I wish to use it."

The results showed that parents also influence the choice of assistive technologies of their wards. This occurs as a result of the cost that comes with some of these materials. Parents are seen to afford to buy low-tech materials such as handframe and stylus therefore their wards are mandated to use them. This corroborates Hasselbring and Glaser (2007) who intimated that students with visual impairment abandon assistive technology due to the high cost of the assistive technology devices, insufficient devices produced, and lack of information about the devices.

Training participants had during their rehabilitation also influence their choice of assistive technology. Participants had this to say:

"We are also influenced by the technologies used during our rehabilitation training. The devices used during this training provide us more proficient in their use than any other technology. One of the participants remarked *'my initial training was on the use of handframe, therefore prefer its use. I see the use of Perkins Brailler to slow down my speed in writing'.*

The results revealed that the exposure to a particular assistive technology during rehabilitation of students with visual impairment influence their selection. Students seem to be more proficient in the use of technology they had been exposed to during their rehabilitation period. They therefore wish to prefer such technology than to learn the use of others. Some even feel the switch to other technologies will slow their speed in writing. Inadequate knowledge of participants influences their choice of a particular assistive technology. Participants had this to say:

"All participants responded that inadequate knowledge on the use of technologies such as adapted computers, Perkins brailler, and iPad affect our choice of them."

Most of the participants lack knowledge in the use of other technologies. This make them disinterested in the use of such technologies. This agrees with Johnson (2011) who conducted a study on attitude of students towards the use assistive technology. Johnson concluded that lack of knowledge and awareness among people with disabilities influence their choice of assistive technology.

Another influential factor is the complexity of some of the devices. Participants remarked:

"The use of some of these technologies are complex. We find it difficult to operate."

It is evident from the results that the complex nature of some of the technologies could not permit students to use them therefore their preference for other technologies. With the upsurge in technology, each time unveil new methods of improving participation of learners with visual impairment in instruction. These new technologies have their accompanying challenges of getting in tune with its operation.

The degree of impairment is paramount in making decision on the type of assistive technology that will suit the needs of the child. This is supported by Messinger-Willman and Marino (2010) when he posit that in making decision on the type of assistive technology, there is the need to consider what type of assistive technology will meet the instructional needs of the student. However, from the results the degree of impairment is not key in the choice of assistive technology, rather the availability, its cost effectiveness, knowledge of its users among others.

5.3 Challenges students face in the use of assistive technologies

"Those of us who use handframe and stylus get fatigued when writing for long hours especially in examinations.

One of the respondents who use computer remarked*:*

"..sometimes the voice sound on the computer ceases making it difficult to track the level of attainment in a particular task I engage in. Some of our sighted colleagues complain of the noise that emerge from the use of handframe and stylus and the computer voice sound. They say this disturb them when we are put together for instructions."

Regarding the challenges students faced, it was evident from the results that students get tired when expose to the use of some of the assistive technology for long hours. They tire out when they use handframe and stylus for long period. Also, the noise associated with the use of handframe in writing make student without disability complain. The voice on the adapted computers also pose challenge to peers without disability. This make students receive stigmatisation form peers without disability. Johnson (2011) on the attitude of students with disabilities towards the use of assistive technology concluded that a lack of knowledge and awareness among people with disabilities, feelings of stigmatisation were the main reasons for underused or non-use of assistive technology devices.

6. Conclusion

The relevance of assistive technology for individuals with disability cannot be underestimated. Students with disabilities maximise their potentials academically when

provided with the necessary assistive technologies and support services that match their specific needs. However, the choice of assistive technology by students with disabilities hinges on many factors. Some of these factors include: availability of assistive technology, prior knowledge on its use from rehabilitation centres, cost of technologies and parents ability to provide these materials, limited knowledge of students and teachers in their use of these technologies. This contrast the fact that an assistive technology should match the specific needs of students with disability. For this reason, student's potentials might not be fully recognised if technology is prescribed on the grounds of availability or affordability not the needs.

6.1 Recommendations

In view of the challenges students and teachers face on the grounds of complexity of assistive technologies, school management and government institutions should carefully provide adequate training on the use of these assistive technologies. Training can bridge the gap between complexity of assistive technology and simplicity.

People who enrolled in the rehabilitation centers should be provided with varieties of assistive technologies than limiting them to a particular type of material. This becomes a limitation when the student enrolls in an inclusive school without the technology exposed to during rehabilitation.

There should be education for students without disability in inclusive settings on the relevance of assistive technology to individuals with disability. This is to help them appreciate the use of assistive technology in reducing the stigmatisation associated with its use.

Government of Ghana in the bid of achieving full inclusion should fund the procurement of assistive technologies for students with disability. The government should collaborate with philanthropist, schools, non-governmental organisations, faith-based institutions in providing and repairing broken down devices. Assistive technologies to be provided should be current to help students compete with other colleagues across the world.

References

Ary, D., Jacobs, L. C., Sorensen, C., & Razavieh, A. (2010). *Introduction to research in education*. Wadsworth: Cengage Learning.

Blackhurst, A. E., & Lahm, E. A. (2000). Technology and exceptional foundations. In *Technology and Exceptional Individuals*, ed. Jimmy D. Lindsey. Austin, TX: Pro-Ed.

Burgstahler, S. (2012). *Universal design in education: Principles and applications*. Retrieved November 04/04/2020 from http://www.washington.edu/doit/universal-design-educationprinciples-and-applications.

Center for Applied Special Technology (CAST). (2010). *Transforming education through universal design for learning.* Retrieved 02/04/2020 from http://www.cast.org/index.html.

Cohen, L., Manion, L., Morrison, K. (2018). *Research methods in education*. England; New York: Routledge.

Copley, J., & Ziviani, J. (2004). Barriers to the use of assistive technology for children with multiple disabilities. *Occupational Therapy International*, 11(4), 229-243.

Creswell, J. W. (2012). *Research design: Quantitative, qualitative and mixed methods approach 3rd Ed*. California: Sage Publications Inc.

Cummings, E. O. (2011). Assistive and Adaptive Technology Resources. *Knowledge Quest*, 39 (3): 70–73.

Dell, A. G., Newton, D. A., & Petroff, J. G. (2012). *Assistive technology in the classroom: Enhancing the school experiences of students with disabilities (2nd Ed.).* Boston, MA: Pearson.

Ennis-Cole, D., & Smith, D. (2011). Assistive technology and autism: Expanding the technology leadership role of the school librarian. *School Libraries Worldwide*, 17(2), 86-98. Retrieved October 10/03/2020, from https://www.scribd.com/document/199271500/Assistive-technology-andautism-expanding-the-technology-leadership-role-of-the-school-librarian.

Evans, C., Williams, J. B., & Metcalf, D. (2010). Using high- and low-technology tools to enhance self- and peer assessment and feedback for pre-service teachers. *Journal of Special Education Technology, 25*(4), 55-60.

Gerring, J. (2004). What is a case study and what is it good for? *American Political Science Review* 98: 341-354.

Goodman, G., Tiene, D., & Luft, P. (2002). Adoption of assistive technology for computer access among college students with disabilities. *Disability & Rehabilitation, 24*, 80-92.

Hasselbring, T. S. & Glaser, C. W. (2012). *Use of computer technology to help students with special needs*. Retrieved, 12/04/2020 from http://www.futureofchildren.org.

Hemmingsson, H., Lidström, H., & Nygård, L. (2009). Use of assistive technology devices in mainstream schools: Students' perspective. *The American Journal of Occupational Therapy*, 63(4), 463–72.

Holcombe, M. C. (2000). *Factors influencing teacher acceptance of the Internet as a teaching tool: A study of Texas schools receiving a TIF or a TIE grant.* Unpublished dissertation submitted to the Faculty of Baylor University, USA.

Individuals with Disabilities Education Act. (2004). Pub. L. No. 108-446.

Johnson, D. (2011). Why is assistive technology underused? *Library Hi Tech News, 16*(6), 15.

Kapperman, G., Sticken, J., & Heinze, T. (2002). Survey of the use of assistive technology by Illinois students who are visually impaired. *Journal of Visual Impairment & Blindness, 96*(2), 106-108.

Leporini, B. (2007, August). *An accessible and useable e-book as educational tool: How to get it?* Paper presented at the Conference & Workshop on Assistive Technologies for People with Vision & Hearing Impairment (CVHI 2007), Granada, Spain. Retrieved 30/03/2020 from http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.142.8348.

Marino, M. T., Sameshima, P., & Beecher, C. C. (2009). Enhancing TPACK with assistive technology: Promoting inclusive practices in pre-service teacher education. *Contemporary Issues in Technology and Teacher Education*, 9(2), 186-207.

Messinger-Willman, J., & Marino, M. T. (2010). Universal design for learning and assistive technology: Leadership considerations for promoting inclusive education in today's secondary schools. *National Association of Secondary School Principals Bullion, 94*(1), 5-16.

Petty, R. E. (2012). *Technology access in the workplace and higher education for persons with visual impairments: An examination of barriers and discussion of solutions.* Independent Living Research Utilization at TIRR: Houston, Texas.

Poel, E. W. (2007). Enhancing what students can do. *Educational Leadership, 64*(5), 64-66.

Rogers, E. M. (2003). *Diffusion of innovation* (5th ed.). New York, NY: Free Press.

Watson, S., & Johnston, L. (2007). Assistive technology in the inclusive science classroom. *Science Teacher*, 74(3), 34-39.

Yin, R. K. (2009). *Case study research: Design and method (4th ed.).* Thousand Oaks, CA: Sage.