Academic Journal of Current Research
Vol.6, No.4, 2019;
ISSN (2343 – 403X);
p –ISSN 3244 - 5621
Impact factor: 5.92

ASSISTIVE DEVICE AS AN EDUCATIONAL TOOL FOR ENHANCING CLASSROOM INSTRUCTION OF SCIENCE STUDENTS WITH LEARNING DISABILITIES

Ankeli, Gabriel Odeh
Department of Physics, College of Education, Oju, Benue State, Nigeria

Abstract: *This paper discussed the concept of disability as it relates to classroom learning. The purpose of this paper is to show the uses of Assistive Device (AD) as an educational tool, and to highlight a few devices that can be used in the areas of Reading and Writing for science students with learning disabilities. Through the use of low-tech and high-tech devices, AD will be able to help students become better readers and writers. In the area of Reading, the use of AD will help students improve upon and build on their spelling abilities, and also better students' decoding, listening, and oral skills. In the area of Writing, the use of AD will enable students to write neatly and legibly, to form letters correctly, and to write sentences that are grammatically correct. The paper conclude that If teachers plan carefully and use AD devices to enhance instruction throughout the school curriculum, Basic Science, reading and writing will not be the only subjects that students with LD will benefit. It was recommended that teachers need also to explore other avenues in their instructional curriculum where they can enhance learning through the use of AD.*

Keywords: *Assistive Devices, Learning Disabilities, Writing, Reading and Basic Science.*

Introduction

Caleb, in basic one tried repeatedly to read the basic one reader, but he could not and put the reader down in frustration. Joshua looked at the numbers that the teacher wrote on the board, but cringed because he knew that he could not calculate the problem. Patrick a new student, left his class for the washroom, but was unable to return to his class because he did not know which classroom was his; he could not read the names on the door. Becky's mom could not take her to school that day, so she allowed her to go by herself because it was just half a block away. She was late for school because she had struggled to read the street signs on her way to school. All these children have one thing in common; they are all students with a learning disability.

Assistive Device (AD) can help these children achieve these tasks and also help them perform better academically, socially and even physically (Lee, 2016). AD can help not only the students but also their teachers, by making adaptations to teaching strategies in each of their respective grades.

Every child is special; they are each unique and exceptional in their own way. Education helps bring an awareness of these special unique attributes to the surface, and the classroom is the ideal location where these attributes can be nurtured and developed. In those settings, the teacher is the one who facilitates this process, by giving the students the opportunity to grow academically and socially growth. In so doing, teachers add a whole new realm of experiences to students' lives which can accomplished with the aid of assistive technology, where students' lives can be enhanced tremendously. Using AD is a strategy that is not only geared towards students with learning disabilities but it can also be used to help all students, in all subject areas, and at any age level.

The purpose of this paper is to show the uses of AD as an educational tool, and to highlight

Academic Journal of Current Research
Vol.6, No.4, 2019;
ISSN (2343 – 403X);
p –ISSN 3244 - 5621
Impact factor: 5.92

a few devices that can be used in the areas of Reading, Writing, and Basic Science for students with learning disabilities. Through the use of low-tech and high-tech devices, AD will be able to help students become better readers, writers, and mathematicians. In the area of Reading, the use of AD will help students improve upon and build on their spelling abilities, and also better students' decoding, listening, and oral skills. In the area of Writing, the use of AD will enable students to write neatly and legibly, to form letters correctly, and to write sentences that are grammatically correct. In the area of Physics, the use of AD will enable students to be able to make proper calculations and computations.

The Concept of Disability

Disability is any restriction or lack of ability to perform an activity in the manner or within the range that is considered normal for a person; Guar and Ivom (2010) said that it is a physical problem that limits a person to perform certain tasks, skills and behaviors because of any functional deficit that person experience as a result of abnormality in the structure or physiology of the body system. Ozoji (2010) simple referred to disability as loss of ability or loss of function of an individual to perform a task. Similarly, Obi (2016) affirms that it is a physical performance that limits a person's ability to perform certain tasks, skills and behaviors. Thus, disability means the lack of ability, functional limitation or a restriction to perform at the activity level of an individual. Disability cannot be seen in a person as it is not a physical characteristic of a person, as it is not a physical characteristic of a person, but can only be determined (seen) when the person involved tried to do something and fails. It is at this point that ability can be established. A disability is always with s person and it becomes a handicap when the person grows. For example, a child speech disorder (impairment) can perform well in a geography class, but will be disable (lack) to perform well in a task that demands verbal discussion in that same class.

Attitudes of the society to Student with Learning Disability

Children with learning disability are members of the society and as matter of necessity interacts the significant aspect of the society. The society as we understand determine what is acceptable and standard to it. Those who fail to measure up to the accepted standards or norms are considered as deviant and treated as such. The social link between the society and people with disability is indicated by attitudes. Attitude is a human expression which Ozoji (2010) said is a feeling of an individual to behave toward an object or something on the basis of what beliefs one has about the object. This means the way you feel and think about somebody or something (this time people with disability) either positively or negatively.

The society seems not to find out each child problem where possible. It is because of this attitude that children with disability are merely left at the mercy of nature to decide their fate and survival. It is on this note that Bryant, Erin, Lock, Allan and Resta (2008) contended that people with disability represent a great area of untapped social, vocational, educational, economical and political resources that is fulcrum for youth empowerment and natural development that have been negated in some cultures. They are not involved in the social and administrative affairs or matters that involve them either in the homes or society. They are socially denied in their environment as they are not rated on the same standard of competence (ability) with the non-disabled people, they are prevented from contributing either in cash or kind at ceremonies or communal efforts.

They are used as clowns for unnecessary entertainment in public places, ridiculed, abused, given left over cold food. Worn out clothes, referred to as ordinary consumers and not producers and regarded as to be heard in the background and not to be seen in the public, they are forced to believe that they are inferior people, are exploited by the normal people and earn less for doing same jobs with the normal people. This is in agreement with observation that they are stigmatized with labels that do not explain anything to show steps that are necessary to help them regain their potentials. Labels of course as Gbaa (2015) found out, accentuate, stereotype and affect a child's and parent's self-image of their children. The society remains ambivalent, envious and mistrust of the child. The child repeatedly meets people who do not accept their deficiency, who appear fearful in joint human endeavors and idolize a normalcy they cannot achieve. Instead of the child cultivating his or her unique areas of competence this child approaches life with varying degrees of crises. The bias in labeling is that the child is known and addressed more by the derogatory names than their real names, nature and ability. It

Academic Journal of Current Research
Vol.6, No.4, 2019;
ISSN (2343 – 403X);
p –ISSN 3244 - 5621
Impact factor: 5.92

is a known fact that these derogatory names nonce given to any one (child with disability). That child, as Duhaney and Duhaney (2015) found out lives and carries it all the rest of his or her life. Let us not forget that these labels are not badges, titles or awards of honor and should not be used on anybody like products on display. We should address and recognized them by their parents.

The Concept of Assistive Device (AD)

According to the Forgrave (2012) Assistive Device (AD) means 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 functional capabilities of individuals with disabilities. The law goes on to say that, "an assistive technology service is any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device. These devices, equipment or systems can be very cost effective to schools and the end result will be very beneficial. They range from "low-tech, low-cost items to high tech, more expensive devices. Low-tech devices require little or no training; high-tech devices may require extensive training" (Lee, 2016). Assistive device can be a fundamental tool in special education because many students with disabilities require instruction that can be tailored towards their needs, and AD can afford them that type of instruction.

Use of Assistive Devices (AD) as an Educational Tool to Enhance Science Classroom Learning

According to Loeding (2014), AD can be an educational tool that can be of great importance
to students with LD in four ways:

(1) By making it possible for them to correct or build on deficient skills that will make them more self-sufficient;

(2) To make their learning experiences more effective and enjoyable whereby a greater volume of learning will take place;

(3) To allow for self-monitoring, and self-evaluation;

(4) To allow for self-instruction.

With society moving towards the technological age, it is necessary for schools to use documented research that would reflect such a change. Teachers now have to deliver instruction to students with diverse learning needs who bring with them a variety of learning styles, languages, cultures, abilities and disabilities. Teachers have to gear their instruction to suit those learners needs and in so doing implement programmes consistent with universal design for learning (UDL). According to the Council for Exceptional Children [CEC] (2012), "the teacher creates varied and inclusive learning situations that use digital and assistive devices" Numerous studies have shown that assistive device as an educational tool has had a profound impact on the learning of students with learning disabilities (Dell, Newton and Petroff 2014; Johnston & Ryan, 2015; Lee, 2016). Some of the studies also revealed that the manner in which teachers use and make adaptations to the technology is what makes the difference in the students' learning. According to Polloway, Patton, and Serna (2011), AD is a supportive instructional tool that would enhance the learning of students with LD in academic, social, functional and community living skills.

Assistive Device as a Support for Reading and Writing in the Science Classroom

Reading and writing are core areas that need to be addressed when teaching students with Learning Disabilities (LD). These areas are the foundation of these students' academic learning disabilities and, if attended to efficiently, students will be able to achieve some measure of success. AD enables students to compensate in areas where they lack the necessary skills for learning. It can help improve on certain skill deficiencies. Some students may not be able to function academically without the use of AD whereas there are other students who just need AD as a support (CEC, 2012). AD can be effective for students with LD; it does not remove or eradicate the disability, but it can assist children in reading and help them achieve success. A student who struggles with reading but who has good listening skills might benefit from listening to books on tape (Raskind, 2016; SEL, 2011). There are some common every day low-tech devices such as color highlighters that are inexpensive that will allow students to identify troublesome words that may look similar like found and fond. When students use such a device it will enable them to differentiate between the words (Duhaney & Duhaney 2015). The following are other ways in which AD can help students with LD with reading:

i. A student who has difficulty reading can look at a series of pictures in sequence from a view finder/computer, and be able

Academic Journal of Current Research
Vol.6, No.4, 2019;
ISSN (2343 – 403X);
p –ISSN 3244 - 5621
Impact factor: 5.92

to write a story based on what the pictures portray. If the student can not write the story then he/she will be able to produce the story orally.

ii. A student can learn to read the sounds of the letters in the alphabet by listening to a listening device. A student with dyslexia with the help of AD can read aloud in the classroom.

iii. A student can attempt more challenging reading materials with assistance from an AD that will be able facilitate him/her.

iv. A student who may have difficulty reading on a flat surface may use a slant board.

v. A student who has difficulty with reading comprehension can get the reading material tape recorded.

vi. It can also be presented using graphic organizers/story mapping (Raskind, 2016). There are various other ways in which teachers can use AD to assist students with reading. Reading using the "talking" computer can help students with LD master decoding skills. The device also helped readers with dyslexia read above their reading ability (Lundberg, 1995). An electronic book is another device that can improve the reading of students with LD. Through the use of E-books, students with LD are better able to read and interact with their reading text (Rhodes & Milby, 2015).There are other available tools that can help teachers such as audio books, graphic organizers and outlining, audio cassette players/listening devices, word prediction programs, proofreading programs, portable word processors, and the list is too numerous to mention all (Dell, Newton & Petroff, 2014).

Writing is another area where AD can be very beneficial to students with learning disabilities. According to Forgrave (2012), "students with learning disabilities often have difficulties with writing". According to Harris, Graham and Mason, (2008), writing is one of the basic skills that create problems for all students irrespective of abilities. It is a demanding task that requires students to make use of their motor skills and cognitive processes. As cited in Harris et al., (2008), Scardamalia and Bereiter (1986) also agreed with Forgrave when they "identified five areas of writing competence that are particularly difficult for the general school population". This statement brings to the forefront the surmountable task that students with LD face by having to cope with the stress of writing along with their disabilities. Writing is a communication tool that puts ideas, information, knowledge and feelings into a written format that is readable by others. Each learner brings his or her own experience, and knowledge to the educational learning environment but it is up to the teacher to use the students' skills and abilities to develop good writers. This is extremely difficult for students with learning disabilities because they come to the educational learning environment deficient in skills and abilities that are below those of their peers. As a result, this makes writing more challenging for them and their teachers. This means that teachers have to find innovative ways of getting students with LD to write, and be motivated to write. One fundamental way in which this can be achieved and help students overcome some of these deficiencies is the proper use of AD. As a result, AD must be included as part of the instructional strategies. Studies have shown that the use of AD in writing can be very beneficial to students with learning disabilities (Lee, 2016; Loeding, 2014; Polloway et. al., 2011). Just like with reading, there are quite a number of devices that can help Students with LD. The word processor is an AD device that is very effective in assisting students with writing. Students using such a device can achieve a greater success output than students of the same ability who do not use the device (Forgrave 2102). Not all AD devices have to be bought commercially. There are quite a few devices that teachers can produce on their own without spending any finances such as using an empty gallon bleach bottle which can be used as a white board when cut into a rectangular shape. There are other low-tech, inexpensive devices that can be adapted to suit students' needs such as a pencil which can be adapted for proper gripping with the help of a low-tech device. This can be done by "building up the shaft of a pencil to improve a student's control" (Dell et al., 2014). This would enable students to feel more comfortable holding the pencil when expressing any kind of thoughts (Loeding, 2014). Literacy (i.e., the ability to read and write) can be promoted through the use of technology (Loeding, 2014). Writing is a powerful tool and once a student has grasp the conventions of it especially when interacting with technology, the reward of expressing oneself in print can be quite motivating. This statement is further illustrated in a report that was concerned with the use of technology for the promotion of

literacy. The report found that the writing status of children with mild disabilities rose to the point where they produced more creative and longer pieces of writing after using a Web-based literacy learning environment called TELE-Web (Dell et al. 2014). Word processing and other computer software are very good tools that can assist students with LD put their ideas down on paper without having to worry about spelling or grammar.

These software programs come with spelling/grammar checkers that are easy for students to manipulate or they can be assisted b their teacher if the need arises. These software programs also help with the editing process of writing. According to Hasselbring & Glaser (2010), "Researchers have found that students are more willing to edit their work and to make necessary corrections on a word processor than on handwritten drafts" This device is especially helpful to students who have problems with their fine motor skills, and those who are constantly rewriting in an effort to give their readers a clearer perspective (Hasselbring & Glaser, 2010).

Where typing maybe difficult for students, there are devices called voice recognition software or speech synthesizers that can be used to enable students to talk into a computer while their work is being transcribed. At does not only support reading and writing but it can also be used for Basic Science.

Assistive Device as a Support for Basic Science in the Classroom

Basic Science is a subject that requires logic and thinking skills, and poses considerable problems for all students. Most students with LD lack those skills and as a result are unable to make sense of information given to perform proper calculations (Johnston & Ryan, 2015). With the use of AD, students with LD can be motivated to function as well as their peers in a Physics environment. According to, "three recent studies suggest that technology can have a positive impact on students' attitude toward mathematics". The demand for technology is increasing rapidly and physics skill is a strong requirement of high tech technology. This demand is not only in the world of work but also in everyday life. Students with LD need to be involved with math in interactive ways, and be able to build positive attitudes toward it which can be done with the use of AD. There are a number of low-tech and high-tech devices that students can use that would make physics interactive and motivating. There are students who have difficulties placing numbers correctly in each column when adding vertically, and they can be assisted with the use of color coded graph paper. This is a low-tech device that allows the students to put the answer in the correct column. Highlight markers are another such device that enables students to write numbers on the line. A hand-held calculator is a device that can also assist students in writing numbers correctly. Many students with LD have reading difficulties and this interfere with their ability to solve word problems. AD enables students with LD to interact with and access the curriculum in settings that would not have been possible or plausible (Morrison, 2013). There are computer-assisted devices that can help students with the identification of mathematical symbols especially if they have difficulties with visual perception. These devices also help students differentiate between symbols that may look similar like addition and multiplication signs. AD can help students in all aspects of the math curriculum; basic computation, fractions, algebra, geometry, calculus and across the spectrum from pre-school to university level, and this can be achieved with the full support of teachers.

Conclusion

Technology is the vehicle that drives the twenty-first century and teachers need to make use of it in their teaching and instruction in order to meet the diverse needs of all the students that they teach. There are a number of AD devices that are available that can help teachers meet those students needs. According to Hasselbring and Glaser (2010), teachers have found that technological innovations can help level the playing field for special needs students and enable these students to succeed in the regular classroom. Research has shown that technology has had, and is having a significant impact on students' learning in the areas of reading, writing and math, and which should not be restricted to those three. As stated by Johnston and Ryan (2015), "for most people technology makes things easier. For persons with disabilities, technology makes things possible.

Recommendations

1. If teachers plan carefully and use AD devices to enhance instruction throughout the school curriculum, Basic Science, reading and writing will not be the only subjects that students with LD will benefit.

Academic Journal of Current Research
Vol.6, No.4, 2019;
ISSN (2343 – 403X);
p –ISSN 3244 - 5621
Impact factor: 5.92

2. Teachers need also to explore other avenues in their instructional curriculum where they can enhance learning through the use of AD. According to Rhodes and Milby (2015) the National Association for the Education of Young Children (NAEYC) has stated that technology should be employed as an active part of the learning process. This statement is also supported by Lee (2016) who stated; Assistive device is an important piece of the whole support system individuals with learning disabilities require to achieve success.

References

Bryant, D. P., Erin, J., Lock, R., Allan, J. M., & Resta, P. E. (1998). Infusing a teacher preparation program in learning disabilities with assistive technology. *Journal of Learning Disabilities, 31, 55-66.*

Council for Exceptional Children. (2012). Universal design for learning: A guide for teachers and education professionals. Upper Saddle River, N. J.: Pearson/Merrill Prentice Hall.

Dell, A. G., Newton, D. A., & Petroff, J. G. (2014). *Assistive technology in the classroom: Enhancing the school experiences of students with disabilities.* Upper Saddle River, N. J.: Pearson/Merrill Prentice Hall.

Duhaney, L. M., & Duhaney, D. C. (2015). Assistive technology: Meeting the needs of learners with disabilities. *International Journal of Instructional Media, 27, 393-402.* Retrieved October 3, 2018 from Factiva database (ijim000020010807dw9m0000v).

Edukugbo, E. & Olawale, G. (2018). Yuguda makes case for children with disabilities, Vanguard 21 May 2018 (Online). Retrieved from http://allafrica.com/stories/2011005210137.html. on January 14, 2019

Forgrave, K. E. (2012). Assistive technology: Empowering students with learning disabilities. The Clearing House, 75, 122-126. Retrieved November 8, 2018, from http://global.factiva.com/ha/default.aspx

Gbaa, D. J. (2015). *A basic textbook on education of people with special needs.* Oju, Benue State: Bestkoncept.

Guar, N & Ivom, D. (2010). *Ability in Disability: Handbook on Understanding Disability.* Garki, Abuja: Yaliam Press Limited

Harris, K. R., Graham, S., & Mason, L. H. (2008). Self-regulated strategy development in the classroom: Part of a balanced approach to writing instruction for students with disabilities. *Focus on Exceptional Children, 35 (7), 1-16.*

Hasselbring, T. S., & Glaser, C. H. W. (2010). Use of computer technology to help students with special needs. *The Future of Children: Children and Computer Technology, 10, 102-123.*

Johnston, L. & Ryan, T. (2015). How assistive technology helps overcome learning disabilities. Retrieved November 17, 2018 from http://tiger.towson.edu/~ljohns15/research/paper.htm

Lee, C. (2016). Learning disabilities and assistive technologies. Retrieved December 1, 2019, from http://www.gatfl.org/ldguide/default.htm

Loeding, B. L. (2014). The use of educational technology and assistive devices in special education. In J.L. Paul (Ed.), Rethinking professional issues in special education: Contemporary studies in social & policy issues in education. (pp. 231-247). Retrieved November 9, 2018, from http://www.netlibrary.com/nlreader/nlreader.dll?bookid=85927&filename=page_231.html

Morrison, K. (2013). Implementation of assistive computer technology: A model for school systems [Electronic

version]. *International Journal of Special Education, 22, 83-95.*

Obi, F. B. (2016). *Essentials of special education needs*. Calabar: Kp Klintin Printers and Publishers.

Ozoji, E. D. (2010). Course material on elements of special needs education. Jos: Deka Publications

Polloway, E.A., Patton, J. R., & Serna, L. (2011). *Strategies for teaching learners with special needs (9th ed.)*. Upper Saddle River, N. J.: Pearson.

Raskind, M., & Stanberry, K., (2016, February). Assistive technology for kids with learning disabilities. An overview. Retrieved Oct 3, 2018, from http://www.schwablearning.org/articles.aspx?r=286

Rhodes, J. A., & Milby, T. M. (2015). Teacher-created electronic books: integrating technology to support readers with disabilities [Electronic version]. *The Reading Teacher, 61, 255-259.*

Special Education Laws. (2011). Retrieved October 3, 2018 from: http://atto.buffalo.edu/registered/ATBasics/Foundation/Laws/atlegislation.php#TRAID