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Mathematics Learning Disability: Some Strategies to Teach Students who have Mathematics Learning Disability

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Abstract

Mathematics is a subject taught in all schools, made compulsory for all educational system and also it is the basic requirement for all students to study any course in higher institution. This subject has been a problem to so many students for its calculation. Many of the students are afraid of the subject, because of the general notion that it is the most difficult subject. Aside these group of students, we have other students who have learning disability in mathematics. These group of students find it difficult to learn and understand mathematics concepts, most of them are discouraged and frustrated due to their inability to learn and understand the basic mathematics concepts. Some of the mathematics teachers handling the subject are not trained in the area of handling these group of students, some are impatient, since they do not specialize in this special area of needs that will take care of students who have mathematics learning disability and so there is a problem in teaching these group of students the subjects. There is a need for trained teachers in this aspect to take care of the learning disability of students. The paper examines mathematics and learning disability, learning disability in mathematics and student's performance, teaching students who have mathematics learning disability and some of the approaches that can be applied to teach students with mathematics learning disability.

Keywords: 1. Learning disability 2. Mathematics 3. Students 4. Strategies.

Introduction

According to Wikipedia (2020) learning disability, learning disorder or difficulty in learning is a condition inside the brain that brings about difficulties in understanding and

processing information and this can be caused by many different factors. Often time, learning difficulty, learning disability and learning disorder are used interchangeably by people, but different in various ways. Barbotte, Guillemain, Chau, & Lorhandicap Group (2001) cited in Udoba (2014) stated that "Disability is a restriction or an inability to perform an activity in the manner or within the range considered normal for a human being, mostly resulting from impairment." Disorder, according to Wikipedia (2020), refers to significant difficulties of learning in an area of academic, while Learning disability, stands for an official clinical diagnosis, where certain criteria are met by the individual, as being determined by the professional (psychologist, speech language pathologist, paediatrician, psychiatrist etc.). Whenever Learning disorder is used, it refers to a set of disorders that is characterized by insufficient development of specific speech skills, academic and language (Wikipedia, 2020). Disorder is an unknown factor that affects the brain ability in processing and receiving information. It can hinder and render the brain of students not to function properly and make it to be problematic not to learn easily. Students with disability in learning have troubles or problems in carrying out some kinds of tasks or skills and also struggle in completing these tasks or skills, if allowed to carry out the work alone (Wikipedia, 2020).

Raborn (1995) defines learning disability as a disorder in one or more of the basic psychological processes that need the usage of language in understanding it, which may manifest in the inability to think, listen, read, spell, think, speak, write or perform mathematics calculations. Students who have learning disabilities might face some challenges that are often pervasive throughout their life time and this depends on the kind of and how serious the disability might be. Interventions, and present technologies can be applied to assist the student to learn, and that approaches will bring about future success (Wikipedia, 2020)

Mathematics and Dyscalculia

Many people are sometimes confused when using these two terms, the "dyslexia and dyscalculia". These two terms are different entirely. The two terms dyscalculia and dyslexia are two different learning disabilities. Wikipedia defines Dyscalculia as a disability which results in a problem of learning or understanding arithmetic such as having trouble in comprehending numbers, how to manipulate numbers, carrying out calculation in mathematics and learning of concepts in mathematics. It is informally called mathematics dyslexia sometimes, but it is quite a different condition.

This disability in mathematics learning can sometimes happen due to some type of injury in the brain. Dyscalculia is a specific type of disability in learning of mathematics, while dyslexia referred to difficulty in reading and interpreting letters. What some people called mathematics dyslexia actually might be dyscalculia. According to Devon (2020) "Dyscalculia is a learning disability in mathematics that impairs an individual's ability to process and represent numerical magnitude in a typical way. Dyscalculia is sometimes

called number dyslexia or mathematics dyslexia “. Dyscalculia is a disorder in learning disorder which affects ability of student in grasping number theory and mathematical concepts. The symptoms that are common with dyscalculia comprise problem in number sense, difficulty with calculation and impaired mathematical reasoning. When a dyslexia student struggles with mathematics, it often relates to an aspect of mathematics interpretation like there calling multi-step instructions, problems and difficulty in attending to instructions during writing (Time4learning,2020).

Mathematics and disability in learning

There are certain problems parents and teachers are facing in teaching mathematics to students with disability in learning. Subject, students generally afraid of is Mathematics, they considered it to be the most difficult subject. According to David(2004) “In theory, a disability in learning can occur as result of inability to represent or process information in all or one of the many mathematical domains “. Teaching students who possess mathematics learning disability is not a simple job. When a particular method or approach used in teaching mathematics is not working, or yielding result, the teacher needs to be patient with the students, they must not be forced rather the mathematics teacher should re-strategize and explore curricula, resources and other effective teaching method that will be better and also suits the learning needs of the students with the learning disability for easy comprehension to achieve the stated objectives or goals. According to Gambaro (2013), “Students who have learning deficits may have issues with processing, visual-spatial relationships or memorization.” These students may have problems in paying attention to the teacher during teaching and have difficulty in applying mathematics strategies. If the instruction is tailored to meet the student’s unique needs, the students can maximally reach their potential and therefore experience more positive experience in learning (Deatline-Buchman, Jitendra, & Xin, 2005, Gambaro,2013).

Some students who have disability in mathematics learning possess an excellent grip of concepts in mathematics, but they have difficulty in calculation, their problem is inconsistency in terms of calculation. They are not reliable in focusing attention on the mathematical operational sign, they cannot carry out the operation appropriately. These sets of students also experience difficulty in mastering basic number concepts (Garnett,1998). Garnett (1998) stated that many learning-disabled students consistent have difficulty in memorizing basic mathematics concepts despite the effort of the teachers. These sets of students, labour over the years to count with their fingers, pencil marks and incapable to develop their memory strategies efficiency by themselves.

Many students have difficulties concerning how to connect their informal knowledge to formal school mathematics and it has developed to a big problem, to bridge this gap makes mathematics teaching to be tasking, so it need experiences from the teacher and well structure instruction. Some students who possess learning disability in mathematics during

their elementary school mathematics usually come to school with a good foundation of informal mathematics understanding, but they have difficulties in relating this informal mathematics knowledge to formal language, procedures and school mathematics symbol or notation (Garnett,1998). For the students to connect this acquired knowledge to school mathematics, they need more experiences and different concrete materials to teach them so that the connection can be well established and stable (Garnett,1998).

Ways to teach students with mathematics disability in learning

There are many studies conducted by researchers, from their findings, certain strategies or methods that can be applied when attempting to teach students who have learning disability in mathematics were discovered. In teaching mathematics to students who possess learning disability, emphasis should be placed on the significance of the mathematics application to everyday life and this aspect must not be underestimated. During this stage of the concept development, it is very important to make use of a well structure concrete materials to arouse, develop and build precise and more comprehensive mental representations. The child should be given enough opportunities at home to acquire informal mathematics knowledge or concept, this has a long way of improving the child mathematical knowledge in the formal school mathematics. Research revealed that students who were taught with the use of concrete materials develop precise and have more comprehensive mental representations and are frequently more motivated on-task behaviour, have a healthier understanding of the mathematical concepts, and may better apply these to life situations (Cawly, & Parmar, 1997, Garnett,1998 Montague, Morgan, & Warger, 2000, Tournaki,2003). They should be allowed to compute the price of goods purchase, make budget in the house, estimate distance covered (Time4learning,2020). Through this, the child knowledge on the mathematics concepts and skills can be improved and also it can assist the child to develop good attitude towards mathematics in the formal school mathematics.

Mathematics should be taught, concrete to nonconcrete or simple to hard. It is very essential for the mathematics concepts development when concrete objects are used during mathematics teaching. Concrete materials are useful in many ways, these can be applied to different purpose of teaching. It helps in developing mathematics concepts and also to teach different mathematics topics and make it clearer to the students understanding. According to Raborn(1995) concrete objects are used to connect the knowledge of concrete experiences to develop abstract concepts. Manipulation of concrete materials is then supported and extended through the application of language. Students who have learning disability in mathematics usually have difficulty in connecting language to actions, memories, and concepts. Learning disability students often have problems in the processing of language, they may find it problematic to understand mathematics, when it is taught solely through language (Raborn,1995, Jones, Langrall, & Thornton, 1997). One

important thing we should understand about concrete objects is that they do not teach by itself, rather they work with the teachers' guidance and the interaction of students while the teacher and students repeatedly demonstrate and explain for proper understanding.

Students who possess learning disability in mathematics have an excellent grasp of concepts in mathematics, but they have problem in calculation, they are inconsistent in relation to calculation. They are unreliable because they focus attention on the operational sign and they cannot also carry out the operation appropriately. These sets of students also experience difficulty in basic number concepts mastering (Garnett, 1998). According to Garnett (1998), many students have difficulties in connecting their informal knowledge to school mathematics and bridging this gap is tasking, it need experiences from the teacher and well structure instruction. Students who have learning disability in their elementary school mathematics often bring to school their informal mathematics understanding, but their problem is how to connect this informal mathematics knowledge to more formal language, procedures and school mathematics symbol or notation (Garnett, 1998).

Teaching students who have learning disability in mathematics

There are many obstacles that confront the mathematics teachers in the classroom during process of teaching -learning which includes; students with different ability levels, lack of teaching materials or resources, lack of support from the government or school management, large class sizes, students' nonchalant attitude towards the subject 'mathematics', learning disability students and so on. The major problem, mathematics teacher encounters in mathematics teaching is student's 'mathematics phobia', which usually leads to students lack of participation, exhibiting anxiety, learning mathematics disability and other behavioural problems (Geary, 2004, Jerman, & Swanson, 2006, DeSimone & Parmar, 2006, Newton, 2015).

Teaching students who have learning disability in mathematics is tasking and a big challenge. Students who struggled with learning of mathematics for several years will be happy if they are eventually cope with mathematics. Three common kinds of disability students in learning usually experience in learning mathematics are: Dyslexia, this occur when students have problem in interpreting and reading letters. Dysgraphia, this happens when students encounter problems with writing. While Dyscalculia specifically referred to learning disorders that is related only to mathematics. Out of these three learning disabilities, student may possess only one of them, or may have more. There are numerous strategies that are useful which can be applied to teach and improve the mathematical knowledge of student with either one or more of these mathematics learning disabilities. Students with more or one of these disabilities in learning are students who may be having trouble or problem with mathematics learning and they are usually slow learner and slowly developing, so they need special method of mathematics teaching.

Number Sense: To develop students who have learning disability in mathematics, there is need to develop their mathematical knowledge from the basic concepts so as to acquire mathematics skills. Teaching them number system or number sense is very important in arousing their interest in mathematics subject. Number sense is students' ability to recognize numbers, count accurately either forward or backwards and how these numbers are related to one another. It is the basic foundation for developing mathematical concepts and skills, and so it is vital to students who possess mathematics learning disability, since learning disorders students generally have less number sense than other students. This is the most basic concept that students can be taught. How does the teacher improve their number sense? The following are three ways their number sense can be improved or developed. i) the students should be taught with concrete objects or materials that are obtainable in the classroom, their homes and elsewhere. The students should be given opportunity to count every concrete object that they can see or imagine such as their fingers, trees, chairs in the classroom and others, this help in building and developing their memory and retention, and it also develop their mathematics' concepts which will assist them for further mathematics learning.

There is need for repetition when teaching these set of students to grasp the mathematics concept, since they have difficulties in learning mathematics. The mathematics teacher should teach each mathematics skill or concept over and over till they are conversant with it and also masters it. The mathematics teacher should create enabling environment and make room for opportunities for students to figure out problems themselves during the learning and counting process to enable them solve the mathematics problems and for further application.

There should be a connection between the mathematics concepts and everyday usage to enable them relate it to their practical experiences, for easy understanding. The teacher should ensure the students become thoroughly familiar with the mathematical symbols and languages. Every symbol, languages and terms used during the mathematics teaching should be well interpreted and well connected to the way they are used for easy comprehension.

Learning disability in mathematics and student's performance

Students who possess learning disability require additional and special consideration in relation to curriculum adaptation, methods of teaching, accessibility of teaching-learning resources (Udoba, 2014). There are many problems in teaching students who have learning disability in mathematics in numerous countries, especially in Nigeria. Many schools lack qualified teachers in this special area of needs in education to teach students who have mathematics learning disability. Despite the robust educational policy, to ensure that every citizen is educated and to inculcate numerical literacy as enshrined in Nigeria

educational policy, students' performance in mathematics still remains very poor, most especially the mathematics learning disability students. Many schools lack mathematics teachers in this field of special education to effectively handle these group of special students. The scarcities of trained mathematics teachers on special educational needs to handle mathematically learning-disabled students and shortage of teaching resources, have an adverse consequence on the teaching of mathematics to learning disability students.

Researches have shown that mathematics learning disability is link to student's poor performance in mathematics, if not properly check or handle it can lead to daily struggle in teaching of mathematics. How can mathematics teachers assist students overcome this, increase or motivate them to have love for the subject and perform well in the subject? According to Module 5 (2020) "mathematics disabilities refer to learning disabilities that affect skills development in mathematics, like understanding quantitative concepts, translating language-based problems into mathematical symbols, and following sequences of steps." Module 5 (2020) went further to state that students that were diagnosed to have mathematics disability may also possess problem of comprehending basic mathematics concepts, and frequently cannot recall the tables of multiplication even though they spend numbers of hours in an attempt to remember them. They may have problem of understanding mathematical signs and replicate numbers or figures.

In the developing countries, many students at various levels of education have difficulties in learning mathematics. The general believes of the students is that the subject 'mathematics' is problematic and it seem to be one of the problems. Unsatisfactory teaching methods, procedures applied by the mathematics teachers in evaluating the students, poor education funding, lack of teaching materials/ infrastructure and students having mathematics disability, all these seem to have negative influence on the performance of students in mathematics (Montague, 2007, Mundia, 2012).

Some approaches to teach students who have mathematics learning disability

Some ways students with disability in mathematics can be assisted are as follows:

Individualize Instruction. This is very essential in the teaching of students who have learning disability in mathematics. This method not only tailored towards meeting the student's needs alone, but the presentation can also be customized as well (Babbit, & Miller, 1996, Fuchs, & Owen, 2002, Gambaro, 2013). Since this set of students have difficulty of learning and understanding mathematics, they need special attention and this can conveniently be taken care of through individualized instruction. According to Gambaro (2013) "Ensuring that the appropriate accommodations are provided for each student can

mean the difference between understanding and failure. This form of support should not only apply to classwork but to homework as well". Gambaro(2013) stated that some accommodations that will assist the students include

"Providing a note-taker for the students who have organization or auditory processing issues, putting fewer problems on a page for students with visual tracking issues, using color-coded problems to assist students with visual discrimination issues and using graph paper to aid students with visual-motor problems to assist them organize information on a page."

Build on the students' confidence: Building confidence in the students is very vital to the student to overcome their learning disability. When teacher build and boost the confidence and students' self-efficacy it makes them to have sense of belonging and recognized, it also serves as a motivating factor that will make them have interest, put more effort and become more capable in solving mathematical problems.

Using Technology in the mathematics teaching: There are many mathematics programmes and apps that can be used to teach or accompany the mathematics lessons. Making use of technology is very vital in teaching students who have disability in mathematics, this can be customized to accommodate student's particular learning deficits. Use of technology can be of assistance to both teachers, and parents, this will enable them to track, know their student's progress and also to provide appropriate practice as well. Examples of technology that can be applicable in mathematics teaching include: computer programs and websites, iPad and calculators (Carran, Rosenberg, & Wood, 1993, Kroesbergen, & Van Luit, 2003, Gambaro, 2013).

The students' understanding should be strengthened: Strengthen the understanding of the students of the basic mathematical concepts and numerical skills are very vital in teaching mathematics learning disability students. Enough opportunities and time should be given to the students to practice. They need enough opportunity since they have problems in understanding mathematics concepts and problems. An ample opportunity should be provided for them to learn, study, practice and master the important concepts required to excel or move further in learning the subject. When students lack rudimentary concepts and skills in mathematics, they struggle with their brain so as to cope with the subject. The resultant effect is discouragement, distraction which eventually leads to frustrations. The students should be involved in regular mental mathematics works and basic mathematics skills to strengthen their basic mathematics concept and skills (Smith, & Wisniewski, 2002, Newton, 2015).

Family involvement in homework: In solving the problem of the students who have mathematics learning disability, cooperation of the family is needed. Involving family in the student's work is of very vital to the foundation of their children mathematics background and which can be done through homework support. Their involvement is of great importance as per the success of the students who have learning disability in mathematics. To teach students mathematics who have learning disability is tasking and challenging, except when the teacher uses the appropriate methods and level of support that can allow the individual student to maximally utilize and realize his/her potential. Learning of mathematics can be of interest and rewarding to the disability students, if the teaching/learning is tailored towards the students' strengths and deficits, and the teacher should make mathematics comfortable experience and fun.

Conclusion

Mathematics is a compulsory subject taught in all schools, from lower level to higher level because of its importance to education and our daily living. Mathematics is the solid foundation of science and technology. For this cause, it is indispensable for the subject to be well handled and taught effectively. Students consider this subject as the most difficult due to calculations that are in it. Many students are facing difficulties in mathematics, most especially those with disability in learning. Students who have learning disability needs to be properly cared for, otherwise these set of students are bound to have problems which may result to discouragement and frustration in their education. Therefore, there is need for qualified and effective teacher to handle this subject called mathematics.

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