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CORRELATES OF DYSCALCULIA AND LEARNING OUTCOME IN MATHEMATICS AMONG SSII STUDENTS IN OBUDU, CROSS RIVER STATE-NIGERIA

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ABSTRACT: *Dyscalculia brings about different types of learning disorder which affects individuals (students) at various levels of learning. It enables the students, educators and guidance to determine inabilities, phobia, anxiety and develop compensatory mechanism for under developed areas. This paper deals with correlates of dyscalculia and learning outcome in Mathematics among SSII students in Obudu, C.R.S- Nigeria. Types of dyscalculia like; sequential, verbal, practognostic and operational dyscalculia are discussed. Tips on how to reduce dyscalculia are listed in the work. The survey research design was adopted for the study. A sample of 200 students was randomly drawn for the study. Data generated were subjected to statistical analysis using Pearson product moment correlation analysis at 0.05 level of significant. Results obtained show among others that dyscalculia significantly correlates with students learning in mathematics. Based on this it was recommended among others that students should engage in practice, extra-time, graphicalized their work and evaluate their work.*

KEYWORDS: Dyscalculia, Learning, Education, Mathematics, Students, Nigeria.

INTRODUCTION

The specification of a unique role in the academic and professional preparation of students in mathematics makes it role vital. According to Evans (2000), science is the bedrock that provides the springboard for the growth of technology and mathematics is the gate and key to sciences. As observed by Ekwueme and Meremikwu (2009), mathematics is the language of science and technology which helps children to be sensible in building a solid foundation for a living. Therefore, mathematics can be seen as a human activity that is older than man because it began when God apportion creation among the days of creation (Gen1:1).

Living a fulfilling and productive life is increasingly challenging for individual without knowledge in mathematics, science and technology for participation in all aspect of society. Fakuade (1973) exclaimed that the growing nature of knowledge and complexity of our societal organization has made it necessary for an incredible expansion of application of logical and qualitative methods of teaching. It is pertinent to know that mathematics is hierarchical and as such students, who do not understand a step, will also find it difficult to move on which may lead to mathematical phobia (Mayer, 2004). No matter the level of teaching with deficit foundation, every effort made cannot produce desired results (Agashi,2003). Mathematics presents various challenges for man as it is often regarded as difficult and tedious subject to learn (Sedig, 2008). A review of student's performance in public examinations shows that over a decade now, students' achievement in mathematics has not been encouraging as a result of difficulties they face.

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The students' inability to achieve their potentials is due to what researchers, educationists and psychologist's term mathematics learning difficulty and technically refers to as dyscalculia (Agashi 2003). The term dyscalculia is derived from Greek prefix "dys" which means "badly" and Latin "calculare" which means to count. Thus dyscalculia means counting badly (Orim, 2016).

Dyscalculia is a condition that affects the ability to acquire arithmetical skills (Department ForEducation and Skills, 2001). The concept of dyscalculia is linked with problems in reasoning, selecting, attention span, memory and focusing on relevant stimuli(Shimamura, 2002).It is a learning disability (difficulty) that may give rise to low self-esteem, school dropout, rigid understanding of counting, poor understanding of number magnitude, immature strategies during problem-solving and a bigger handicap on a learning process (Udgen, 2004). There is no single type of mathematics disability. Dyscalculia varies from one person to another and can hinder people differently at different levels of life leading to life-long difficulties in learning skills both in school and outside bringing about frustration and avoidance of learning the subject. Perhaps, the disposition of any individual could affect the level of mathematical difficulties (Pseudo- dyscalculia). Dyscalculia occurs at all ages.

To diagnose a child with learning disabilities can be difficult as there are many areas of development to be considered. Some of these areas are: Child's gross and fine motor skills, reading, mathematics attention span (MAS), social and emotional development (Nieme, 2007). Moreover, as arithmetical thinking involves a wide variety of components, there are many forms and causes of arithmetical difficulty, with different degree of importance (Mazzocco and Myers, 2006; Desoete and Roeyers, 2003). Despite several researches carried out on dyscalculia, the fact still remains that there are still students in and out of schools with difficulties when it comes to learning mathematics. This can be noted when a child is yawning for an English class and will not want to attend a mathematics class. Other indications of dyscalculia among students are performing below expectations, discrepancy between developmental level and cognitive ability, laterality, rote counting, rules and formulae, sequencing, time management, etc.

It is against this backdrop this study seeks to examine the correlates of dyscalculia and learning outcome among SSII Mathematics students.

Statement of the Problem

The learning of mathematics is done differently. So thus students with dyscalculia may have difficulty with numbers and remembering mathematical operations leading to poor performance in and out of needs. Learners with dyscalculia may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers and have problems learning number facts and procedures. Even if they produce correct method/answer, it may mechanically be done without confidence (British Dyslexia Association, 2009).

Types of Dyscalculia

The observation of dyscalculia in children can be done differently bearing in mind that it is a learning disability. Some of them are:

- Sequential dyscalculia:-counting according to sequence/using the sequence effectively. students with neurological impairments have difficulty generating and producing counting sequence (Lacert, 1997) and applying steps in arithmetic procedures in a

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correct sequence (Gordon 1992). The understanding and utilization of sequence is very necessary for effective mathematics learning outcome. This is so because the answer is not what is needed but the step taken in solving a mathematical problem to achieve at such answer is based on student's level of understanding.

- Verbal Dyscalculia:- refers to challenges in remembering and naming mathematical terms and symbols. Challenges associated with this types of dyscalculia is a problem of recalling numbers, calculation and geometric shapes.
- Practognostic Dyscalculia:- involves challenges using manipulative/pictures when solving a mathematical problems. Any student with this type of disorder fails to understand and answers oral or written problems that are presented in words or picture.
- Operational Dyscalculia:- deals with issues of basic arithmetic operations. A student with this type of dyscalculia has difficulties arranging numbers by size and sequences. Finger counting becomes a solution to manage the situation. Bad memory of multiplicative tables.

Statement of hypothesis

There is no significant relationship between dyscalculia (sequential, verbal, practognostic, operational) and students learning outcome in Mathematics.

METHODOLOGY

A survey research design was adopted for this study. Simple random sampling technique was used to select for four schools out of the 22 se3condary schools in the research area. Four intact classes of 50 students each from the four schools were used as sample. A sample of 200 students was therefore use for the study.

TABLE 1: Pearson product moment correlation analysis of the relationship between dyscalculia (acalculia, verbal, operational/practognostic and sequential) and students learning outcome in mathematics.

N=200

Variables	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-cal
Sequential (X_1)	2748	40036	24352	0.167
Verbal (X_2)	2210	28146	19573	0.145
Practognostic (X_3)	2321	28721	20552	0.171
Sequential (X_4)	2313	30099	20366	0.198
Students learning				

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Outcome (Y)	1783	17738

Significant at 0.05, df=198, critical r=0.138

The result presented in Table 1 show that calculated r-values for X_1, X_2, X_3 and $X_4$are 0.16, 0.145, 0.971 and 0.198 in that order are found to be statistically greater than the critical r-value of 0.138 at .05 level of significance with 198 degrees of freedom. Sequel to the result the null hypothesis was rejected on the premise that the calculated values were found to be statistically less than the tabulated value. It therefore means that dyscalculia significantly correlates with students learning outcomes in mathematics in the research area.

DISCUSSION

The findings of the hypothesis reveal that dyscalculia affect a targeted learning outcome from the subject (Mathematics). This finding is in harmony with the views of some writers (Adler 2001, Farmer, Riddick and Sterling 2002, Butterworth 2003, Mazzocco and Myers, 2006, Wadlington and Wadlington, 2008, Rubinstein and Tannock, 2010) who believe that dyscalculia has a great effect on students learning outcome.

In general the findings could be explained by the adage "garbage in garbage out" or "what goes around comes around". In addition, dyscalculia can cause students to become frustrated and develop behavioral and social problems, which then becomes the focus of any teacher in a learning process. Sometimes failures in mathematics are as a result of students' carelessness. However, this may result from lack of understanding of the factors or operation involve in solving mathematical problems.

CONCLUSION

The under listed strategies should be employed to reduce the level of dyscalculia in students:

- Practice: (a) Review Frequently
  (b) Draw a picture to help understand the problem
- Extra time: (a) Check more examples
  (b) Replace a real life situation with this type of problem
- Graphicalized (a) Present the situation graphically
  (b) Userhythm or music to help memorize.
- Evaluate: Task

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