

THE EFFECTS OF MATHEMATICS ANXIETY, DECISION MAKING AND ACHIEVEMENT IN MATHEMATICS EXAMINATION ON STUDENTS WITH HEARING IMPAIRMENT'S INTEREST IN MATHEMATICS IN LAGOS STATE, NIGERIA

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Abstract

This study examined the effects of mathematics anxiety, decision-making and achievement in mathematics examination on interest in mathematics among students with hearing impairment from Basic Schools in Lagos State. This study employed descriptive survey research design. Purposive sampling technique was used to select 94 students with hearing impairment from intact class in Lagos State basic schools. Anxiety in Mathematics, Decision-making, Interest in Mathematics scales and Mathematics Achievement Test with reliability coefficients of 0.69, 0.71, 0.70 and 0.80 respectively were used to collect data. Three hypotheses were tested and results revealed no significant difference in anxiety and interest in mathematics of the participants, also there is no significant difference in decision-making and interest in mathematics among students with hearing impairment. However, there is significant difference in achievement in mathematics examination and interest in mathematics among the participants. It was recommended that stakeholders (teachers, parents, caregivers and government) should help students with hearing impairment to develop the right decision-making skill and reduced anxiety through right counseling strategy, training and functional therapeutic approaches. Sign language that will represent most difficult symbols in mathematics should be developed locally and internationally.

Keywords: *Mathematics Anxiety, Decision-Making, and Hearing Impairment*

Background to the Study

Life achievement most of the time is made possible by the interest individual possesses in achieving a set goal. Attainment of life goal may be difficult if there is shift in interest, or the right proportion of interest is lacking occasion by some attendant challenges of life. Among students, academic excellence may

not be achieved even if the environment is conducive and right pedagogical strategies are employed without commensurate interest from the learners. So, interest is important in learning process. Unfortunately, some students demonstrate lack or low interest in some school subjects especially in primary and secondary levels because of the perceived

difficulty and complexity of those subjects among which mathematics is one. Mathematics is one of the core subjects that learners must pass for him/her to make advance in academic journey. Unfortunately, many students perform poorly due to poor interest motivated by intra and interpersonal cum environmental problems. Among these problems are school environment, teachers' personality, teaching materials and methodology, students' anxiety in passing examination, students' locus of control, decision-making, students' achievements and a host of other factors within and outside learning environments. Learners with hearing impairment are not immune from the conditions stated above and most often, mathematics interest of this group of children suffer double jeopardy due to the conditions of their disabilities.

Mathematics anxiety is believed to be a feeling of tension, apprehension or fear that interferes with mathematics performance (Asif & Khan, 2011). This feeling is present in majority of learners because of the perceived difficulty and complex nature of mathematics in which learners with hearing impairment are not exempted. Mathematics anxiety from a larger perspective is a complex construct consisting of affective and cognitive responses to a perceived threat to self-esteem which occurs as a response to situations involving mathematics (Atkinson, in Olango, 2016). Many people experience a genuine fear for mathematics and become nervous when engaging in mathematical tasks (Maloney, Waechter & Fugelsang, 2012), avoiding mathematics and mathematics-related courses, and this has its attendant consequences inform of

poor interest in mathematics and failure thereby limiting future careers and earning opportunities (Hembree, 1990; Chipman, Krantz, & Silver, 1992). Having anxiety about a particular subject cannot be totally term as negative feeling because; a level of anxiety propels performance. However, if it becomes so serious to the extent that hatred is developed towards the subject with its attendant consequence in form poor performance or outright failure, then attention must be drawn towards limiting the escalation of its consequences. Asif and Khan, (2011) believed that a high level of anxiety is associated with a lower level of performance. This corroborated Tapia and Marsh (2004) who found that students having little mathematics anxiety scored significantly higher than the students with high mathematics anxiety. The reason for this has been attributed to a number of factors such lack of self-confidence (Stuart, 2000), pattern of decision-making by individual cum goal-setting ability, innate and acquired (Garrecht, Bruckermann & Harms, 2018).

Decision-making according to Wilson and Keil (2001) describes a rational process which causes the selection of a favored option or course of action among multiple alternatives that are based on specific criteria. Decision-making is a complex and manifold process involving conscious and concerted efforts at achieving a target (Wood, Quinn & Kashy, 2002; Ajzen, 1991) and involve cognitive precursor to action (Garrecht, Bruckermann & Harms, 2018). The issue of decision-making is vital and regarded as the most important element in the lives of individuals and it has a great impact on them as a key factor for problem solving

and strategy to adapt to surrounding circumstances (Asha, Asma & Hawi, 2016). The study by Abdi and Davoudi (2015) pointed to the fact that decision-making is vital in achieving success. Their study was on impact of life skills and academic achievement of high school students in Iran. The findings revealed amongst others that decision-making statistically related to academic achievement of their participants. Also in another study carried out by Piramanayagam and Kasirajan (2017) on impact of decision-making ability and academic achievement of higher secondary school students. The result revealed significant relationship between decision-making and academic achievement of higher secondary school students. By implication decision-making is a construct that can influence achievement, hence, interest in learning can be influenced by good decision-making and can go a long way to influence interest in mathematics among learners with hearing impairment if they are equipped with the skill.

Academic achievement of student with hearing impairment has been a subject of concern most especially in core subjects like in English and Mathematics. Learning mathematics by students with hearing impairment is confronted with some complex factors such as language difficulty, interpretation of some mathematics symbols (Nair & Ramaa, 2014), and interplay of some environmental factors. Studies have consistently reported that deaf children show a slower achievement rate than their typically hearing peers in mathematical proficiency (Pagliaro & Kritzer, 2013; Edwards, Edwards, & Langdon, 2013). The poor achievement

has been linked to lack of understanding of some frequently used conditionals, comparisons, negation, and inferences as well as multiple meaning of words. (Pagliaro, 2006; Noorian, Maleki, & Abolhassani, 2013). These difficulties sometimes lead to poor performance in mathematics and by implication affect interest of students with auditory difficulties. This is evident in the performance of students with hearing impairment in problem solving tasks and figure interpretation (Hassan, Hassan & Mohammed, 2019). With a lot of studies revealing poor performance of students with hearing impairment in mathematics and its link to different variables in and out of school, it is therefore necessary to investigate the effects of anxiety, decision-making and achievement in mathematics on interest of students with hearing impairment in mathematics.

Purpose of the Study

1. To test the mean difference between students with hearing impairment's anxiety for mathematics and their interest in mathematics.
2. To test the mean difference between students with hearing impairment decision making and their interest in mathematics.
3. To test the mean difference between students with hearing impairment achievement in mathematics examination and their interest in mathematics.

Research Hypotheses

1. There is no significant difference between hearing impaired students'

- anxiety for mathematics and their interest in mathematics
2. There is no significant difference between hearing impaired students' decision making and their interest in mathematics.
3. There is no significant difference between Achievement in mathematics examination and Interest in mathematics

Methodology

This study employed descriptive survey research design in which quantitative data were collected in line with the variables under investigation. The population for the study included students with hearing impairment in in Lagos State Basic Schools, Nigeria. The samples for the study were ninety four (94) students with hearing impairment purposively sampled from the available Basic Schools that practice inclusive education in Lagos State. Their ages range between 12 and 21. This serves as one of the criteria for selection. Others criteria were that they were available during the period of this study and indicated they were ready to participate in the study through the consent form filled by the participants. The instrument for this study was anxiety in mathematics scale, decision-making scale, interest in mathematics scale and

Mathematics achievement test. The scales were constructed in 4 likert type: Not all true of me (NATM), Hardly true of me (HTM), Moderately true of me (MTM), Exactly true of me (ETM) of fifteen items. The reliability of the scale were 0.69, 0.71 and 0.70 respectively using cronbach alpha. The Mathematics Achievement Test (MAT) was adopted from National Examination Council 2016 Basic Education Certificate Examination. 20 items were re-modified and used for this study. The reliability for MAT was 0.80 using test re-test. To collect data, the researchers sought the permission of the Principals of the schools used. After the permission had been granted, the researchers met with the students and explain the essence of the study to them with the help of their class teachers. Thereafter, consent forms were given to the students and those who responded positively were asked to respond to the scales and subjected to 50 minutes mathematics test of multiple choice type. The researchers waited patiently for the respondents to attend to the scale and the test. The responses were collected after they have been duly attended to. Data collected were coded and analyzed using descriptive statistics and paired sampled t-test.

Result

Hypothesis One: There is no significant difference between hearing impaired students' anxiety for mathematics and their interest in mathematics.

Table 1: Paired Sampled t-test comparison of Anxiety and Interest

Parameter	Number	Mean	S.D	Tcal	df	P – value	Remark
Anxiety	94	22.32	4.256	1.262	93	0.210	NS
Interest	94	21.77	3.465				

Table 1 presents the paired sampled t-test comparison of hearing impaired students' anxiety for mathematics and their interest in mathematics. The t-test comparison showed a difference which is not statistically significant between their anxiety for and interest in mathematics ($t_{\text{calculated}} = 1.262$, $df = 93$, $p > 0.05$). We therefore accept the null hypothesis.

Therefore there is no significant difference between hearing impaired students' anxiety for mathematics and their interest in mathematics. The mean anxiety of sampled students to mathematics is however higher than their interest in mathematics. The difference however is not significant; therefore it cannot be generalized.

Hypothesis Two: There is no significant difference between hearing impaired students' decision making and their interest in mathematics.

Table 2: Paired Sampled t-test comparison of Decision making and Interest

Parameter	Number	Mean	S.D	Tcal	df	P – value	Remark
Decision Making	94	21.60	4.494	- 0.321	93	0.749	NS
Interest	94	21.77	3.465				

Table 2 presents the paired sampled t-test comparison of hearing impaired students' decision making and their interest in mathematics. The t-test comparison showed a difference which is not statistically significant between their decision making and interest in mathematics ($t_{\text{calculated}} = -0.321$, $df = 93$, $p > 0.05$). We therefore accept the null

hypothesis. Therefore there is no significant difference between hearing impaired students' decision making and their interest in mathematics. The mean decision making of sampled students to mathematics is however higher than their interest in mathematics. The difference however is not significant; therefore it cannot be generalized.

Hypothesis Three: There is no significant difference between Achievement in mathematics examination and Interest in mathematics.

Table 3: Paired Sampled t-test comparison of Achievement in mathematics examination and Interest in mathematics

Parameter	Number	Mean	S.D	T-cal	Df	P – value	Remark
Achievement	94	8.94	2.435	-29.574	93	0.000	S
Interest	94	21.77	3.465				

Table 3 presents the paired sampled t-test comparison of hearing impaired students' achievement in mathematics examination and their interest in mathematics. The t-

test comparison showed a difference which is not statistically significant between their achievement in mathematics and interest in mathematics ($t_{\text{calculated}} = -29.574$, $df =$

93, $p < 0.05$). We therefore reject the null hypothesis. Therefore there is a significant difference between hearing impaired students' achievement in mathematics examination and their interest in mathematics. The difference in the mean interest in mathematics and interest in mathematics was found to be statistically significant. Therefore the mean difference can be generalized. The mean interest of sampled students is higher than their achievement in mathematics examination and hence can be generalised. Therefore the mean interest of hearing impaired students in mathematics is significantly higher than their achievement in mathematics education.

Discussion

The findings revealed that there is no significant difference between hearing impaired students' anxiety for mathematics and their interest in mathematics. By implication, anxieties of students with hearing impairment affect their level of interest in mathematics. This has been severally expressed in different studies dealing with anxiety and academic performance of students. The more students develop high and negative anxiety towards a subject, the poor the performance and that may affect the level of interest of such student. The result corroborated the assertion of Asif and Khan, (2011) who believed that a high level of anxiety is associated with a lower level of performance which may eventually make students to develop negative interest in a subject. Though having anxiety about a task is not out rightly bad because it motivate performance as found by Tapia and Marsh

(2004) in his study that students having little mathematics anxiety scored significantly higher than the students with high mathematics anxiety. It then means learning to moderate level of anxiety helps in achieving a desire goal which in turn may help in developing interest in such task.

The finding further revealed that there is no there is no significant difference between students' with hearing impairment decision-making and their interest in mathematics. By this outcome, it shows that interest in a particular task is informed by decision from an individual. In inference, the decision-making styles of students with hearing impairment affect their interest in mathematics. The finding is line with Abdi and Davoudi (2015) that posited that decision-making in vital in achieving success. The view is a reflection of the outcome of their study on impact of life skills on academic achievement of high school students in Iran. The findings revealed amongst others that decision-making statistically related to academic achievement of their participants. This then means that poor interest demonstrated by students with hearing impairment as evident in their performances is as a result of decision-making. Also, the result is line with the study of Piramanayagam and Kasirajan (2017) on impact of decision-making ability and academic achievement of higher secondary school students in which the result revealed significant relationship between decision-making and academic achievement of higher secondary school students. Hence, decision-making is vital to success in the life of an individual. In addition, the finding of the study revealed that there is a significant

difference between hearing impaired students' achievement in mathematics examination and their interest in mathematics. This implies that the achievement in mathematics among students with hearing impairment might not necessarily be consequence of interest in the subject alone but may also be predicated on some other factors. For instance, Nair and Ramaa (2014) noted that learning mathematics by students with hearing impairment is confronted with some complex factors such as language difficulty, interpretation of some mathematics symbols, and interplay of some environmental factors. This finding is another eye opener to understanding why performance in mathematics by students with hearing impairment have being on the poor side. It can then be figured out that many mathematics signs are either misrepresented by sign language and sign language interpreters or may not have any sign language representing such making comprehension difficult. This makes learning and comprehension difficult for students with auditory impairment.

Conclusion

This study investigated the effects of anxiety, decision-making and achievement in mathematics examination on students with hearing impairment interest in mathematics in Lagos State using survey research approach. The results revealed that there are no significant differences between anxiety and decision-making and students with hearing impairment's interest in mathematics. However, the results revealed a significant difference between achievement in mathematics

examination and interest in mathematics among the participants.

Recommendations

1. Stakeholders are enjoined (teachers, parents, caregivers and government) to help students with hearing impairment to develop the right decision-making skill and how to reduced anxiety through right counseling strategy, training and functional therapeutic approaches.
2. Sign language that will represent most difficult symbols in mathematics should be developed locally and internationally to reduce the rate of misrepresentation that often leads to confusion.

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