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Self-Concept and Mathematics Performance of Senior Secondary School Students with Hearing Impairment in Port Harcourt, Rivers State

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Abstract
The study investigated the influence of self-concept and the academic performance of hearing-impaired senior secondary school students in mathematics in Port Harcourt, Rivers State. The study will adopt a descriptive research design. The population of the study comprised of 300 hearing-impaired students of the 16 public secondary schools in Port Harcourt, Rivers State. Simple random sampling technique was utilized in selecting the sample for the study. The instrument for data collection was titled: "Self-concept Scale (SCS)". The instrument was validated by three (3) experts in educational psychology, guidance and counseling in the Department of Educational Psychology, guidance, and Counseling, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt. The reliability of the Self-concept Scale (SCS) was determined using Cronbach Alpha Reliability Method. The SCS yielded a reliability coefficient of 0.86. The instrument was administered to the participants of the study on a one-on-one basis. The research questions were answered using Mean and Standard Deviation, while the null hypotheses was tested at 0.05 level of significance using independent sample t-test. The Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 27.

Keywords: Self-Concept, Mathematics Performance, Hearing Impairment, Special Needs Education, Inclusive Learning

Introduction

Academic success is largely determined by a learner's self-belief and the effort they invest. Achieving excellent results requires significant sacrifices, and poor performance among students concerns everyone, including parents, guardians, school authorities, and the government. Several factors influence students' academic performance, with a positive self-concept being a crucial determinant of success (Soares et al., 2009). Mathematics, as a methodical subject, cultivates qualities such as reasoning, creativity, critical thinking, and problem-solving abilities (Muraina, 2013). The academic performance of hearing-impaired students in mathematics has been a subject of research, with various studies examining the factors that influence their learning. Abba (2007) highlighted the role of mathematics puzzles in encouraging clarity in reasoning, particularly when introduced early in education. Self-concept plays a significant role in academic success and is defined as an individual's perception of themselves and their abilities. Carl Rogers argued that self-concept shapes personality and influences motivation for self-actualization. Studies have consistently shown a strong link between self-concept and academic performance, with positive self-perception often leading to better outcomes. Self-concept encompasses self-image (how individuals see themselves) and self-esteem (how individuals value themselves). Mkpae (2015) emphasized that an individual's self-conception significantly impacts their behavior and academic performance.

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Study habits are another critical factor in academic success, as they determine how effectively students engage with learning materials. Good study habits include being organized, taking notes, and avoiding distractions, while bad habits, such as skipping classes or procrastinating, hinder performance. Effective study strategies are essential for independent learning, enabling students to master content efficiently (Okanezi & Braide, 2018). Academic stress, which arises when students struggle to meet academic demands, can negatively affect performance. It manifests as anxiety, sleeplessness, and hostility and, in extreme cases, can lead to mental breakdowns. Thorndike's laws of learning, readiness, exercise, and effect, suggest that behaviors followed by pleasant outcomes are more likely to be repeated. Examination malpractice, often a result of inadequate preparation, is another concern. For example, the 2019 WAEC results showed that over 180,000 results were withheld due to malpractice, emphasizing the importance of consistent studying and preparation. Uwah (2016) underscores the necessity of cultivating a habit of continual learning for academic survival.

In Ahoada East, the performance of hearing-impaired students in mathematics has raised concerns due to low academic achievements and frequent repetition of classes. Academic performance is measured by how well students meet the standards set by educational institutions (Bell, 2011). Eze (2004) asserted that a student's performance largely depends on their study habits. Therefore, this research investigates the relationship between self-concept, study habits, and the academic performance of hearing-impaired students in mathematics in Ahoada East.

Empirical Studies

Fehintola (2014) conducted a study to explore the interaction of personal and contextual factors, such as gender and teachers' knowledge of the subject matter, in shaping the academic performance of hearing-impaired students. The study utilized a structured questionnaire titled Teachers' Knowledge and Students' Academic Performance Scale (TKSAPS) as the research instrument. The population of the study comprised hearing-impaired students and their teachers in secondary schools located in Saki-West Local Government Area, Oyo State, Nigeria. A total of 120 participants, including 80 hearing-impaired students and 40 teachers, were selected through stratified random sampling to ensure proportional representation across various schools. Similarly, Akpan and Ita (2015) examined the role of self-concept and demographic variables, such as gender, in influencing the academic performance of hearing-impaired students in science subjects. The researchers employed a combination of instruments, including the Self-Concept Inventory (SCI) and the Science Academic Performance Test (SAPT), to collect data. The population consisted of hearing-impaired secondary school students in Cross River State, Nigeria. A total of 150 students were selected as the sample from 10 public secondary schools. The schools were identified using purposive sampling to target institutions with a high population of hearing-impaired students, while simple random sampling was applied to recruit participants within the schools.

Mandah (2018) conducted a study to examine the effects of self-esteem on the academic performance of hearing-impaired students, with a specific focus on differences between boys and girls. The research utilized a standardized instrument titled Self-Esteem and Academic Performance Questionnaire (SEAPQ) to measure self-esteem levels and their relationship with academic outcomes. The population for the study consisted of hearing-impaired students in secondary schools located in Rivers South-East, Rivers State, Nigeria. A total of 200 students were selected as the sample using a multi-stage sampling technique. First, purposive sampling was employed to identify schools with a substantial number of hearing-impaired students, followed by random sampling within those schools to ensure a representative sample. The findings of the study revealed significant gender-based differences in the influence of self-esteem on academic performance.

Statement of the Problem

Studying is crucial, as no learning process can be effective without it. However, a major issue in the Nigerian educational system is the persistent failure of learners in national examinations, particularly in mathematics, a core subject at the secondary school level (Ajayi, 2012). This challenge is even more pronounced among hearing-impaired students, who often experience anxiety when learning and solving mathematical problems, contributing to high failure rates in external examinations like WAEC and NECO. Self-concept plays a critical role in academic performance. Many hearing-impaired students hold negative beliefs about themselves, seeing themselves as inferior to their peers and unable to succeed academically. This discourages them from making additional efforts to improve. Furthermore, poor study habits such as neglecting homework, tests, and reading worsen their performance. This research seeks to explore the relationship between self-concept, study habits, and the academic performance of hearing-impaired students in mathematics within Ahoada-East Local Government Area of Rivers State.

Purpose of the Study

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The aim of this study is to examine the relationship between self-concept and study habits on the academic performance of hearing-impaired senior secondary school students in mathematics in Rivers State, and is based on the following specific objectives:

1. To find out the mean difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender
2. To find out the mean difference in the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender

Research Questions

The study is backed up with the following research questions:

1. What is the mean difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender?
2. What is the mean difference in the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender?

Hypotheses

Ho_1: There is no significant difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender

Ho_2: There is no significant difference in the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender

Methodology

This section deals with the various research methods embraced in the course of conducting this study; research design, population of the study area, sampling techniques, sampling, instruments for data collection, validation of the instrument, reliability of the instrument, methods of data administration and collection, and finally, methods of data analysis. The study used a correlational research design. Odinaka (2019) explained that correlational design is a type of design that takes into account the characteristics of the entire population or a sample of the entire population. The population of the study comprised of 1,398 hearing-impaired students of the 16 public secondary schools in Rivers State, source: (planning, research and statistic department, Rivers State Senior Secondary Schools Board (RSSSSB, Port Harcourt, Rivers State (2020).

Ogidi (2018) refers sampling as any portion of the population or universe selected for the study to represent the entire population. The study used 300 students that were randomly drawn from the six (6) public secondary schools. Fifty (50) students were selected from each of the 6 secondary schools in Ahoada East, Local Government Area, Rivers State. Ogidi (2018) explained sampling techniques as a plain specifying how elements will be drawn from the population. The sampling technique adopted in the study is simple random sampling technique where every individual in the defined population have equal and independent chance of being selected.

The instrument for data collection was structured by the researcher. It was titled: Self concept scale, it was further divided into two (2) sub-scales, they include; Positive Self -Concept Scale (PSCS), Negative- Self Concept Scale (NSCS), Also, the Mathematics Test scores of the students in the six (6) selected senior secondary schools in Rivers State. The Self-Concept Scale formed Section B, while the demographic information of the respondents formed section B. The Self Concept Scale (SCS), was designed in line with the four (4) point Likert Scale and each response weights thus: Strongly Agree (SA) = 4, Agree (A) =3, Disagree (D) =2, Strongly Disagree (SD) = 1. The instrument was validated by three (3) experts in educational psychology/ guidance and counseling in the department of educational psychology, guidance and counseling, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt. Their scrutiny, observation were effected in the final draft copy of the instrument.

The reliability of the Self concept Scale (SCS) was determined using Cronbach Alpha Reliability Method. The Self concept scale (SCS) yielded an overall reliability result of 0.86

The instrument will be administered to the participants of the study in a one-on-one basis. The researcher will then retrieve the completed copies. The research questions were answered using Mean and standard deviation will be used to answer the research questions, while independent sample t-test will be used test the null hypotheses at 0.05 level of significance. The Data analysis was done using the Statistical Package for Social Sciences (SPSS).

Results

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This chapter presented and analyzed data generated from the study. Out of the 300 instruments administered to the respondents, only 284 were completed by the respondents. Thus 284 were used for the final analysis. In addition, the summary of findings and discussion of findings were also presented in this chapter. Since the hypotheses were drawn directly from the research questions, table for their results were presented simultaneously.

Research Question One: What is the mean difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender?

Table 1: Mean score in Mathematics of students with hearing impairment with Positive self-concept in senior secondary schools in Rivers State.

Group	Gender	N	Mean Score in Mathematics	Std. Dev.
Positive Self Concept	Male	42	77.8	7.4
	Female	65	82.5	6.8
	Total	107		

Table 1 displays the mean mathematics scores of senior secondary school students with hearing impairment and a positive self-concept in Rivers State. The data reveals that females (N = 65) outperformed males (N = 42), with a mean score of 82.5 compared to 77.8. The standard deviation for females (6.8) is slightly lower than for males (7.4), indicating that the females' scores are more consistent.

Research Question Two: What is the mean difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender?

Table 2: Mean score in Mathematics of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State.

Group	Gender	N	Mean Score in Mathematics	Std. Dev.
Negative Self Concept	Male	85	52.9	10.1
	Female	93	55.6	9.5
	Total	178		

Table 2 illustrates the mean mathematics scores of senior secondary school students with hearing impairment who exhibit a negative self-concept in Rivers State. The data reveals that females (N = 93) achieved a slightly higher mean score of 55.6 compared to males (N = 85), who had a mean score of 52.9. The standard deviation for females (9.5) is lower than that for males (10.1), indicating more consistency in the females' scores.

Hypotheses

Hypothesis One: There is no significant difference in the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender

Table 3: Summary of independent t-test analysis on the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender.

Gender	N	$\bar{x}$	SD	Df	t_{cal}	t_{tab}	Sig.	Decision
Male	42	77.8	7.4	115	-3.37	1.96	0.00	Reject: H_{O1}
Female	65	82.5	6.8					

Table 3 shows the results of an independent t-test comparing the mathematics scores of students with hearing impairment with positive self-concept in senior secondary schools in Rivers State, based on gender. The

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calculated t-value (tcal = -3.37) is lower than the critical t-value (ttab = 1.96), and the significance level (Sig. = 0.00) is less than 0.05. Therefore, the null hypothesis is rejected, indicating a statistically significant difference, with females with positive self-concept performing better in mathematics than males with positive self-concept in Rivers State.

Hypothesis Two: There is no significant difference in the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender.

Table 4: Summary of independent t-test analysis on the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender.

Gender	N	$\bar{x}$	SD	Df	t_{cal}	t_{tab}	Sig.	Decision
Male	85	52.9	10.1	115	-1.84	1.96	0.68	Accept: H_{O1}
Female	93	55.6	9.5					

Table 4 shows the results of an independent t-test comparing the mathematics scores of students with hearing impairment with negative self-concept in senior secondary schools in Rivers State, based on gender. The calculated t-value (tcal = -1.84) is lower than the critical t-value (ttab = 1.96), and the significance level (Sig. = 0.68) is greater than 0.05. Therefore, the null hypothesis (HO1) is accepted, indicating that there is no statistically significant difference in the mathematics performance of male and female students with negative self-concept in Rivers State.

Discussion

The study results indicate that there is a significant difference in the Mathematics scores of students with hearing impairments and positive self-concept in senior secondary schools in Rivers State, based on gender. This implies that gender plays a role in how students with positive self-concepts perform in Mathematics. The observed difference suggests that male and female students with hearing impairments and positive self-concepts achieve varying levels of academic performance in Mathematics, underscoring the influence of gender on their outcomes. These findings reject the null hypothesis, affirming that gender is a significant determinant in the Mathematics scores of hearing-impaired students with positive self-concept. This finding is consistent with the observations of Fehintola (2014), which highlighted the interaction of personal and contextual factors, such as gender and knowledge of subject matter, in shaping academic performance among hearing-impaired students. Furthermore, it aligns with Akpan and Ita (2015), who emphasized that self-concept combined with demographic variables, such as gender, significantly influences the academic performance of students with hearing impairments in science subjects.

The findings reveal that there is a 2.7 mean difference in the mathematics scores of students with hearing impairment who have negative self-concept in senior secondary schools in Rivers State, based on gender. This indicates that gender plays a role in the mathematics performance of students with hearing impairments and negative self-concepts. While both genders perform relatively lower in mathematics when negative self-concept is present, the observed mean difference suggests that one gender may experience a slightly more pronounced effect of negative self-concept on academic performance than the other. This result aligns with the broader understanding that self-concept influences academic outcomes differently for boys and girls, as also noted in previous studies such as Mandah (2018), which highlighted the effects of self-esteem on the academic performance of hearing-impaired students. However, further analysis is necessary to understand whether the 2.7 mean difference is statistically significant.

Conclusion

Positive self-concept test-taking skills, strategic material system, paraphrasing information, and active reading are positively related to the academic performance of hearing-impaired students in mathematics in senior secondary schools in Rivers State. The study therefore concludes that, with the exception of negative self-concept, other variables in the study had positive relationship with the academic performance of hearing-impaired students in mathematics in Rivers State.

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Recommendations

Based on the findings of the study, the researcher recommends as follows:

1. Teachers with requisite knowledge of the subject matter in Mathematics should be employed into the school system. To this end, employment of teachers in the school system should not be politicized.
2. Counsellors in schools should emphasize the importance of developing positive self-concept. Students with negative concept should be identified and provided adequate psychological intervention to improve on their learning
3. Information and communication technology facilities should be provided in senior secondary schools by the government. This is particularly due to the importance of technology in teaching and learning (especially as it affects the academic performance of students).

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