INFLUENCE OF FLUID INTELLIGENCE ON ACADEMIC PERFORMANCE AMONG SENIOR SECONDARY SCHOOL STUDENTS IN KATSINA ZONAL EDUCATION QUALITY ASSURANCE, KATSINA STATE

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Abstract

This study investigated the Influence of Fluid Intelligence on academic performance among senior secondary school students in Katsina Zonal Education Quality Assurance, Katsina State. The study was guided by one research objective, one research questions and one hypothesis. The study adopted a descriptive research design. The population of the study consists of 17,328 students offering Mathematics in all the twenty-five Senior Secondary Schools in Katsina Zonal Education Quality Assurance, Katsina State. Cluster and Simple Random Sampling Techniques were adopted in this study. A total sample size of 370 students from six schools were selected and used for the study. Two instruments were used for data collection; Non-verbal test of fluid intelligence, and Mathematics West African examination council and National examination council past questions was used to assess students' academic performance. Mean and standard deviation and Pearson product moment correlation was used to test the hypotheses. The Result of this study shows a significant Influence of Fluid Intelligence on Mathematics Performance, this shows that students with fluid intelligence have high scores in academic performance unlike their counterpart. Based on the findings the researcher recommended that administrators and teachers should provide an environment which will help students develop their cognitive abilities such as fluid intelligence.

Keywords: Fluid intelligence and Academic Performance

Introduction

Intelligence is one of the most frequently investigated individual differences in psychology. Countless studies have demonstrated that test measuring cognitive ability or intelligence predict a number of important real-world outcome such as academic performance (Kuncel & Hezlett, 2007; Kuncel, Hezlett, & Ones, 2004; Sackett, Borneman, & Connelly, 2008). For centuries intelligence is used as determinant of academic performance which demarcates achievers and underachievers. General intelligence also referred as fluid intelligence was defined by Martinez, (2014) as the ability to understand complex relationship and solve novel problems. Fluid intelligence is usually measured by administering tests that involves deductive and inductive reasoning, which reflects the ability of an individual to think, reflect and solve complex problems based on logical reasoning and make inferences in significant way. Fluid reasoning or fluid intelligence (Gf) is the capacity to reason and solve novel problems, independent of any knowledge from the past. Measures of fluid cognitive ability often focus on manipulating concepts, working with mathematical or logical relationships, and solving novel problems. It is the ability to analyze novel problems, identify patterns and relationships that underpin these problems and the exploration of

this using logic. It is necessary for all logical problem solving. Fluid reasoning includes inductive reasoning and deductive reasoning. Fluid intelligence is the ability to think abstractly, intuit information, recognize pattern and evaluate problems by piecing together information that isn't necessarily formally taught, but imagined and generated from one's own experience and understanding. A measure of the capability to reason in novel situations demonstrated through deductive, inductive, conjunctive, disjunctive, and other forms of reasoning, drawing inferences from relationships, and comprehending implications. Tasks intended to measure Gf should not depend heavily on previously acquired knowledge, Gf is best measured with tasks that are novel.

Carroll (1993) cited in McGrew (2009) gives the following as the various component of fluid reasoning:

General Sequential (deductive) Reasoning (RG): Ability to start with stated assertions (rules, premises, or conditions) and to engage in one or more steps leading to a problem solution. The processes are deductive as evidenced in the ability to reason and draw conclusions from given general conditions or premises to the specific, often known as hypothetico-deductive reasoning.

Induction (I): Ability to discover the underlying characteristic (e.g., rule, concept, principle, process, trend, class membership) that underlies a specific problem or a set of observations, or to apply a previously learned rule to the problem, reasoning from specific cases or observations to general rules or broad generalizations. Often requires the ability to combine separate pieces of information in the formation of inferences, rules, hypotheses, or conclusions.

Quantitative Reasoning (RQ): Ability to inductively (I) and/or deductively (RG) reason with concepts involving mathematical relations and properties.

Piagetian Reasoning (RP): Ability to demonstrate the acquisition and application (in the form of logical thinking) of cognitive concepts as defined by Piaget's developmental cognitive theory. These concepts include seriation (organizing material into an orderly series that facilitates understanding of relations between events), conservation (awareness that physical quantities do not change in amount when altered in appearance), classification (ability to organize materials that possess similar characteristics into categories), etc.

Speed of Reasoning (RE): Speed or fluency in performing reasoning tasks (e.g., quickness in generating as many possible rules, solutions, etc., to a problem) in a limited time also listed under Gs.

Statement of the Problem

The problem of academic performance among senior secondary students in Katsina is degrading and in Nigeria at large. Academic performance of mathematics which is measured by end of term examination is unbecomingly disappointing, and the education system is shrinking under pressure, one of such problem is the lack the awareness of the abilities which they possess talks more of using those abilities to improve in school such as the cognitive abilities in question and the non-cognitive abilities. Although cognitive abilities are linked to academic indicators of success in school, recent research indicates that the ability to self-regulate has greater influence on student's academic performance than his or her IQ (Duckworth & Seligman 2005). Fluid intelligence as one of the cognitive abilities has great impact on academic performance. It's the intelligence that allows us to be creative and remember things short-term. In our society today we've recently been neglecting it, focusing all our energy on being book smart. But intelligence is far more than being able to read and write creativity and other factors of intelligence.

Otherwise known as fluid reasoning, it is the ability to problem solve without past knowledge influencing your thinking, students in Katsina zonal education quality assurance lack problem solving abilities which is essentially what makes intuitive people wise. However, having more fluid intelligence is actually a tremendous gift, though it is underestimated. It often makes people innovative, creative and exceptional. An abundance of fluid intelligence defines a person who doesn't so much want to perfect what exists to but to break the status quo and create something people don't even know they want yet. In schools Katsina intelligence is determined only through standardized testing, we are conditioning young students to believe that just because they are not proficient at repeating facts and figures, they are not intelligent.

This study therefore, aims at finding out to what extent fluid intelligence can influence academic performance. The study also aims at creating awareness among students and teachers on the need of enhancing fluid intelligence in our senior secondary schools in Katsina.

Objectives of the Study

The objectives of this study are:

1. To find out the relationship between fluid intelligence and academic performance in Mathematics among senior secondary school students in Katsina zonal education quality assurance.

Research Question

1. What is the relationship between fluid intelligence and academic performance in Mathematics among senior secondary school students in Katsina zonal education quality assurance?

Research Hypotheses

The following hypotheses guided the study:

Ho1. There is no significance relationship between fluid intelligence and academic performance in Mathematics among senior secondary school students in Katsina zonal education quality assurance.

Methodology

The study is correlational survey design set to investigate Influence of Fluid Intelligence on academic performance among senior secondary school students in Katsina zonal education quality assurance in mathematics. It involves collection of data through the use of questionnaire in order to test hypothesis or to answer questions concerning the current status of the subject of the study.

The target population of this study covered all senior secondary school two (SS II) students' offering mathematics in Katsina Zonal Education Quality Assurance. The assessible population of the study consists of all SS II students in the public schools. They were selected because they share similar character. The students comprise of both male and female gender from different, religion, culture and socio-economic background.

There are a total number of twenty-five (25) senior secondary located in Katsina Zonal Education Quality Assurance with the population of seventeen thousand three hundred and twenty-eight (17,328) senior secondary school (SS II) students' offering mathematics.

A test is valid when it measures what it intends to measure. However, for the purpose of this research study, the research supervisors checked the instrument, make possible corrections and then give advice on the test to make sure that it suits the study. So also, professionals in the fields of educational psychology

and some lecturers in the Department of Education validated the instrument and found it appropriate for the study.

The test re-test reliability for the Ravens progressive matrices ranged between 0.69 and 0.85 while, Cronbach co-efficient alpha ranged from 0.88 to 0.93 showing from acceptable to good temporal stability and from good to high internal consistency.

Results

There is no significance relationship between fluid intelligence and academic performance in Mathematics among senior secondary school students in Katsina zonal education quality assurance.

Table 1. Result of PPMC on Fluid Intelligence and Academic Performance in Mathematics

Variable	N	Mean	SD	r-value	p-value	decision
Fluid Intelligence	370	20.07	2.919			
				.316	.000	significant (rejected)
Academic performance	370	19.73	3.284			

Table 1 shows the result of a correlation of fluid intelligence and academic performance in Mathematics among senior secondary school students in Katsina Zonal education quality assurance. The result indicates fluid intelligence as Mean=20.07, SD=2.919 and that of Academic performance as Mean=19.73, SD=3.284, r-value=.316 that resulted p-value to .000 which is less than the alpha value 0.05 significant level. The null hypothesis that state there is no significance relationship between fluid intelligence and academic performance in mathematics is therefore rejected. This means that, there is significant influence of Fluid Intelligence on Mathematics Performance among Senior Secondary School Students of Katsina Zonal Education Quality Assurance.

Discussion of the Findings

The finding of this study indicates significant relationship between Fluid Intelligence and Academic Performance among Senior Secondary School Students in Katsina Zonal Education Quality Assurance. This means that fluid intelligence which deals with the capacity to think logically and solve problems may positively affect their performance in mathematics. As many studies showed that broad cognitive abilities (i.e. fluid reasoning, Gc, and processing speed) were important predictors, speaking to the cognitive complexity of mathematics (Taub, Floyd, Keith & McGrew 2008).

Conclusion

This research work concludes that, there is significant influence of fluid intelligence on academic performance among Senior Secondary School Students in Katsina Zonal Education Quality Assurance. Therefore, influence is of positive dimension at which the higher the fluid ability of a student the higher the performance level, and this is of benefit to schools and society at large particularly in mathematics performance among students.

Recommendation

1. Having the findings of this study in mind administrators and teachers should provide an environment which will help students develop their cognitive abilities such as fluid intelligence.

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