EFFECTS OF STUDENTS' ATTITUDE AND SELF-CONCEPT ON ACHIEVEMENT IN SENIOR SECONDARY SCHOOL MATHEMATICS IN OGUN STATE, NIGERIA.

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Abstract

Over the years, researchers have been investigating the factors which determine performance in academic situations. In their search, they have been able to identified two areas: the cognitive domain which includes aptitude, intelligence, memory perception and reasoning. These variables are said to constitute a great part of the predictors of academic achievement. The other area is the non-cognitive domain, which includes variables such as socio-economic status, students’ attitude, personality determinants, peer group influence, self-concept, anxiety, etc. As a result of this, this study investigated the effects of attitude and self-concept on achievement in senior secondary school mathematics in Ogun State, Nigeria. Two thousand four hundred students from 60 selected schools in nine local government areas within Ogun State, Nigeria were involved and three research instruments namely; Attitude to Mathematics Questionnaire; (r = 0.73); Self-Concept Scale; (r = 0.71) and Mathematics Achievement Test; (r = 0.84) were used. Data were analysed using multiple regression at .05 level of significance. The findings show that students’ attitude to mathematics and self-concept have significant joint effect on mathematics achievements.

Key words: Students’ Attitude; Self-Concept; Academic Achievement.

Background to the study

One does not need a fortune teller to tell him/her the importance of mathematics to an individual and his society. Mathematics has been highly rated among other subjects and for that reason, it has been described as the queen of all sciences and servant to all discipline. In spite of all these importance accorded mathematics in the society, there exist low levels of mathematics attainment of students at every segment of the educational system in the country. This has given many educators/stakeholders a high level of concern.

According to Adebayo (1995), among the personality factors that contributes to academic performance are self-concept and attitude. A learner’s attitude relates to all the factors of his education. According to Odufuye (1985), the attitude of a learner towards mathematics will determine the measure of the learner’s attractiveness or repulsiveness to mathematics. This invariably, will influence the learner’s choice and even, achievement in that subject.

Olaosebika (1985) in his study on attitude of students towards mathematics stated that attitudes are related to the achievement and enrolment in the subject. According to him, poor attitude, leads to poor achievement and poor achievement leads to not offering the subject. It follows therefore, that in order to have better students’ performance in mathematics, there is need to motivate them to have positive attitude towards the subject. This is supported by the finding of Adebowale (2000) who said that, students’ lack of interest in mathematics
makes it difficult for teachers to impart pertinent knowledge to them on the subject. Research findings by (Aghenta, 1982; Soyibo, 1985) shown that Nigerian students have negative attitude towards science and for those who have chosen to study science subjects, Medahunsi (1985) and Ezezobor (1986) among others, observe that their performance in mathematics and science has been poor. McBee and Luke (1996); Brodie (2001); Finger and Schlesser (2002); and Williams (2004) find significant relationships between attitude to a subject and achievement in that subject. Akinola (2003), similarly, stresses that attitude has a greater influence on aspects of learning which are emphasised in the classroom. Dulton (2004) concurs that attitudes are related to academic performance when measured on promotion grades.

According to Bandura (1977), attitude is often used in conjunction with motivation to achieve. It is how well people judge themselves to perform a task successfully. Moreover, extensive evidence and documentation were provided for the conclusion that attitude is a key factor in the extent to which people can bring about significant outcomes in their lives. The relationship between attitude and academic achievement is best summed up by Bandura (1977)

“The evidence is relatively consistent in showing that efficacy beliefs (such as attitude) contribute significantly to level of motivation and academic achievement. They predict not only the behavioural changes accompanying different environmental influences but also differences in behaviour between individuals receiving the same environmental influence, and even variation within the same individual in the tasks performed and those shunned or attempted but failed (Bandura, 1977)”.

Aiken (1970) referred to attitude as “a learnt predisposition or tendency on the part of an individual to respond positively or negatively to some object, situation, concept, or another person”. McLeod (1992) added that the positive or negative feeling is of moderate intensity and reasonable stability. Neale (1996) defined attitude towards mathematics as an aggregated measure of “a liking or disliking of Mathematics, a tendency to engage in or avoid Mathematical activities, a belief that one is good or bad at Mathematics; and a belief that Mathematics is useful or useless”.

In a more objective term, attitude may be said to connote response consistency with regards to certain categories of stimuli (Anastasi 1990). He said further that in actual practice, attitude has been most frequently associated with emotionally toned responses (Anastasi 1990). Zimbardo and Leippe (1991) defined attitude as favourable or unfavourable evaluative reasons whether exhibited in beliefs, feelings, or inclinations to act towards something.

According to Myres (1996), attitude is commonly referred to as beliefs and feelings related to a person or event and their resulting behaviour. This means that when individuals have to respond quickly to something, the feeling can guide the way they react. Psychologists like Greenwald, McGhee and Schwarts (2002) agree that knowing people’s attitude is to predict their actions. Attitude involves evaluations. According to them, attitude is an association between an object and our evaluation of it. When this association is strong, the attitude becomes accessible. Encountering the object calls up the associated evaluation towards it. They said further that one acquires attitude in a manner that makes one sometimes potent, sometimes not. For this reason, they concluded that attitudes predict actions if other influences are minimised, if it is specific to the action and it is potent.

In considering the academic achievement of students as being greatly influenced by their attitude towards different subjects, findings revealed that attitude affects achievement either positively or negatively. Greenwald, McGhee and Schwarts (2002) define mathematics attitude as how an individual feels about mathematics. Javis and Pell (2004) contend that when students were taken to a science centre and given exposure to space science, the students’ attitude towards mathematics was positively affected. Babatunde (1982) studied the attitude of students and their academic achievement in biology and found that
there was a positive attitude to biology but weak correlation between attitude and achievement in biology. This indicates that students can have a positive attitude towards a subject and yet not achieve well in it. Jegede (1987) also studied the effects of science related attitude on achievement in high school and found a positive relationship between attitude and cognitive achievement. Dulton (2004), found that high achievers have more positive attitude towards mathematics than the under-achievers. He said further that when students were asked to list their subjects in the order of preference, the achievers gave mathematics a significantly high ranking than their other counterparts. Lawal (1993) also studied the effects of attitude on achievement in high school mathematics and found a positive relationship between attitude and cognitive achievement.

There is considerable evidence to support the contention that attitude beliefs contribute to academic achievement by enhancing the motivation to achieve (Bandura, 1977). Schunk (1989) in a number of studies had shown that children with the same level of intellectual capability differ in their performance as a function of their level of attitude. Enemark and Wise (1981) demonstrated that the attitudinal variables were significant indicators of mathematics achievement, and few of the attitudinal variables also showed strong relationship with mathematics achievement even after background and academic orientation variables were controlled. Steinkamp (1982) concluded that primary among the variables that determine achievement in mathematics is attitude to it. These conclusions represented the view of a strong relationship between achievement and attitude.

Cheung (1988) prepared a study to examine the relationship between mathematics achievement and attitude towards mathematics in junior secondary schools in Hong Kong and found that the correlation between attitude and mathematics achievement were positive. It showed that the more positive the students’ attitude towards mathematics, the higher the achievement. These conclusions represent the view of a strong relationship between attitude towards mathematics and achievement in it, with correlations above 0.40, as supported by a number of researchers (Kloosterman, 1991; Minato, 1983, Minato & Yanase, 1984; Randhawa & Beamer, 1992). Still, other findings show that although the attitude towards mathematics and achievement in its relationship is statistically significant; it is not very strong from a practical perspective, with correlations ranging from 0.20 to 0.40 in absolute value (Aiken, 1971; Jacobs, 1974; Quinn, 1978). The work of Tuckman (1999) compared the task performance of students at high, intermediate, and low levels of attitude with regards to the task. The results reflect a clear relationship between attitude beliefs and academic productivity.

Attitude contributes substantially to the difficulties encountered by students in learning and understanding of mathematics. A learner’s attitude relates to all the facets of his or her education. According to Ellis (1996), the attitude of a learner towards science or mathematics will determine his attractiveness or repulsiveness to science or mathematics. This, invariably, will influence the learner’s achievement in that subject. He concluded that the attitude of students towards science subjects is related to the achievement in science.

In both theory and practice, a strong relationship between attitude towards mathematics and achievement in it has long been assumed. As illustrated by Suydam and Weaver (1975), teachers and other mathematics educators generally believe that children learn more effectively when they are interested in what they learn and that they will achieve better in mathematics if they like it. Therefore, continual attention should be directed towards creating, developing, maintaining and reinforcing positive attitudes. Robinson (1975) concluded that achievement in mathematics accounts for, at best, 15% of the variance in attitude towards mathematics, indicating that the relationship has useful implications for educational practice.

Katz (1998), points out that favourable attitudes are developed towards objects which facilitate the attainment of individual needs. According to him,
the achievement of a child in science may eventually determine the attitude he/she develops towards the subject. The proposition, therefore, is that a child who is achieving highly in science, no matter how bad the laboratory, teacher, method and other factors are, will still be favourably disposed towards the subject. If, on the other hand, all the other factors mentioned above are adequately taken care of, and the achievement is low, such a student owing to this (low achievement) may dislike the subject. Studies like those of (Okpala and Onocha, 1985; Yoloye 1994) show that there are relationships between attitude towards science and achievement in science. They found also that parents who show more interest in their child’s studies often get involved in their child’s homework and the child often performs better in the subject.

The study of self-concept has awakened growing interest in psychological research in recent years. According to Clark (2000), self-concept is considered to comprise various dimensions, areas or facets of academic and non-academic components. Academic self-concept is then divided into self-concept in particular subject areas (Mathematics, English, and so on) while non-academic is divided into social, emotional, and physical self-concepts. Marsh (2000) later tests the academic self-concept portion of the Shavelson, Hubner and Stanton (1976) model and concludes that the model is supported when it is limited to self-concepts in academic core subjects such as English and Mathematics.

Self-concept, according to Hamachek (1981) quoted by Machargo (2004), “is the set of perceptions or reference points that the subject has about himself/herself; the set of characteristics, attributes, qualities and deficiencies, capacities and limits, values and relationships that the person knows to be descriptive of himself/herself, and which he/she perceives as data concerning his/her identity”. He explains further that it is a set of knowledge and attitudes that we have about ourselves; the perceptions that the individual assigns to himself/herself and characteristics or attributes that we use to describe ourselves. It is understood to be fundamentally a descriptive assessment and has a cognitive nuance.

The importance of self-concept stems from its notable contribution to personality formations. Self-concept has to do with social competence since it influences how a person feels, how he or she thinks, learns, values himself or herself, relates to others, and ultimately, how he or she behaves (Clemes and Bean, 1996; Clark, Clemes and Bean; 2000). Byrne (1984) notes that much of the interest in the relationship between self-concept and achievement stems from the belief that academic self-concept have motivational properties such that changes in academic self-concept will lead to changes in subsequent academic achievement. Marsh (2000) submits that in reality, the relationship between self-concept and academic achievement is likely to be reciprocal, that is prior academic achievement affects subsequent academic self-concept and prior academic self-concept also affects academic achievement. It follows therefore, that if an individual has a negative attitude towards a particular subject, as a result of low self-concept, the individual will have low level of confidence to study and achieve better in the subject. The perception of one self-concept has been found to influence the attitude, learning and performance in a subject.

According to Muller (1998), a positive self-concept in terms of self-esteem and self-acceptance is the foundation for healthy personality development. If a person is balanced psychologically, there are more chances that he would perform better on academic tasks than one who is psychologically, handicapped. Bakare (1987) carried out a study in which he correlated five variables (which include academic self-concept) with academic achievement. He found significant correlation of 0.38 between academic self-concept and achievement. This was supported by the findings of Adedipe (1994), where he found significant positive correlations between self-concept and academic performance of students.

Closely connected with self-concept is self-esteem which is subsumed in self-concept and defined by Lawrence (1998) as what a person feels about the
discrepancy between the way they are and the way they would like to be. Thus, a person whose actual and ideal self are very distanced from each other and who therefore has a negative perception of self is said to have low self-esteem. Research supports a positive relationship between the level of self-concept and academic achievements are Lawrence, 1981; Wooster and Carson, 1982. According to Lawrence (1981), self-esteem enhancement is the improvement of a person’s self-evaluations in particular aspects (eg academic achievement) and is also achieved by extending the range of attributes upon which a person’s self-evaluations are determined.

According to Harter (1998), self-concept is a characteristic way of thinking, feeling and behaving about oneself. It may embrace attitudes, one’s own interest area or opinions that affect the way we deal with different situations. He said further that it is important for students to have a good understanding of themselves and their personality, if they are to make intelligent career plans. What they would like to be is a determining factor in self-concept. According to him, self-concept factors to be considered include their mental abilities, special abilities and interest. Pajares (1997) considered factors of mental abilities to be verbal comprehension, word fluency ability, spatial ability, numerical ability, reasoning ability and memory. He matched careers with abilities in backing up his reasoning and urged students to become familiar with their personality and self-concept in order to guide their career choice. According to him, a developed career plan included evaluation of personality through self-concept, self assessment and communication with others.

According to Wigfield and Eccles (2000), self-concept is shown to be a domain with many pathways. In this domain, there are numerous career clusters as well as career clashers that coincide with abilities. Harter (1998) states that it is helpful to consider the attitudes people hold about themselves when choosing a career. This is because attitude about self-concept have been organised into consistent modes of thinking, feeling and reacting to evaluation of our environment. This was supported by Dekrefflin (2003) found that individual learners who have higher self-concept aim more at success in academics than those with low self-concept. He also found that students with low self-concept maintain a low level of confidence, negative self perception and low level of performance.

Self-concept is also defined as the collection or impressions a student made about his/her appearance. These impressions form the cognition or the understanding in dealing with persons or things. Thus, what makes up the cognitive map or self-concept may not be fully known. Everyone shares some factors or constructs. These constructs are self-concept traits that become valuable when choosing a career. The environments, such as our formal education has played a major role in the formation of constructs. Organisations of personality or self-concept constructs are evidence in three situations. First, the individual sees the factors that could potentially change personality. Second, only certain environmental factors impinge upon the individual. These environmental factors enter into the ideas that the individual has had about themselves. Third, of all the factors that enter into the cognizance, only a few are perceived, and even those may be distorted or altered to fit the requirements needed to fulfill the comfort limits of our reality.

Simon (2000) said that the process choice is affected by experience and purpose. One’s experience is limited by the ability to perceive only what the individual is prepared to perceive. Individual’s purpose also limits his/her ability to perceive. Thus, experience and purpose have been translated to self and situation, or personality and environment. Self-concept determinants include the entire cluster of individual’s biological and psychological attributes, as well as behavioural and physical features with genetic origins. The genetic determinants include sex, physical structures, intellectual and non-intellectual abilities and aptitude. The physical appearances such as height, weight, body proportions, and structure of the face exert influences on others’ reactions toward us and in-turn on our self evaluation.
Marsh (1990) stated that there are “coherent systems of thought and feelings manifested by corresponding pattern of behaviour”. He went on to identify three ego states that individual’s exhibit. The first, called the “parent” ego, is derived from parental figures, figures of authority. The second state, the “adult” ego, appraises the environment objectively on the bases of experience. And third, each individual carries within himself/herself, a little boy or girl who feels, acts, talks and responds just the way he or she did when he/she was of a certain age. This ego state is called the “child”. Individuals always operate in one of the three ego states during any time of the day. Each of the ego states has its importance and people need all three in order to operate as a complete human being.

Significance of the study

In view of the importance accorded mathematics as a subject in the society, this study is an area worthy of academic attention in the course of our struggle to actively participate in the technological growth of the world. It should also be noted that the end of the secondary school is the beginning of identification of potential and how far a student can go in pursuit of his/her academic career. The outcome of this study with respect to the selected variables investigated would therefore be significantly used as a pointer by researchers, since it provides additional empirical data for a better understanding of some of the factors that account for different levels of students’ performance in mathematics. It also adds to the field of research on students’ attitude, self-concept and mathematics achievement. More importantly, this study differs from related studies in that it adds attitude and self-concept to the study of mathematics.

Statement of the problem

Observations and reports from examining bodies revealed that a high percentage of secondary school students continue to perform poorly in mathematics examinations. This poor performance continues to generate much concern among parents, teachers, students and other stakeholders in the education business. The failure is likely to be caused by some factors such as age of the mother at birth of the child, parents’ education, occupation and support, number of children in the family, academic motivation, self-concept or students’ attitude. As a result of these factors, this study sought to investigate the extent to which students’ attitude and self-concept determine the mathematics achievement of secondary school students in Ogun State, Nigeria. The study also sought to find the effects of these variables on students’ cognitive achievement in mathematics at the senior secondary school level.

Research hypothesis

There is no significant joint and relative effect of students’ attitude and self-concept on achievement in senior secondary school Mathematics in Ogun State, Nigeria.

Methodology

Research design

The study is a non-experimental type and an ex-post facto research design was adopted.

Population and sample sizes

The target population for this study comprised all the senior secondary school one students (SSS 1) in Ogun State. The sample of the study was selected using the multi-stage sampling procedure. At the first stage, nine local government areas were purposively selected from twenty local government areas in Ogun State. At the second stage, the stratified random sampling technique was used to select a total of 60 senior secondary schools from 147 senior secondary schools in the 9 LGAs selected in Ogun State, Nigeria and this represented a total of 40 per cent of the entire schools in the nine local government areas selected. At the third stage, simple random sampling technique was employed to select a total of 40 SS1 comprising male and female students from each of the participating schools. Altogether, a total of nine local government areas, 60 schools and 2,400 students were involved in the study.
**Instrumentation**

In order to collect data and provide answers to the research hypothesis, the following research instruments were developed and employed by the researchers in gathering data:

1. **Attitude Towards Mathematics Questionnaire (ATMQ)**
2. **Self-Concept Scale (SCS)**
3. **Students’ Mathematics Achievement Test (SMAT)**

**Validity of the instruments:**

For the purpose of this study, both the face and content validity of the instruments were ensured. To ensure validity of the instruments, the initial drafts of the instruments were scrutinised by four experts in questionnaire and content construction who were required to check for all non-technical flaws in the instruments. Such inputs enhanced a thorough validation in order to ensure that the instruments actually measured what they were intended to measure in relation to the research hypothesis. Based on the suggestions and comments of these experts, the necessary corrections were made and the final version of the instruments was trial tested on a sample of 50 students who were not part of the real study sample, in Ijebu-Ode LGA of Ogun State, Nigeria. The data collected showed that the students did not have problems responding to the items in the questionnaire.

**Reliability of the instruments:**

In computing the reliability of this research instruments, Cronbach’s alpha ($\alpha$) was utilised in estimating the reliability coefficient. The scores for each item were encoded in SPSS software. The Cronbach alpha reliability of the instruments was established as $\text{ATMQ} = 0.73$ and $\text{SCS} = 0.71$ while the reliability of the test was estimated as 0.84. The construct, content and criterion related validities were found to be adequate.

**Data collection and analysis procedure**

The necessary data for this study were obtained from students of the selected schools in the selected local government areas. After collection of data, questionnaire responses without corresponding responses to achievement tests were discarded. The idea was to have complete sets of the students’ related instruments. 2,400 copies of the questionnaire were distributed to the selected students in the 60 schools in the 9 local government areas and a total of 1951 questionnaire, fully responded to, were utilized and data collection lasted for 28 working days. Data were analysed using multiple regression at .05 level of significance.

**Results and findings**

$H_0$: There is no significant joint and relative effect of students’ attitude and self-concept on achievement in senior secondary school Mathematics in Ogun State, Nigeria.

From the table, the R-value (0.16) has an adjusted R$^2$ (0.02) which indicates that 2.0% of the variance in mathematics achievement is jointly accounted for by students’ attitude to mathematics and their self concept. The F-value (7.68) which is significant at 0.05 ($p < 0.05$) shows that students’ attitude to mathematics and self concept have significant joint effect on mathematics achievements. The beta values 0.45 for attitude and 0.01 for self concept indicates that attitude predicts mathematics achievement better than self concept. Both attitude and self concept have positive effect on mathematics achievement, while attitude has significant relative effect on mathematics achievement, self concept does not.

**References**


