

The Effect of Gender, Self Concept, Socioeconomic Status of Parents and Type of School on Students General Academic Achievement & Students Achievement in Biology: A Case Study of Senior Secondary School Students in the Calabar Municipality, Nigeria

Ekwale Emilia Ada

PhD Research Student, Faculty of Education, University Of Buea, Cameroon

ABSTRACT

The purpose of this study was to determine the effect of gender, self concept, socio economic status of parents and type of school on academic achievement of students in biology in the Calabar municipality.

280 Senior Secondary School II (SSS II) students offering biology in their various schools were randomly selected from ten out of the fifteen schools in the Calabar municipality. Six out of the ten schools were coeducational schools, two were boy's schools and the other two were girl's schools.

Eight research questions were formulated to guide the study. The following hypotheses were tested:

1. There is no significant difference in the academic achievement of biology between male students and female students.
2. There is no significant relationship between students' academic achievement in biology and students' self concept.
3. There is no significant difference in the academic achievement in biology of students in co-educational schools and those in single sex schools.
4. There is no significant difference in the academic achievement in biology between students from high socio-economic background and those from low socioeconomic background.
5. There is no significant difference between the general academic achievement of male students and that of female students.
6. There is no significant relationship between students' general academic achievement and self concept.
7. There is no significant difference in the general academic achievement of students in coeducational schools and those in single sex schools.
8. There is no significant difference in the general academic achievement between students from high socio-economic background and those from low socioeconomic background.

The instrument used to collect data for academic achievement in biology was the SSS II second term examination scores in biology. The instrument used to collect data for general academic achievement was the SSS II second term examination average scores for all subjects.

A questionnaire was constructed by the researcher which contained two sections. Section A and B. Section A contained students' personal data including gender, parents' socioeconomic background (high and low socioeconomic background) and type of school (co-educational or single sex school). Section B contained questions which purport to measure social, academic and emotional self concept. Fifteen out of the forty questions measured academic self concept, fifteen measured emotional self concept and ten measured social self concept. Twenty of the questions were positively framed while the other twenty were negatively framed.

The independent t-test was used as the test statistics for hypotheses 1, 3, 4, 5, 7 and 8 and the Pearson Product Moment Correlation was used as the test statistic for hypotheses 2 and 6. For hypothesis one, the calculated t value of 0.78 was almost the same with the critical value of 0.92 at 0.05 levels of significance. For hypothesis two, the calculated r value of 2.780 was almost the same with the critical value of 2.820 at 0.05 levels of significance and a calculated r value of 2.780 and a critical value of 2.756 at 0.01 alpha levels of significance. For hypothesis three, the calculated t-value of 5.88 was higher than the critical value of 1.960 at 0.05 levels of significance. For hypothesis 4, the calculated t value of 5.32 was higher than the critical t-value of 1.56 at 0.05 alpha levels of significance. For hypothesis 5, the calculated t-test value of 5.34 was higher than the critical value of 1.96 at the alpha levels of significance of 0.05. For hypothesis 6, the calculated r-value of 1.960 was higher than the critical value of 1.630 at 0.05 alpha levels of significance. For hypothesis 7, the calculated t-value of 1.96 was higher than the critical value of 1.63 at 0.05 alpha levels of significance. For hypothesis 8, the calculated t-value of 2.36 was higher than the critical value of 1.63 at 0.05 alpha levels of significance.

KEYWORDS: Gender, Self Concept., Socio-economic status of parents, Type of school, Students, Achievement in biology, Senior Secondary School, Calabar, Municipality

INTRODUCTION

The standards of Education are deteriorating in such a way that, the products of our schools cannot meet up with the demands of the society Cubberley (1935); Santrock (2004). Biology is one of the science subjects which is very important in the well being of a nation since without knowledge in biology, individuals aspiring to be medical doctors, radiographers, human anatomists, human physiologists, biochemists, gynaecologists, ophthalmologists, surgeons, entomologists, parasitologists, environmental scientists and others cannot succeed.

In developing countries, science and technology are essential for economic and technological advancement and as such, much attention is given to the teaching, learning and achievement in science subjects such as biology, chemistry, mathematics and physics (Salifou, 1983).

In our schools today, many factors affect academic achievement in different school subjects including biology. Some of these factors are gender, self concept, type of school, socioeconomic background of parents, attitude of teachers, the lack of well equipped laboratories, , motivation of students, early withdrawal from school and by the production of students who are unfit for employment. Thus an educational and instructional programme which exercises a great influence on the quality of education is of great importance (Ikpaye, 1987). Obasi (1981) found out that the enrollment of girls is more in arts subjects and boys in sciences subjects and that the performance of girls was high the arts subjects and boys in the science subjects.

Hilton & Berglunds (1974); Carey (1958); Denga (1988); Hughes & Hughes (1959); Dale (1974); Blackstone (1976); Baja (1979); Anastasi (1958); Akintunde (1978); Oduche (1982); Oleforuh (1991); and Essien (1990), posit that boys have higher academic achievement in science subjects such as biology, chemistry, mathematics and physics than girls and that girls achieve higher in languages and arts subjects. Some researchers are of the view that girls achieve higher in the science subjects just like boys Ogbada, (1980); Smith (1982); Wuzencraft, (1963); Powel (1971); Rowland (1976) and Okeke (1975).

Self concept is one of the factors that can affect academic achievement as found out by Combs (1965); Purkey (1970); Uche (1990); Rosenbert & Simmons (1973); Lewis (1982); Asagwara (1987); Isangedighi (1986); and Odok (1990). However, some researchers argue that there is no significant relationship between self concept and academic achievement. Among them are Chickerings (1958); Callaham (1977); Evans (1972) and Jacob (1969).

One of the factors that affect academic achievement is socioeconomic status of students' parents. A number of researchers are of the opinion that, the socioeconomic status of parents affect academic achievement, among them are Child (1977); Lomax (1979); Okon & Anderson (1982); Farrant (1964); Brembeck (1971) and Douglas (1964).

One of the factors which contribute to the falling standards of education is the school environment. For the products of schools to be able to meet up with the demands of the society, the school environment has to be healthy. Green et al (1980); Simmons (1991) and Ayorinde (1987); Fenzel et al (1991); Miron, Nelson & Risley (2004) posit that, the school

environment has a paramount influence on the academic achievement of students.

BACKGROUND

The standards of education in Nigeria and other developing countries have been on the decline in recent years. The percentage of student who pass G.C.E, W.A.E.C and S.S.C.E is very discouraging. Ike (1979) noted that 50% of the Nigerian candidates who sat for the school certificate examination in 1976 failed which revealed that, there is low achievement among students in secondary schools. Due to low achievement, most students can no more stay in school, and therefore become dropouts and the dropout rates are higher in females than in males, Edem, (1989); Taiwo, (1980). Students achievement in biology in Nigerian secondary schools is on the decline as evident in the biology score of senior secondary school certificate examination (S.S.C.E) in Calabar Municipality in particular and Nigeria as a whole. Only a few of the students who offer the subjects make the required level of credits. Umoren (1988) observed that out of a total of 299,033 candidates who sat for biology examination in 1984, only 91,725 passed and those qualified for university admission were only 10.6 percent. In 1985, a total of 250,476 candidates wrote the examination and 12,526 passed with only 1.64% qualified for university admission.

Mass failure is always registered in biology and other science subjects and not in the arts. This is why remedial programmes in all Nigeria universities are structured for the sciences. Yet some students are not even qualified to be admitted into the remedial programmes. With the decline in the academic achievement of biology and others sciences subjects, technicians, pharmacists, medical doctors, psychologist, anatomist, radiographers etc cannot be trained to meet the technological demands of a developing nation like Nigeria. This problem of low academic achievement in biology has generated much controversy among teachers, others educators, parents and the Federal Government. Parents shift the blame to teachers and government, teachers shift the blame to parents while the the government shift the blame to teachers.

Among the factors that affect academic achievement in biology are gender differences, self concept, socio-economic status of parents and type of school. This research work is based on these factors.

PROBLEM STATEMENT

The standards of education in Nigeria are on the decline. The level of students' achievement in biology and other science subjects is low. Ike (1979) found out in a study that Nigerian candidates who sat for the school certificate examination in 1976 had a low percentage pass. This is evident that, there is low achievement in secondary schools. Students' achievement in biology in Nigerian secondary schools is on the decline as evident in the biology scores of Senior Secondary School Certificate Examination (S.S.C.E). Umoren (1988), observed that, out of a total of 299,033 candidates who sat for the biology examination in 1984, only 91,725 passed and those qualified for university admission were only 10.6%. In 1985, a total of 250,476 candidates wrote biology examination in S.S.C.E and 12,520 passed with only 1.64% qualified for university admission. There is therefore a pertinent problem of academic achievement in biology in particular and the other sciences subjects.

THEORIES

Bloom's theory of Mastery Learning

Benjamin Bloom stated that, the basic task in education is to find strategies which will take individual differences into consideration but which will do so in such a way as to promote the fullest development of the individual. The two main ideas of mastery learning are time and quality instruction which enables learning for all kinds of learners. Benjamin Bloom coined the term "Learning for Mastery" and then later "Mastery Learning" in 1968 and 1971 to describe an educational method in which each student stays with a certain unit of learning material in a process of assessing and correcting until the objectives of that unit are mastered before moving on to the next unit. This remains among the most intuitive and effective teaching methods today. As nation-wide education reform focuses increasingly on setting standards and testing, there is an urgent need to bring students who are slow in learning up to the steps of high achievement and performance. Allowing students the opportunity to achieve mastery of content at different time intervals has proven to be an effective method of increasing student learning. According to Bloom, the normal curve with a few students learning very well, some learning well, many learning averagely, some learning less well, some learning poorly and a few learning very poorly, is what we might expect to occur without the intervention of instruction. It is what will occur if the students were totally left on their own with aptitude and perseverance being the only factors influencing learning. However, instruction should support or scaffold learners at points where their aptitudes and attitudes might impede learning. This theory is related to this work in that, learners have to be scaffolded by the teacher above their natural aptitudes and attitudes in order for them to gain mastery in the learning and therefore be able to show high levels of academic achievement

Social Learning Theory by Bandura (1977)

Bandura (1965, 1977, and 2000) is considered the leading proponent of this theory. According to his theory, behaviour is learned from the environment through the process of observation. Albert Bandura's Social Learning Theory posits that people learn from one another, via observation, imitation, and modelling within a social context. Among others, Observational learning, also called social learning theory, occurs when an observer's behaviour changes after viewing the behaviour of a model. For observation to appropriately take place there must be attention (captivating the interest of the learner), retention (understanding), reproduction (imitating the behaviour or activity) and motivation (encouragement which increases perpetuation of such behaviours). The Cognitive Apprenticeship Theory by Collins et al, (1987), is a theory that attempts to bring tacit processes (processes within a person) out in the open. It assumes that people learn from one another through observation, imitation and modelling. It is similar to Bandura's social learning theory.

These two theories are related to this work in that biology involves practical activities in which the learners have to observe the teacher keenly in order to be able to reproduce the activities conducted by the teacher. It is only in this way that the learners can learn well and be able to achieve high academically.

Piaget's Theory of Cognitive Development

Jean Piaget was a cognitive constructivist who lived between 1896 to 1980. He conducted a series of experiments on

children's ways of thinking and concluded that human beings go through several distinct stages of cognitive development. He discovered a stage cognitive development: the sensorimotor stage (from 0 to 2 years); the preoperational stage (2 to 7 years); the concrete operational stage (7 to 11 years) and the formal operational stage (11 years and above). The formal operational stage occurs during adolescence in which the child is able to comprehend highly abstract concepts. Piaget also opined that, accommodation and assimilation are processes responsible for how children use and adapt their schemas.

This is relevant to this study in that, students who can incorporate new knowledge into existing knowledge and are not conservatives but can adjust to new information will understand lessons better and can achieve highly academically. Senior Secondary School children are at the formal operational stage and are able to comprehend highly abstract concepts, manipulate materials and equipment during practical activities and can apply knowledge gained conveniently. Nevertheless,

Social Constructivist Theory by Vygotsky

Vygotsky was a social constructivist. He theorised that, the most important tool that shapes cognitive functioning is language (Robbins, 2001). His theory also emphasize that knowledge is situated and collaborative (Bearison and Dorval, 2002) and Maynard (2001). That is knowledge is distributed among people and environments which include objects, artefacts, tools, books and the communities in which people live. This shows that knowledge can best be advanced or students understand better through interaction with others in cooperative activities. One of Vygotsky's ideas was the concept of the Zone of Proximal Development (ZPD) which is the range of tasks that are too difficult for children to master alone but can be adequately learnt with the guidance and assistance of a teacher, adults or more skilled children. The lower limit of the ZPD is the level of problem solving reached by the child when he/she is working independently while the upper limit is the level of additional responsibility the child can accept with the assistance of a good instructor and probably quality instruction. Hasse (2001) found out that, social interactions during instruction between the learners and the instructor and between the learners and other learners helps in developing children's cognition. According to this researcher, social interactions might go further to develop the child's affective domain as the child sees his/her instructor and peers behave and the psychomotor domain as he/she sees the instructor and the peers manipulate objects such as materials and equipment.

This theory is relevant to this work in that, as students learn in groups during class activities and during practical activities; they easily learn psychomotor skills, language skills and social skills and can achieve high academically. This theory is also related to this work in that, instruction has to be of quality in order to target the upper limit of the ZPD (Zone of Proximal Development) and produce profound learning in the cognitive, affective and psychomotor domains without which learners cannot develop higher order skills such as critical thinking, problem solving and creativity which lead to high academic achievement.

Atkinson and Shiffrin's (1968) Theory of Memory

The modal model of Memory is an explanation of how memory processes work. The three-part multi-store model was first described by Atkinson and Shiffrin in 1968, though

the idea of distinct memory stores was by no means a new idea at the time. William James described a distinction between primary and secondary memory in 1890, where primary memory consisted of thoughts held for a short time in consciousness and secondary memory consisted of a permanent, unconscious store. Atkinson and Shiffrin included a sensory register alongside the previously theorized primary and secondary memory, as well as a variety of control processes which regulate the transfer of memory. The sensory memory is made up of iconic memory which deals with the field of vision and the echoic memory refers to information that is registered by the auditory system.

This theory is relevant to this work in that, when students learn, and the material learnt is repeated (rehearsed) as can be seen in the same class or the material is taught in a complex way in a higher class or level of education, the material which is learnt will be sent to the long term memory where retrieval is easy. It is only at this point that the material which is learnt can be exploited well in examinations and permit high academic achievement.

Bloom et al (1956) Taxonomy of Educational Objectives

Work on the cognitive domain was completed in the 1950s and is commonly referred to as Bloom's Taxonomy of the Cognitive Domain (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). Others have developed taxonomies for the affective and the psychomotor domains. The major idea of the taxonomy is that what educators want students to know (encompassed in statements of educational objectives) can be arranged in a hierarchy from less to more complex. The levels are understood to be successive, so that one level must be mastered before the next level can be reached. The original levels by Bloom et al. (1956) were ordered as follows: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

Anderson and Krathwohl (2001) and Krathwohl (2002) revised Bloom's taxonomy to fit the more outcome-focused modern education objectives, including switching the names of the levels from nouns to active verbs, and reversing the order of the highest two levels. The lowest-order level (Knowledge) became **Remembering**, in which the student is asked to recall or remember information. Comprehension became **Understanding**, in which the student would explain or describe concepts. Application became **Applying**, or using the information in some new way, such as choosing, writing, or interpreting. Analysis was revised to become **Analyzing**, requiring the student to differentiate between different components or relationships, demonstrating the ability to compare and contrast. These four levels remain the same as Bloom et al.'s (1956) original hierarchy. In general, research over the last 40 years has confirmed these levels as a hierarchy (Anderson & Krathwohl, 2001). In addition to revising the taxonomy, Anderson and Krathwohl (2001), added a conceptualization of knowledge dimensions within which these processing levels are used (factual, conceptual, procedural, and metacognition).

The two highest, most complex levels of Synthesis and Evaluation were reversed in the revised model, and were renamed Evaluating and Creating (Anderson & Krathwohl, 2001). Both depend on analysis as a foundational process. However, synthesis or creating

requires rearranging the parts in a new, original way whereas evaluation or evaluating requires a comparison to a standard with a judgment as to good, better or best. This is similar to the distinction between creative thinking and critical thinking. Both are valuable while neither is superior. In fact, when either is omitted during the problem solving process, effectiveness declines (Huitt, 1992).

In any case it is clear that students can "know" about a topic or subject in different ways and at different levels. While most teacher-made tests still test at the lower levels of the taxonomy, research has shown that students remember more when they have learned to handle the topic at the higher levels of the taxonomy (Garavalia, Hummel, Wiley, & Huitt, 1999). Krathwohl, Bloom, and Masia (1956) also developed taxonomy for the affective domain. There are three taxonomies of the psychomotor domain that have received acceptance (Dave, 1975; Harrow, 1972; Simpson, 1972). Clark (2010) provides an overview of these three taxonomies.

This theory is related to this research work in that, students must be presented with the material at a higher level before the material is well understood in its varieties in order to increase the ability to apply and even create without which academic achievement will be low.

Cognitive Flexibility Theory (Spiro, Feltovitch & Coulson)

Cognitive flexibility theory focuses on the nature of learning in complex and ill-structured domains. Spiro & Jehng (1990, p. 165) state: "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands". "This is a function of both the way knowledge is represented (e.g., along multiple rather than single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)". The theory is largely concerned with transfer of knowledge and skills beyond their initial learning situation.

Spiro, Vispoel, Schmitz, Samarapungavan and Boerger (1987) assert that effective learning is context-dependent, so instruction needs to be very specific. In addition, the theory stresses the importance of constructed knowledge; learners must be given an opportunity to develop their own representations of information in order to properly learn. The theory is especially concerned with the application of knowledge in new situations (knowledge transfer), rather than the mere reproduction of knowledge in the way that it was originally learned. It is argued that knowledge transfer in complex and ill-structured domains is centrally dependent upon "cognitive flexibility." According to the theory, greater flexibility in the representation of domain knowledge will result from approaches that promote highly interconnected rather than neatly compartmentalized or hierarchicalized mental representations. Cognitive flexibility has been more broadly described as the ability to adjust one's thinking from old situations to new situations as well as the ability to overcome responses or thinking that have become habitual and adapt to new situations (Moore, & Malinowski, 2009). According to Deak (2003), if one is able to overcome previously held beliefs or habits (when it is required for new situations), then they would be considered cognitive flexible.

A cognitively flexible learner is one who can readily reorganise and apply knowledge in response to varying situational demands. To attain this flexibility, learners must understand problems in their full complexity

This theory is related to this study in that, when instruction is properly handled, the learners will comprehend the material well and will be able to apply the knowledge in different situations using materials that are available in their context of existence.

Functional Context Theory by T. Sticht (1975 & 1987)

The functional context approach to learning stresses the importance of making learning relevant to the experience of learners and their work context. The learning of new information is facilitated by making it possible for the learner to relate it to knowledge already possessed and transform old knowledge into new knowledge. By using materials that the learner will use after training, transfer of learning from the classroom to the real world will be enhanced. The performance of a task requires knowledge about what one is reading or writing, processing skills for comprehension and communication and display of information to be processed. The principles of this theory are: instruction should be made as meaningful as possible in terms of the learners prior knowledge; materials and equipment that the learner will actually use after training should be used; learning can be improved by improving content knowledge, information processing skills, or the design of the learning materials; valid assessment of learning requires context/ content specific measurement.

This theory is related to this research work in that, as the learners conduct activities with materials found in their context of existence, learning becomes profound and the learners can be able to apply the knowledge adequately and therefore achieve higher.

Bronfenbrenner's Ecological Theory

According to this theory, the inherent qualities of a child and his environment interact to influence how the child develops. Bronfenbrenner stressed the importance of studying a child in the context of multiple environments. According to this theory, the home of the child is a microsystem; the mesosystem involves interactions between the child's home and school, between peer group and family and between family and church; the exosystem is made up of parents' work places, the larger neighbourhood and extended family members; the macrosystem is made up of the child's cultural patterns, values, beliefs, ideas as well as economic and socio-political situations in the society in which the child lives; the chronosystem which includes a change in family structure, address and parent's employment status.

This theory is related to this research work in that, the mesosystem which involves the child's school environment can have a paramount influence on the child's academic achievement. The type of school environment and other factors can cause a child to achieve high or low.

METHODOLOGY

This research work is a quantitative empirical study. Self concept is in a questionnaire which is scored. General academic achievement and achievement in biology are quantified as the second term average scores of all the

subjects of the students and the second term biology scores of the students respectively.

Population and Sample

The study population consists of students from ten secondary schools in Calabar Municipality. There are about 20,000 students in these schools. For the purpose of this study, senior secondary school II (SSS II) students offering biology in the ten selected schools were considered. A total of 280 SSS II students constituted the sample of the study. The SS II students were chosen because they had no external examination to write and therefore had ample time to devote towards answering to the items of the instrument.

Sampling Technique

For the sampling technique, each school was given the opportunity of being selected for the study; a random sampling technique was used. The names of each of the secondary schools in the study area were written on a separate piece of paper and the pieces of papers folded and put in a container. The pieces of paper were thoroughly mixed up and with eyes closed, a child hand-picked a folded piece of paper, one at the time. Names of each of the schools picked were recorded and the pieces of paper put aside. The remaining pieces of paper were mixed up again and the picking continued until ten schools were selected. This technique removed bias in the selection of schools.

In each of the randomly selected schools, a balloting system was conducted to choose the number of students to participate in the study. Altogether, a total of 280 subjects were selected for participation. Of this number, 149 (0.53%) were females while the remaining 131 (0.47%) were males. They came from a variety of backgrounds ranging from poor through fairly well to do and those from wealthy homes.

Instrumentation

For the purpose of gathering relevant information for the study, the SSS II second term examination scores in biology were taken as the students' achievement scores in biology. The students average scores for all the subjects in the second term examination were taken as the students' general academic achievement. The reason for this was that, the researcher knew that the students would consider any achievement test presented to them by the researcher as a mere research tool that had nothing to do with their final scores for promotion to the next class. As such they would not have performed according to their potential abilities. This consideration led to the researcher's use of the second term examination scores in biology and the second term average scores in all the subjects as good indicators of the subjects' achievement in biology and the subjects' general academic achievement respectively.

Also, a questionnaire was constructed for the purpose of the study. It contained two sections. Section A sought for the students' personal data including name, age, gender, socioeconomic background of parents and type of school of the subjects. Section B measured social, academic and emotional dimensions of self concepts. Fifteen out of the forty items in the questionnaire were used to measure academic self concepts, ten for social self-concepts and fifteen for emotional self-concepts. 20 of the 40 items were positively framed while the remaining 20 items were negatively framed. The instruments were duly scrutinized by the research supervisor, a test statistic expert who after

making recommendations for its modification finally authorized its use for the purpose of the research. Appropriate instructions were also provided to guide the responses of the students. The responses were to be made on a six point Likert scale that ranged from very strongly agree through agree to very strongly disagree.

Data collection and procedure

All the schools under study were personally visited by the researcher. After taking permission from the school principal and seeking for the cooperation of the biology teachers in each of the selected schools, the questionnaire was administered to the randomly selected students in SSS II in each of the selected schools.

The purpose of the research was explained to the students by the researcher after which the students responded to the items in the questionnaire. With the help of the biology teachers, the questionnaire was collected from each student.

The students were assured that the information they provided in the questionnaire will not in any way be used against them. The students' scores in their second term biology examination and their average scores in all their subjects for the term were collected from the vice principal for academics in each of the selected schools for the ultimate purpose of analysis.

Scoring of instrument

The questionnaire contained a total of forty items measuring academic, social and emotional self concepts. Respondents were to examine the items and chose between the following response options:

- Very Strongly Agree (VSA)
- Strongly Agree (SA)
- Agree (A)
- Disagree (D)
- Strongly Disagree (SD)
- Very Strongly Disagree (VSD)

The score value for the items in the questionnaire are as follows:

| Nature of Response | Scale Value of Positive Self Concepts | Scale Value of Negative Self Concepts |
|----------------------------|---------------------------------------|---------------------------------------|
| (1) Very strongly agree | 6 | 1 |
| (2) Strongly agree | 5 | 2 |
| (3) Agree | 4 | 3 |
| (4) Disagree | 3 | 4 |
| (5) Strongly disagree | 2 | 5 |
| (6) Very strongly disagree | 1 | 6 |

Data analysis

In preparing the data for analysis, the responses were coded and recorded. Each hypothesis was then tested using the appropriate statistics after identifying the independent and dependant variables in each of the null hypotheses as follows.

Hypothesis 1

There is no significant difference in the academic achievement of biology between male students and female students.

Independent Variable: Gender of students

Dependent Variable: Achievement in biology

Statistical Test: Independent t-test

Hypothesis 2

There is no significant relationship between students' academic achievement in biology and students' self concept.

Independent Variable: Self Concept

Dependent Variable: Achievement in biology

Statistical Test: Pearson Product Moment Correlation

Hypothesis 3

There is no significant difference in the academic achievement in biology of students in co-educational schools and those in single sex schools.

Independent Variable: Type of school (Coeducational schools and Single sex schools)

Dependent Variable: Achievement in biology

Statistical Test: Independent t-test

Hypothesis 4

There is no significant difference in the academic achievement in biology between students from high socio-economic background and those from low socioeconomic background.

Independent Variable: Socioeconomic background of students' parents

Dependent Variable: Achievement in biology

Statistical Test: Independent t-test

Hypothesis 5

There is no significant difference between the general academic achievement of male students and that of female students.

Independent Variable: Gender

Dependent Variable: General Academic Achievement

Statistical Test: Independent t-test

Hypothesis 6

There is no significant relationship between students' general academic achievement and general self concept.

Independent Variable: General self concept.

Dependent Variable: General Academic Achievement

Statistical Test: Pearson Product Moment Correlation

Hypothesis 7

There is no significant difference in the general academic achievement of students in coeducational schools and those in single sex schools.

Independent Variable: Type of school (Coeducational schools or Single sex schools)

Dependent Variable: General Academic Achievement

Statistical Test: Independent t-test

Hypothesis 8

There is no significant difference in the general academic achievement between students from high socio-economic background and those from low socioeconomic background.

Independent Variable: Socioeconomic Background.

Dependent Variable: General Academic Achievement

Statistical Test: Independent t-test

SUMMARY OF FINDINGS

The following results were obtained.

1. There is no significant difference in the academic achievement of biology between male and female students. That is male and female students achieve equally in biology.
2. There is no significant relationship between academic achievement in biology and general self concept. That is students with high and low self concept achieve equally in biology.
3. There is a significant difference in academic achievement of biology by students in co-educational schools and those in single sex schools. Students from co-educational schools achieve higher in biology than those in single sex schools.
4. There is a significant difference in the achievement of biology by students from high socio-economic background and those from a low socioeconomic background. Students from High socio-economic background achieve higher in biology than students from low socio-economic background.
5. There is a significant difference in the general academic achievement of male and female students. Male students achieve higher academically than female students.
6. There is a significant relationship between students' self concepts and students' general academic achievement. That is students with high self concepts achieve higher academically than students with low self concept
7. There is a significant difference in the general academic achievement of students from coeducational schools and those from single sex schools. Students from co-educational schools achieve higher academically than those in single sex schools.
8. There is a significant difference in the general academic achievement of students from high socio-economic background and those from low socioeconomic background. Students from High socio-economic background achieve higher academically than students from low socio-economic background.

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