AN INVESTIGATION OF FACTORS ASSOCIATED WITH SCIENCE INTERESTS OF SECONDARY SCHOOL STUDENTS IN KADUNA STATE OF NIGERIA

BY

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ABSTRACT

An investigation was conducted into secondary school students' science interests in Kaduna State of Nigeria to identify the factors most highly associated with these interests. The sample consisted of 399 students from Forms III and V who were randomly selected from four Secondary Schools. An interest inventory, entitled, "The Activities I like to do" Interest Inventory for Secondary Schools was developed and was used to collect data on the students' science interest.

Other personal information on the students were obtained through a questionnaire. Four hypotheses were tested:

Hypothesis 1:

There is no significant difference between the degree of science interest of the male and female students as measured by the Interest Inventory.

Hypothesis 2:

There is no significant relationship between students' interest in science as measured by the

Interest Inventory and the students' future desired career.

Hypothesis 3:

There is no significant relationship between students' science interest as measured by the Interest Inventory and the students' stated ambition to continue further studies in science.

Hypothesis 4:

There is no significant relationship between students' interest in science as measured by the Interest Inventory and as indicated by their previous examination results and the students' academic achievements in science.

The scores obtained from the Interest Inventory and the ratings on the questionnaires were subjected to the computer analysis using the Statistical Package for the Social Sciences (SPSS) programme and utilizing the one way analysis of variance ant t - test sub programmes, the various hypotheses were tested. Results obtained from the analysis revealed that hypotheses 1, 2, 3 and 4 were rejected for the Form III students while in the case of the Form V students all the hypotheses were

rejected except hypothesis 1 which was accepted (α = 0.05).

The study showed, like many of the previous reported studies that students' science interest was sex dependent but noted that this factor on the students science interest might be nullified or reduced as a result of school science experience which was not indicated in the previous reported studies. Motivation by the science teachers and the parents was found to influence the development of students' science interests.

The study suggested that there was a significant difference in the students' science interest in the two Classes that were studied, thus suggesting that the students' science interest seemed to be affected by the secondary school science programmes to which the students were exposed. In the light of this observation there may be an urgent need for further investigations into the content of our secondary school science programmes and the methods of teaching the subjects by the science teachers in order to identify some of the shortcomings in the science programmes.

It is believed that other advantages might be derived from the Interest Inventory developed for this study. In addition to measuring the students' science interest, it could also be used to identify other students' interest areas in the secondary school subjects, thereby providing useful information about in the trends of the students' interest development.

Furthermore, it is possible that the Interest Inventory developed for this study could be used by the secondary school teachers and administrators while guiding the students to come to some decision concerning the courses they will take in school and the type of careers they intend to enter.

APPROVAL PAGE

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The undersigned certify that they read, and recommend to the Faculty Board of Education for acceptance, a thesis entitled

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DEDICATION

Dedicated to my mother and the memory of my late father, without whose guidance and care my achievement and success in life would have been impossible.

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CHAPTER I

THE PROBLEM

1. 1. Introduction: The development of students' interest in science has long been accepted as an objective for school science teaching by science educators and teachers alike. The term 'interest' has been employed to denote a range of meaning that extends from positive feelings towards science to complete absorption in scientific inquiry. (Hasan 1975).

Research into the interest of students in science may help science educators and teachers to plan their science teaching strategy and tactics to meet students' desires and interests. Such research may also lead to a better teaching - learning environment for the general education of the

citizens. From student interest studies, it may be possible to advise the students about their future careers in the science field when their desires and interests are identified.

While it may not be possible to authoritatively assert the view that the construction of the curriculum in science should be based solely on the conclusions of student interest studies, the finding from the studies can be considered while constructing the science curriculum.

Wright stone, et.al (1956) asserted that 'Interest' is considered to be freely chosen enjoyable activities which basically relate to the individual's needs and drives. It seemed to be true that when pupils are interested in any activity they work longer, harder and more effectively under self-discipline than otherwise. In any learning situation the child carries on activities which helps him internalize his needs, abilities and interests. Any science course which fails to provide the young citizen with a reasonable opportunity to achieve his personal objectives is inadequate. Science teaching and learning are more effective when the learning begins with a problem that arouses the curiousity and

interest of the learner.

The problem of selecting appropriate teaching materials and techniques that will challenge and hold the interest of the students in science education can be facilitated by knowing the factors that are associated with the students interest in the subject.

Pollock (1924) emphasized that teachers should not tie themselves to any particular textbook in mapping out a course of study in general science and that the children's interest list should be used to direct the choice of the different selected readings and references to be used during any course.

Craig (1927) believed that evaluation of objectives on the basis of the children's interest potrayed by the questions they asked would give some index of the extent to which the phenomena involved in each objective were within the experience and interest of the children at the various grade levels; thereby; making it possible for curriculum planning to be tailored in the same direction as the children's interests.

Rotham (1969), Hasan (1975) showed in their studies that students' science interest was sex dependant. The study also showed that there were significant differences between

the preferences of the boys as regards the topics in science they would like to study as compared with the preferences of the girls. Consequently, it would be appropriate to make provision for such differences when the science curriculum is being planned.

1. 2. The Problem

What is the relationship between Selected Variables and the extent of students' science interest in the Kaduna State secondary schools?

The investigation will attempt to answer the following questions.

1 Is there a significant relationship between students' sex and the extent of students' interest in science?

2. Does a significant relationship exist between students' interest in science, the students' stated future career and the ambition to continue further studies in science?

3. What significant relationship exists between students interest in science and school achievement in science?

4. What is the effect of science experience on the students interest in science?

1. 3. Hypotheses tested:

The following null hypotheses were tested during the course of the study.

Hypothesis 1:

There is no significant difference between the degree of science interest of the male and female students as measured by the Interest Inventory.

Hypothesis 2:

There is no significant relationship between students' interest in science as measured by the Interest Inventory and the students' future desired career.

Hypothesis 3:

There is no significant relationship between students' science interest as measured by the Interest Inventory and the students' stated ambition to continue further studies in science.

Hypothesis 4:

There is no significant relationship between students interest in science as measured by the Interest Inventory and

the students academic achievements in science as indicated by their previous examination results..

1. 4. Definition of terms:

Science - a body of knowledge and a process which provides a method of study by which man can develop an understanding of the universe around him through observation, experimentation and classification.

Interest: A tendency to prefer to engage in a particular type of activity. (Thorndike p. 649 1969).

Attitude: Feeling of favourableness and unfavourableness towards some group, institution or proposition (Thorndike p.644 1969).

Triad: an item system containing a set of three alternative or optional statements.

1. 5. Basic assumptions: During the course of the study, the following basic assumptions were made:

1. Student interest can be measured.

2. It was assumed that by their choice of alternative activities, the strength of the individual's tendencies to take part in various kinds of activities can be determined by the number of related activities selected

by the student.

3. It was also assumed that the individual's responses were indicative of the true attitudes toward specific activities.

4. It was also assumed that it may be possible to determine the degree of relationship between students' interests and the academic achievements as well as students' career choices.

1. 6. Significance of the Study: The concern with development of student interest in science stems basically from two major considerations. First, the effects of science on human life and thought have become so great, that those who have no understanding of science cannot be considered properly educated or truly cultured for they are unable to participate fully in the life of their time. Present 'scientific illiteracy' is in part due to a lack of understanding of the basic nature and aims of science.

Secondly, the increasing influence of scientific advancement on the industrial and social life of the country means that science education for the average citizen needs a more timely content so as to be able to cope with the manpower

demands in the technological development. Consequently, our science teaching today should aim at stimulating students interests and eventually direct as many students as possible to choose a career in a science related area.

The findings from the study may be useful as a guide for selecting topics and examples for constructing the science curriculum. Moreover, the discovery of areas of interest in school children may not only furnish teachers with information useful in motivating and selecting children's curricula within a grade level, but also may aid the counselor in assisting his students to come to some decision concerning the courses they will take in school and the occupations they will enter. (Pollock, 1924).

Finally, the findings of this study may provide a good basis for the comparison of Nigerian students' interests with other reported investigations of students interest conducted elsewhere in the world: such as studies from America (Finley, 1911, and the several other studies); Jordan (Hasan, 1975) and Britain (Meyer, 1970). The view points of the students could then be compared to see whether any similarities or differences exist.

1. 7. Scope and Limitation of the Study:

Owing to the limited available time at the investigator's disposal for the project, stratified random sampling was confined to a few schools selected in and around Kaduna and Zaria. The investigation concentrated basically on the students in the third and fifth forms of the secondary schools. It is in the third form of the secondary schools that the students start to prepare for their West African School Certificate Syllabus in science and it is at this stage of their secondary school programme that the students have the option of concentrating on either science subjects (i.e., Biology, Physics, Chemistry etc.) or Arts subjects (i.e., Literature, History, Geography, etc). The students take their West African School Certificate examinations (WASC) in the fifth form. Furthermore, most of the students in the fifth form would have attained the age of seventeen years and their interest decisions are more stable at this stage of their development. Strong (1943) suggested that interest of the students were not stable until the age of seventeen years.

Only the factors of sex, science achievement, the occupations practised by the students' parents, future career proposed by the students and the students ambition to pursue further studies in science were identified.

The study attempted to determine if these factors were associated with the measured science interests of the students in the secondary schools.

It was decided that the study should be conducted in Kaduna State Secondary Schools because of their Central geographical location. Owing to the central location, Kaduna State was very highly industrialized and because of the available industries, many Nigerians from all other parts of the country were attracted to Kaduna State to take up appointments. Two cosmopolitan towns in Kaduna State, Kaduna and Zaria have been popularly attractive because of their academic institutions. Zaria housed Ahmadu Bello University, with over sixteen faculties and a student population of almost 13,000; and other institutions such as the Advanced Teachers' College and a host of other Secondary Schools. Similarly, Kaduna happened to be the State's administrative capital with institutions such as Kaduna Polytechnic, many secondary schools and the Commercial Training Centres. As a result, Kaduna State, particularly Zaria and Kaduna townships, has been inhabited by a broad spectrum of Nigerian ethnic groups such that, any sample taken from such an area for a study might be considered as being representative of the population of the Nigerian Community. On this basis, therefore, it was thought that an investigation conducted and limited to students in the Kaduna State Secondary Schools might be considered as representative of the population

of secondary school students in Nigeria.

The IBM Computer was used in the analysis of data for the study At the present stage of the Ahmadu Bello University's Computer science development the computer was unable to handle 'Verbal information' and this handicap made it imperative that all the data collected had to be coded into numerical form in order to use the Computer for the study's data analysis. During the course of the coding and punching of cards a few errors might have occurred and this might have some adverse effects on some of the results obtained from the study. However, attempts were made as much as possible to scrutinize the cards and to correct any discovered errors.

The pilot study would have been betterly conducted using the actual age group in Form III but time did not allow for this since the secondary schools were on holidays when the inventory and the questionnaires were developed. Some of the activities in the Interest Inventory may not be very familiar with the secondary school students because the face validation was not done using the secondary school students themselves for the pilot study.

A double checking of the examination result's grades reported by the students was not conducted because the researcher assumed that the students' responses were reliable.

CHAPTER II:

REVIEW OF BACKGROUND LITERATURE.

Studies on children's science interests have been conducted all over the world but very little has been reported in this particular field from Nigeria. Hence, the need for science interest investigation is of greater importance in Nigeria. A Nigerian study of science interest may be compared with studies conducted elsewhere in order to identify similarities and differences among students' viewpoints.

It has been generally observed that the earliest interest studies centred upon the young children in the kindergarten classes and in the primary schools. This emphasis may be due in part to the fact that such studies were aimed at developing appropriate teaching materials which could be used to arouse and hold children's interest

in science from the primary grade level onwards.

The present study was concerned with the secondary school level because a study of secondary school students' interest in science might reveal the trends in the students' science interest development and this might highlight the influence of our secondary school science programme on the students' science interest development trends. Since the true experience curriculum is one in which everything is organised around experiences growing but of interests and needs of the students; it is based on the rationale that students learn best that which comes from their own experience. In order to learn to think logically, students must become involved in solving problems that are real to them.

The content of the science curriculum being taught, should provide activities that will satisfy the students interest, needs and aspirations. In order to be able to foster the desired development of science interest among the secondary school students, the science teachers will be concerned, most especially with their students' curiosity, through the type of question they ask, the type of science readings and activities they prefer to do.

There were many reported studies relating to students' interests and the studies were categorised into:

1. Studies relating to the kindergarten and primary schools pupils science interests.
2. Discovering students interest through students' questions.
3. Studies of factors affecting students' interest in science.
4. Studies of students' interest in science and prediction of careers in science.

2. 1. Studies relating to the Kindergarten and Primary Schools pupils science interests:

Most of the earliest studies were conducted in order to identify the different topic areas in the natural world that appealed to the small children. Findings from such studies provided information that could be used to develop the content of the curriculum for the age level. The earliest scholars in the field of students' science interest at the kindergarten and primary school levels were by Finley (1911), Downing (1912), Mau (1912) and Trafton (1913).

Finley (1911) in his second unit of investigation

on pupils science interest attempted to secure data relating to children's interest in three phases of elementary science - plants, animals and physical phenomena. The investigation involved 827 children in grades three to eight in five schools, three of the schools were represented in his first unit of investigation. The plant, the bird, and the pendulum were presented to the classes in varying orders and were each explained and discussed with free class participation for a period of from 8 to 10 minutes. At the end of the exercise, the regular class teachers were given a typewritten set of instructions covering further exercise procedures. The teachers were requested to collect the written responses from the exercises the following day. Each pupil was encouraged to write about only one of the three objects. The topic upon which each pupil wrote was taken to indicate which of the three objects presented was most interesting to that pupil.

As an additional check upon the children's interests, just two weeks after the first exercises had been given, the children in one of the schools were asked to indicate on slips of paper which of the objects previously

demonstrated they would choose to consider, if they might have another discussion of one of the three.

The investigation showed that in 22 out of the 25 classes, the bird was the topic about which most compositions were written by the pupils. More than half of the choices expressed in the check experiment were for the bird showing that the pupils were more interested in animals.

Downing (1912) investigated independently the problem of whether children were more interested in animal, plant or physical material in nature study, and in what phases of these materials the children were most interested. The investigation consisted of questions and observations voluntarily written to St. Nicholas under the departments, "We will ask St. Nicholas about it", and "Because we want to know". Questions and observations were collected from 301 boys and 441 girls with an average age of about 12 years. In all, 295 observations and 447 questions were analysed.

The investigation showed that 61% of the material analysed concerned animal material; 20.6% - plant material; 11.6% - physical material and 1.8% - miscellaneous (largely the enjoyment of beauty and the companionship of

nature); thus showing that the child's major interest was in animals. The investigation further showed that boys wrote more often about plant materials than girls and girls wrote more often regarding physical phenomena than boys. The investigation also indicated that children were more interested in the activities and identifications of the plant animal and physical materials.

Mau (1912) worked independently to determine: (a) the different attitudes children took towards the three phases of nature materials: plant life, animal life and physical nature, as a basis for determining factors of help in the selection of the work for the different grades. (b) the relation of age and sex to the kind of object preferred; the cardinal factors employed in determining the preference and the dominant interests in each phase of the materials in the different grades.

The first unit of Mau's investigation consisted of 1,388 children drawn from four grades: the kindergarten first, second and third grades in nine representative schools in and about Chicago. The children were shown three objects: (1) a pepper plant with many red berries on it, (2) a grey cat and (3) a toy engine about eight

inches long and five inches high with very complete works. The children were then asked to choose one object from the three and to give reasons for their choice. The second unit of the investigation from the same schools and grades consisted of 2,085 children and the materials used were: (1) sensitive plant, (2) a turtle dove in a cage, and (3) two bar-magnets and iron filings. The children were allowed to participate freely in experiments that included feeding the bird, touching the sensitive plant so that its leaves suddenly closed and using the magnet to pick the iron filings.

The general conclusion from Mau's investigation showed that the children's interest in the bird was paramount in all grades: the interest in the cat reached its culmination in grade three; the interest in the plant exceeded that in the cat in grade one; the climax of interest in the engine was in the kindergarten; the order of interest for boys seemed to be animal life, physical material, plant life; and for girls, animal life, plant life and physical material.

Like Downing's study, the investigation further confirmed that the dominant interests in the plant were in

the growth and activities of the plant and its identification. However, interest in identification was relatively slight in kindergarten, steadily increased and exceeded that in the plant activities in grade three. From the point of view of children's questions, animal interests exceeded all others at all ages; there was an increasing interest in animal life with advancing years, and the awakening of new interests was very marked in grade three.

Trafton (1913) investigated children's interest in nature materials in order to test children's knowledge of animals and plants and "to see nature from the child's standpoint". A little less than 1,000 children in the four upper grades: the fourth, fifth, sixth and seventh of the Passaic, New Jersey, public schools participated in the study. The children were given four sets of descriptive questions that were set to provide information concerning the children's knowledge of animals and plants they know.

The study showed that sounds (chiefly birds' songs) appealed more to the girls than the boys and the contrast between the sexes increased with age. The general con-

clusion from Trafton's investigations showed that the children had limited acquaintance with wild plants and animals because the average number of wild animals named was 11; of domestic animals 7; cultivated trees 4; wild trees 6; cultivated flowers 6; wild flowers 3. The study also showed that the children in the lower grades were more interested in different colours and sizes of the objects mentioned more than the children in the higher grades. The breeding habits, modes of locomotion and habitat appealed more to boys in every grade and in general animal activities appealed slightly more to boys than the girls. Therefore, from the standpoint of the children's interest; Trafton felt that the study of living things may be initiated through the learning of different colours and then relating the colours to the colours of the living things so as to arouse the children's interest. The investigation concluded that as the children got to know more about animals, they showed a tendency to be more impressed by the animals' habitats and other activities, a fact which shows that as the children's

experience about the natural materials around them increased, the children's interest in knowing more about their surroundings increased also.

2.2 Discovering Students' Science Interest through Students' Questions.

Students are keen to learn about new things that appeal to their interests; they are curious to learn and discover new phenomena around them. Thus, they ask questions. Their interests, therefore, could be determined by the nature of the different questions asked about natural phenomena. From the several studies found, it appeared that biological content carried more appeal to the students than physical science. These results have reflected the nature study emphasis in the curriculum at that time as well as the natural interests of the children.

Finley (1911) in another study attempted to obtain data on children's interest in animals through the type of questions the children asked.

The subjects of the investigation were 1,716 children in grades one to eight in thirteen schools presenting a wide range in type. Finley presented a live "water dog"

or "mud-puppy" in a glass aquarium to the children in a classroom. In grades three to eight the children in small groups viewed the animal for a three minute period, during which no oral questions or discussion were permitted; they then returned to their seats and, in writing, asked about the animal all the questions they desired to have answered. In the first and second grades the teachers and the experimenter wrote down the questions all of which the children whispered to them. The questions were then classified.

As a check on the experiment, 40 days after they had had the discussion on the animal, the children in the fourth, fifth, sixth, seventh and eighth grades in the University of Chicago Elementary school were requested to write a composition on the animal, making sure that during the 40-day interval no further work had been given on the animal and neither pupils nor teachers knew that the written work was to be called for. No questions or suggestions were permitted and no words were spelt for the pupils.

The phases of interest revealed in the composition showed close agreement with the phases of interest shown

by the questions, confirming that the children's questions were indicative of their interests. In the lower grades little interest was manifested in the kind of food eaten by the animal; in the upper grades, however, much interest was shown in this phase, though with little variation in grades four to eight. Not many questions pertaining to the movements of the animals were asked except in rural schools and one city school. Grades four and five showed most interest in this phase. The interest in the habits of the animal was not great and showed little variation throughout the grades.

Palmer (1923) investigated the scientific interest of children enrolled in rural schools of New York as revealed by their questions.

A request was made on the last pages of Cornell Rural School Leaflet for September 1921, that teachers should send in the nature study questions which had been asked by their pupils. The investigation was based upon the first 500 questions submitted. The analysis of the questions showed that 86% of the questions asked dealt primarily with biology, 5.2% with organic nature, 4.2% with practical agriculture.

3.4 percent with pedagogy and 1.2 percent with miscellaneous items. The most frequently recurring type of questions asked regarding inverteberates, birds, mammals, reptiles, amphibia and fish concerned with habits. The questions asked were related basically to the plants and animals that have every day association with the lives of the children. Questions concerning the habits and activities of plants and animals were most numerous, questions relating to taxonomy, ecology and physiology were considerably more numerous than those relating to any others of the remaining classification of questions.

Pollock (1924) investigated some of the scientific questions of eighth grade children for the purpose of guiding more intelligently the selection of text-books in general science and the choosing of a list of supplementary scientific readings.

The investigation involved every eight grade child in Columbus, Ohio. The children were requested to make a list of five questions in which they were really interested. This request resulted in 3,500 questions being received from children in 13 schools.

The investigation identified 119 interests among the

children. There was considerable overlapping in the children's interests, i.e. there were many interests of girls not expressed by boys and vice-versa. Hence, he suggested that in the science course, as elsewhere, provision should be made as far as practicable, for sex differences. The study emphasized that teachers should not tie themselves to any particular text-book in mapping out a course of study in general science. The children's interest list should be used to direct the choice of the different selected readings and references to be used during any course.

Craig (1927) attempted to revise the contents of nature study being taught at the Horace Mann Elementary School using the children's questions in science as the basis of evaluating the objectives of teaching science to the children. Co-operating teachers were carefully instructed on how to secure the questions in such a way as "to avoid setting up any factors that might in any way influence the children in stating their questions". The children were asked to write down the questions in science and nature study which had interested them most and which they desired to have explained. In the first

and second grades the teachers wrote the questions which the children stated orally. Precautions were taken to prevent the children knowing what questions other children asked. No model questions were given. Out of the questions secured, 4,354 were analysed for vocabulary; every noun was listed and checked in a frequency table. Two teachers of science in addition to the investigator, checked all the questions against the list of objectives. In all, 6,806 questions were secured from 635 boys, and 669 girls distributed through the eight grades in elementary schools in widely scattered cities and rural schools.

The investigation showed that if the questions asked by the children "were a correct random sampling of all children's questions in science, it was evident that in order to meet the questions of the children, the teacher must have at least elementary knowledge covering the fields of astronomy, biology, chemistry, geology and physics."

Craig believed that evaluation of objectives on the basis of the children's interest portrayed by the questions they asked would give some index of the

extent to which the phenomena involved in each objective were within the experience and interest of the children at the various grade levels.

Nettles (1931) investigated the science interest of the junior high school pupils in various topics of general science in order to determine (1) what topics appealed most strongly to the interests of boys and girls and (2) whether there were marked differences in the interests of dull, average and bright pupils. The investigation covered the pupils in the seventh, eighth and nineth grades of the junior high schools of Los Angeles. The pupils were requested through simple questionnaires to list out five things relating to science in which they were really most interested. The pupils were asked to give their grade, age and sex but not their names. Space was also provided for the teachers to indicate whether the class was composed of superior, average or inferior pupils from the standard of mental ability (as judged for the most part from the results of mental tests). Not all pupils were able to express five interests. From the 1,867 papers

returned, (by 155 inferior, 157 average and 219 superior girls; and by 143 inferior, 194 average and 199 superior boys) 178 different scientific interests were tabulated.

The investigation showed that the questions asked by the three groups of pupils: superior, average and dull, revealed few instances of significant differences in the "progressive increase or decrease" of interest with increase of intelligence. The changes were found more often in the case of boys than of girls. The investigation further showed that when the interests of inferior and superior pupils are compared, omitting consideration of the average pupils, the interests of the two groups of girls in astronomy, planets, earth, weather, flowers, chemistry, radio, geology, human body, zoology, birds, and fish showed appreciable differences. The same might be said for moon, earth, sky, weather, biology, chemistry, physics, aviation, telephone, oceans, insects and agriculture in the case of the two groups of boys.

2.3 Studies of Factors Affecting Students Interest in Science.

The curriculum of the time must always reflect the best known ways to foster the development of the students. As the science curriculum is focused upon, so also must children's needs, interests and aspirations be carefully considered. In order to provide adequately for the children's needs, interests and aspirations in science, the influence of factors such as motivation, society's attitude towards science, and effect of participation in scientific extra curricular activities on the development of the students science interest need to be thoroughly investigated.

Fitzpatrick (1936) investigated the factors which influence the responses of pupils in studies of scientific interests as a means of determining the probable reliability of such studies.

The investigation began with the compilation of a list of 100 "terms suggestive of the materials of science at least in one or more of their usages," chosen from Thorndike's list of twenty thousand words. Approximately half the terms pertained to physical, and the

rest of biological science. The terms were then arranged in a column such that they fall into groups under the following 11 categories: anatomy, and physiology, largely of the human body; human diseases; ecology, economic biology, natural history, plants and animals; astronomy; climate and weather; geology, energy, its control and use; and applications of physical science in the home. A second list of terms was prepared each of which "matched" the corresponding item in the first column. In all cases the paired items were either synonymous or were related in their implications. A third column was prepared in which all items were arranged in the form of questions selected to match the items in the first and second lists. A fourth column was likewise prepared consisting of items which incorporated 'salesmanship' terms such as 'dangers','romance', 'value','wonders' and 'mysteries'.

The items in each column were then 'scrambled' and then were allocated to four final forms (designated as Forms I_I, II_I, III_I, and IV_I) by a 'staggering

process such that each contained in each of its four columns 25 items matched by corresponding items from the three other original columns. Four other final forms (designated I_2, II_2, III_2 and IV_2) were prepared in exactly the same way as the first one except that the order of items were reversed. Thus, the corresponding pairs of item - lists (such as Form I_I and Form I_2) were identical, except for the order in which the items occurred..

The forms were administered to six groups as follows: Groups A - composed of 36 graduate students of both sexes in Teachers College, Columbia University, most of whom were majoring in some elective field of science; Group B - composed of 34 College Students of both sexes in New College of Teachers College, Columbia University, who were studing the elective survey science course; and Group C, D, E and F consisted respectively of 37 girls in an electives tenth grade general science class, of 33 girls in seventh - grade general science, and of 30 fifth - grade boys and girls in a course in science - all in the Horace Mann School, New York City.

The four forms of each series were administered to the six groups with an interval of 15 minutes between each form and the next. the students were required to underline at least twenty items that were of interest to them and they would like to study. The experiment was repeated after three months. Conclusions of the investigation were based on the percentages of individuals in each of the six groups who gave consistent responses after 15 minutes and the three months intervals.

The investigation showed that the average individual changed his or her testimony to a marked degree after a three months interval and that the individual differences with regard to change of testimony were striking. The change of testimony was characteristic of the whole groups (classes), ranging in grade placement from the fifth grade to the graduate college.

No material sex difference were evident in the matter of supposed 'interest' or with regards to consistency of testimony. Comparative word difficulty appeared to have been an important conditioning factor at the fifth grade level. Above the seventh grade

level this effect was no longer apparent, except that the more advanced students showed a preference for the more difficult terms. The investigation concluded that the general inconsistency of the testimony makes any conclusion regarding comparative interests at different grade levels or regarding the groups of subject - matter materials as the basis of 'interests' of dubious value.

Bingman (1968) attempted to determine the special aptitudes and interests that science fair participants might develop as a result of taking part in science fairs.

The investigation consisted of five selected senior high schools that were frequently represented in the Montgomery County Science Fairs during the period of 1962 - 1966. The cumulative record cards of the tenth-grade biology students who had participated in the Montgomery County Science Fair were examined. The participants and non-participants were matched on general intelligence and grades earned in biology.

The investigation showed that students that participated in science fairs as a group, generally demonstrated a profile of aptitudes, of reasoning, scientific and computational interests that were considered essential to success in science as indicated by results of related research studies. In addition, the participants demonstrated a significantly greater clerical aptitude and a significantly less preference for artistic activities than the non-participants. It was also found that the profiles of aptitude and interests that were generally considered to be essential to success in science were not sufficient, in themselves, to characterise science fair winners. The winners scored significantly higher than the non-winners only on the clerical speed and accuracy tests.

Rotham (1969) studied the relationships between teachers' backgrounds, personalities and attitudes towards physics and students' learning. The first sample of teachers consisted of 51 teachers selected randomly from a list of about 17,000 Americans physics teachers compiled by the National Science

Teachers Association. A battery of tests was given to the students taught by the teacher sample at the beginning and end of the physics course. Student measures were selected to sample broadly the cognitive and effective domains of learning. This measures were given at the beginning and end of the academic year, and gain scores derived by calculating the differences between post test scores predicted in a regression equation by pre scores and the actual post scores. Mean scores for the students of each teacher were used as the unit of analysis. In the study of personality, the sample consisted of 35 high school physics teachers who agreed to take the personality instruments and their students. This group of teachers was not a sample randomly selected from the national pool.

The study showed that there were statistically significant relationships between teacher's personality and teacher's hetero-sexuality on one hand and students cognitive learning on the other. However, no overall relationships existed between these same teacher variables and students changes in attitudes and interests. Students of teachers with high economic

values and high heterosexual needs gained the most in physics achievement as measured by the personality Aptitude Test (PAT). Whereas the teacher attitudes were not related to student cognitive learning, they were related to changes in students attitudes towards physics. The study indicated that the "teacher effect" could not be attributed to any one factor, but involved the interaction of several different characteristics. It was also demonstrated that using teacher's back ground as the sole predictor of teacher's proficiency and effectiveness was unwaranted.

Meyer (1970) conducted an investigation on the scientific attitudes and interests among fifth form secondary school pupils in England who had experienced at least two years of a Nuffield Science subject since their third form. The sample consisted of 1,226 fifth form pupils, of these 546 pupils were in the Non-Nuffield "control" or traditional" group and 680 in the Nuffield "experiment" group. All the pupils in the experimental group had studied two other science

subjects following conventional syllabuses. All those pupils in the control traditional group were studying all three sciences: Biology, Chemistry and Physics for the Ordinary Level of the General Certification of Education ('O' Level G.C.E.). The two groups were matched as closely as possible. Ages and abilities were made closely equivalent by restricting each group to fifth form students enrolled in two or three science subjects for 'O' level G.C.E. The types and locations of schools were matched quite closely. There were equivalent numbers of grammar, comprehensive, maintained , and public schools from both urban and rural districts in each group. The proportions of sexes in the groups were not exactly equivalent. There were more boys than girls in the experimental group and the sexes were about equally divided in the control group. The selection of a controlgroup (546 pupils from eight schools) was largely predetermined. This was an attempt to reduce the "Hawthorne" effect (i.e. the professional bias and natural enthusiasms of a teacher who had chosen to introduce a Nuffield Science Programme); the "Control" schools were with one exception, selected

from those which had not yet introduced Nuffield Science; but which had volunteered to act as trial schools for new Nuffield courses for the Advanced Level (A - level) sixth form of the G.C.E. As far as possible, therefore, the control and experimental schools were equally matched from the point of view of the attitude of staff to the Nuffield ideal. All the tests used in the studying involved the subjective rating of Likert-type items and were scored by the absolute summation of the ratings.

The pupils in both experimental and control were tested personally by the researcher or his representative after taking considerable care to establish suitable rapport between test administrator and subject. The pupils were assured of anonymity and given a guarantee that no one in their school would see the results from that school. All pupils responded with interest and enthusiasm and appeared willing and anxious to express their opinions. "On spot" checks of validity were made by asking all pupils to write

essays on their attitude and interests and by interviewing selected pupils. All teachers involved were interviewed in depth. This qualitative data gave assurance that the test results were highly valid.

The investigation drew special attention to the differences that existed between attitudes and interests of boys and girls. The differences were consistent with previous research, indicating significantly greater overall scientific orientation among boys than girls. Boys were said to have greater interest, a better attitude to science as a school subject and more ambition to continue further scientific studies. The pattern found of boys being more interested in the content of physics and chemistry and girls in the descriptive subjects (biology, geology and history of science) was expected and was also consistent with previous research. The corollary that girls showed greater interest in non-scientific areas such as literature and fine arts was also reconfirmed. The somewhat unexpected absence of significant differences between boys and girls interest in science as a method of solving problems or in scientific thinking (attitude) was noted in the research.

Out of the three possible ways of solving problem by approach to authority, i.e. by consulting an expert, reading a book or questioning a teacher, only the latter method proved significantly different between boys and girls and it was in favour of girls.

Palmer (1973) attempted to determine the relative consistency and concordance of student science interest responses by utilizing paired and triad stimulus comparision inventories. The main purpose of the study was to investigate an inventory method for determining students ranking of science categories on the basis of interest for use at the interface between the subject matter and the student. The investigation attempted to analyse data utilizing four inventories to determine class levels of consistency within inventory responses and average class concordance between rank orders obtained utilizing different inventories. The sample consisted of 1819 pupils enrolled in the eighth grade classes from the Wisconsin junior high or middle schools excluding the Madison and Milwaukee school districts. The inventories which were in two sets were administered by the respective class teachers

in the selected schools. The completed inventories were returned to the researcher by post.

The study concluded that the use of paired comparisons and triad comparisions inventories to gather stimulus comparision data yielded rankings of selected science categories with class levels of consistency within response sets which did not come from random assignment. The study further showed that there was positive concordance between rankings from corresponding inventories. This study indicated that the inventory method of measuring students' interest provided a greater advantage for gathering data relating to selected sets of students, interests than the manifestations method.

Hasan (1975) conducted an investigation to determine the influence of some selected variables (instruction, student, home and social) on the development of student interest in science. The sample consisted of 340 eleventh - grade science students ranging in age from 16 - 19. The students were randomly selected from four major secondary schools in Jordan. There were 166 boys and 174 girls in the sample. The student

interest in science was measured by a science interest scale consisting of 40 triad statements. The scale measured students' preference for science topics, school science lessons and activities and leisure -time science activities. Other personal information on the students were obtained through a questionnaire. The science interest scale and the questionnaire were administered to students in the selected sample in two settings in 1971 and 1972. The male and female students were each divided into three groups: high, medium and low on the basis of their scores on the science interest scale. The highest and the lowest 27 percent scoring students on the interest scale were studied as students with high and low interest in science respectively.

The investigation showed that some of the variables differentiate significantly between high and low science interest students. Male students with high interest in science as compared with male students with low interest in science seemed to participate in more science activities, had a better image of their capabilities, rated their science teachers as better motivators, had more desire to follow a career in science and had parents who exhibited more desire to see them follow a career in

science.

Female students with high interest in science as compared with female students with low interest in science seemed to have parents who exhibited more desire to see them follow a science career, better perception of science and scientists as socially desirable, possessed a better image of their science capabilities and had more desire to follow a career in science. The investigation claimed that the interests of students in science was sex dependent and that female interest in science seemed to be influenced more by the social desirability.

2.4 Students Interest in Science and Prediction of Careers IN Science

Science instructors should acquaint students with career possibilities in technical fields and in science teaching. A continued effort should be made to identify and motivate those who develop special interest in science. Special opportunities should be given for some direct experience of a professional nature and for a perspective of the fields of science.

Neujahr et. al. (1970) used the Columbia University Science Honours Programme (SHP) which was developed in

1958 to study and to formulate a picture of what happened to the Science Honours Programme graduates. The Columbia University Science Honours Programme was supported by private foundations and was designed to provide an enriched science and mathematics course to talented high school students from the greater New York metropolitan area. The major goal of the programme was to challenge the exceptionally bright student who had an interest in science. A secondary goal of the programme was to develop a more valid procedure for identifying the talented. The study consisted of all students enrolled in the Science Honours Programme from 1958 to 1966. Questions were asked about the college attended, major subject and current employment. Only the data for students graduating from high school in 1960 and 1961 were used. The first graduating class was not considered because the admission and questionnaire data on them were limited. Students graduating from high school after 1961 were not considered because they did not have sufficient time to establish themselves in graduate school at the time the questionnaire was sent out in 1967. In 1960,

170 Science Honours Programme students graduated from high school. Of these, 93 returned the questionnaire. Of 186 graduates in 1961, 101 returned the questionnaire. Thus, there was an overall response rate of 54.5 percent. The returned questionnaires were divided according to whether the student had done graduate work in a field which was (1) emphasized in the Science Honours Programme or (2) directly related to such a field. Students were said to have done graduate work in science if they had done graduate work in medicine, mathematics, psychology or the natural sciences. Graduate work in science was established as a criterion because the primary goal of the Science Honours Programme was to stimulate students with potential to make a creative contribution to science.

The study concluded that in a group of talented high school students, expressing a serious interest in science, differences were found in test results and responses to questionnaires between those who later went on to graduate work in science and those who did not. Students who went on to graduate work in science were likely to have higher mathematics test scores,

devoted to eac field. Both Pollock (1924) and Nettles (1931) asked students to list five expressions of interest relating to science and then categorized the responses. Pollock used nouns relating to science from the students as his categories and reported the number of times each noun was used. Nettles picked categories which he thought grouped the statements, listing the categories under broader headings. The use of expressions as a means of measuring students' interest, however, has the advantage that responses are phrased by the student, but carries with it the problem of investigator's interpretation.

Studies such as those conducted by Fitzpatrick (1936) showed that students' science interest could also be manifested by the students' responses to structured questionnaires. Through his study, Fitzpatrick requested that students from different grade levels should underline at least twenty items that interest them and they would like to study from a supplied list of items. An advantage of the use of manifestation of interest is that a student actually demonstrates interest by his actions. This

advantage on the other hand, involved a disadvantage in that the investigator must infer that certain actions indicated interest while other actions did not indicate such interest. The validity of a study based on students manifestation of interest therefore was dependent upon the validity of the inferences. In addition, gathering data on students science through manifestation procedures as conducted by Fitzpatrick had the disadvantage of being very time consuming..

On the other hand, the reviewed literature revealed that studies such as conducted by Palmer (1973) and Hasan (1975) showed that inventory methods were available which provided for systematic data - gathering relating to selected sets of interests at a faster rate than from manifestation methods. P investigation attempted to analyse students' science interest data utilizing four inventories to determine class levels of consistency within inventory responses. The study concluded that the students responses showed consistency with class levels within response sets which did not

come from random assignment. Hasan measured the students' science interest by a science interest scale consisting of 40 triad statements similar to the Kuder Preference Inventory. The scale measured students preference for science topics, school science lessons and activities and leisure-time science activities. The study showed that using the inventory methods, the students science interest can be adequately measured since the conclusion showed that the variables Hasan tested in his hypotheses differentiated significantly between high and low science interest students as measured by the interest inventory used in the investigation. Consequently, this present study utilized the interest inventory method to measure the students science interest because the method provided a systematic means of gathering data and also the responses obtained from the students had been found to be consistent for different grade levels (Palmer 1973). The triad statements were used because the item format forced a choice between three alternatives. Essentially, the individual was required to rank the options from most to least preferred. Under these

circumstances, each student must make the same number of selections and the same number of rejections as any other student; thereby, making it possible to identify any existing differences within the group under investigation.

The reviewed literature further showed that students science interest can be influenced by factors such as sex, experience, society's attitude towards science and participation in scientific extra-curricular activities.

As a result of these reported observations from several other studies conducted all the world over, this present study also attempted to investigate the degree of relationship of such factors to the students science interest in the Kaduna State Secondary Schools.

CHAPTER III

PROCEDURE

3. 1. Development of the Interest Inventory

The study was concerned basically with the domain of students' interests in the secondary schools. Thus, emphasis was placed upon determining the students' preferences for different activities; the knowledge of which would contribute immensely in pinpointing the major areas of interests of the students. It was hoped that information would be gained that

would help both the teachers and counselors find solutions to immediate practical problems associated with educational and vocational guidance of the students. In order to be able to guide an individual correctly, attempts should be made to obtain tangible information concerning the individual's preferences. Thus, it would be necessary to ask the individual an array of questions concerning his preferences so that a fairly reasonable inference could be obtained about the individual's areas of interest.

One of the interest inventories used to obtain information about an individual is the Kuder Preference Record (Science Research Associates, 1960). In the Kuder Preference Record, each item forced a choice between three alternatives. Essentially, the individual is required to rank the options from most to least preferred. Under these circumstances, each person must make the same number of selections and the same number of rejections as any other person. Individual deffe- rences in enthusiasm or in the tendency to be affirmative rather than negative are ruled out. Everytime the examinee chooses one interest area, he must reject some other. He cannot be positive toward everything. So each person's record

would show both areas of acceptance and of rejection.

The interest inventory developed for this study was based on the same format as that used in the Kuder Preference Record. In constructing the Interest Inventory, care was taken to identify the activities that were believed to be of greatest interest to secondary school students. Several of those activities were identified by consulting secondary school text-books, examining published journals, and through discussions with students both at the graduate, and under-graduate levels. It would have been much more appropriate to consult the secondary school students directly in order to obtain a first hand knowledge concerning the various activities they would like to do most; but at the time the researcher was developing the interest inventory, most of the secondary school students were either involved in their final end-of-session examinations or had left their schools on holidays. The activities were based on the different subjects offered in secondary schools such as science, arts commerce, and general studies. The extra-curricula activities commonly practised in the schools were also identified and a comprehensive list of the different activities was compiled

under the broad areas of: Scientific, Artistic, Literary, Mechanical, Computational, Musical, Outdoor, Clerical and Persuasive. Fifteen to twenty activities were identified for each of the broad areas.

The different broad areas of activities were then coded as: A, B, C, D, E, F, G, H, and I; each letter corresponding to each of the identified broad areas of classification. The letter codes were then subjected to the computer for the random arrangement of the different areas into a triad system such that no activity appeared twice within a triad. A triad is an item system containing a set of three options or alternatives. e.g. a typical triad or a set of three options might read:

(i) Fix a broken clock

(ii) Keep a set of accounts

(iii) Paint a picture

The blue print from the computer was used to arrange the identified activities into triads to give the 45 triad items of activities countained in the Interest Inventory.

As regards the choice of the vocabulary in the Inventory, care was taken to make sure that the operational phrases in

each triad statements were tailored in such a way that reduced all forms of ambiguity to the minimum e.g.

(i) Write short plays to be dramatized

(ii) Write short musical plays for the orchestra.

(iii) Write short reports on a hunting expedition.

An indirect approach was used to validate the level and clarity of the vocabulary. The researcher employed the assistance of other graduate students to read the different statements in the triad and then to identify the different activities that were depicted by the statements. As an example, a statement like "fix a broken clock" was associated with activity dealing with mechanical interest. Each statement in the inventory was taken one by one and wherever there was any conflict arising as a result of the wording of the statement, efforts were made by the researcher to modify or to reframe the statements. The statements were formulated in such away that each triad, consisting of three different activities, was framed so that a respondent's choice was not influenced by the divergence of the operational phrases used to project the activities. For example this is a typical triad from the inventory:

(i) Teach a course on modern art.

(ii) Teach a course on exploration and adventures.

(iii) Teach a course on modern music.

In the above example, each of the activities starts with the operational phrase "Teach a course" and this type of arrangement was maintained throughout in the Interest Inventory. The scientific activities contained in the Interest Inventory consisted of 15 different activities: 3 biological, 3 Chemistry, 3 Physics, 4 laboratory experiments and 2 general leisuretime activities were distributed randomly in the inventory. Each of the major areas of classification also consisted of 15 different and varied activities distributed randomly over the inventory.

The inventory instructions were similar to those of the Kuder Preference Record (Science Research Associate, Chicago; 1960); and that of an inventory devised by Palmer (unpublished Doctoral thesis, 1973), emphasizing the fact that the interest inventory was not a test of intelligence or achievement but a record of the students' preferences for the different activities. This was done to eliminate, as much as possible, insincere apprehension which might alter the students responses.

The Interest Inventory used in the investigation entitled "The Activities I like To Do" - Interest Inventory for Secondary Schools, consisted of 45 triad sets of activities commonly encountered by secondary school students in Nigeria. The activities were arranged under nine broad areas similar to that used in the Kuder Preference Record Form C; (Sceince Research Associate, Chicago; 1960); each broad area consisted of fifteen different activities randomly arranged as:

01 Scientific Activities: activities based on pure science dealing with discovering relationships and solving problems.

02 Artistic Activities: activities that involve doing creative work with one's hands. It is usually activities that have "eye appeal" involving attractive design, colour and materials.

03 Literary Activities: activities connected with reading and writing.

04 Mechanical Activities: activities dealing with machines and tools.

05 Computational Activities: activities connected with numbers.

06 Musical Activities: activities involving concerts, playing instruments, singing or reading about music and musicians.

07 Outdoor Activities: activities that keeps one outside most of the time usually dealing with animals and growing things on the farm.

08 Clerical Activities: activities that are associated with office work that requires precision and accuracy.

09 Persuasive Activities: activities that are connected with meeting people and promoting projects or things to sell.

"The Activities I like To Do" Interest Inventory

(Appendix A), formed Part I of the investigation while Part II consisted of a questionnaire that contained items obtaining personal information about the respondent on a set of items identified as factors that might stimulate or promote the students interest in science. Items identified included factors such as the science teacher, the parents and the society as they help to promote or stimulate student interest in science (Appendix B). The students were requested to rank such items in the order in which each one helped the students to promote their interest in science. Twelve defferent items were included in the questionnaire. The responsee produced by the students were ranked to facilitate analysis.

3. 2. The Pilot Study: A letter seeking permission to

conduct a study on a pilot basis was written to the Principal, School of Basic Studies, Ahmadu Bello University, Zaria, early in June, 1976 (Appendix C). Subsequently, a letter of approval was received from the Principal, after he had examined a copy of the Interest Inventory and the questionnaire (Appendix C1). A follow up visit was undertaken to finalize necessary arrangements regarding the date, place and the manner in which the students were to be selected. In June and July, 1976, two randomly selected groups of students in the Science and in the Arts disciplines completed the Interest Inventory and questionnaire in order to validate these instruments. The administration of the Interest Inventory and the questionnaire on a pilot study basis also gave an indication of the time it would take an average student in a secondary school to complete the exercise.

It should be noted that the students admitted to the School of Basic Studies were students who had just completed their secondary education programme and were being prepared for university admission. Originally, these students had been selected from an open competitive examination which was taken by secondary school students from all over the country. The

sample therefore may have been representative of the successful secondary school leavers from Nigeria. The pilot study also gave an opportunity to identify any difficulty that might have arisen as regards the level of the vocabulary contained in both the interest inventory and the questionnaire. From the pilot study, it was found that the interest inventory discriminated sufficiently between the two comparable groups of, Science and Arts students at the School of Basic Study, i.e. the science students scored high on the activities that are scientific and the other related components of the inventory like Computational and Mechanical while the Arts students scored high on the activities such as Literary, Artistic and Music.

Independently, the draft of the Interest Inventory was also administered to a randomly selected undergraduate and graduate students of different academic disciplines at the Ahmadu Bello University, Zaria in June, 1976. The students were requested to code the different activities on the interest inventory under the major interest headings. The responses obtained were compared with the blue prints earlier obtained from the computer and it was found that there was close agreement (80 percent) between the responses obtained in

...

and the items contained in the interest inventory.

It was assumed that the vocabulary level of the Inventory was appropriate for the students in the secondary schools because all the students that participated in the pilot study completed the Inventory and questionnaire without any vocabulary assistance. However, from the responses obtained on the questionnaire during the pilot study and after consultation with an analyst at the Computer Centre, a few changes such as requesting the students to give the actual scores and not letter grades in their examination results were effected before the final administration of the interest inventory and the questionnaire. This was necessary because the computer could only handle numerical information and not letters. Typographical errors and omissions were also identified and corrected in the master copies of the instruments used for the investigation.

3. 3 Sampling Procedure A letter seeking permission and assistance to conduct a research project in the Kaduna State Secondary Schools was written to the Permanent Secretary, Ministry of Education, Kaduna, Kaduna State in June 1976 (Appendix C3) and a letter of approval obtained from

the Permanent Secretary, Ministry of Education, Kaduna (Appendix C4). Copies of the letter seeking permission and the reply from the Ministry of Education were sent to the Principals of all the secondary schools in and around Kaduna and Zaria. The list of schools was obtained from the latest issue of the Kaduna State Telephone Directory for June 1976. Ten secondary schools were identified: six boys' secondary schools, three girls' secondary schools and one co-educational secondary school. The letter of introduction to the principals of the secondary schools, also requested a convenient date when it would be possible for the schools to allow the researcher to administer the questionnaires and the interest inventory (Appendix C5). Unfortunately, only one out of the ten principals contacted acknowledged the receipt of the letters sent out (Appendix C6). Owing to the poor response, four schools were randomly selected from the ten schools identified through a process similar to the lottery system. Stratified sampling was performed by taking the girls' schools and the boys' schools separately during the balloting process in order to ensure equal representation of the boys' and the girls' schools in the sample. Each of the schools identified was alloted a letter written on small slips of paper and the letters were then chosen and then "matched" against the schools that corresponded to the letters chosen.

Direct visits were then arranged by the researcher to the selected schools in order to fix dates for the administration of the questionnaire and the interest inventory. The four selected schools were:

1. Kufena College, Zaria (Boys)
2. Sardauna Memorial College, Kaduna (Boys)
3. Queen Amina College, Kakuri, Kaduna South, (Girls)
4. Government Girls' Secondary School, Kawo, Kaduna North, (Girls).

3. 4 Administration of the Interest Inventory and the Questionnaire:

The interest inventory and the questionnaire were administered to the students in Forms III and V in the randomly selected secondary schools during the months of October and November, 1976. At the Sardauna Memorial College, Kaduna, (which was the first school visited) all the Students in Form III and V were assembled in the school's assembly hall, and the researcher selected the students randomly with the assistance of the nominal roll provided by the principal. This procedure was followed so as to ensure that the sample was representative of the secondary school student population.

In the other secondary sechools, the students sat in their respective class-rooms and the instruments were distributed randomly to them. The students completed the Interest Inventory first, i.e independent of the questionnaire, and were later directed to answer the questionnaire. The students were free to complete the interest inventory and the questionnaires at their own pace; the whole exercise lasting between one hour to one and one half hours. Where necessary, explanations were provided by the researcher on how to complete the inventory. i.e pointing out to the students that they were required to rank the options in the triad items from most to least preferred. This meant that they had to choose one item out of the three of the alternatives they liked most and one item of the three alternatives they liked least leaving the third item unselected. A typical example by a student:

Q

(i) Learn how to play the piano.

(ii) Learn how to preach a sermon in the church.

(iii) Learn how to take notes in shorthand.

Most		Least
X	i	
	ii	
	iii	X

This meant that from the responses marked by the student, the student was most interested in learning how to play the piano, least interested in learning how to take notes in shorthand that his interest in learning how to preach a sermon in the church was somewhere between the other two choices (Appendix A). It was also pointed out to the students that the Interest Inventory was not a test but a record of their preferences so as to ensure that the students responses were as sincere as possible. The same procedure was maintained in all the selected schools.

3. 5. Data Handling Procedure

Scoring of the Interest Inventory was based on the internal relationships of the items included in the interest inventory. A close observation of the responses to the items in the inventory would reveal that a number of items dealing with a specific broad area such as scientific activities would tend to be selected together by students having interests in science. If a student chose one scientific item of a triad, he was likely to choose scientific items in the other triads wherever they occurred in the inventory; and if he rejected one he was likely to reject the others. Consequently, the number of selctions made by a student on the different

activities were scored according to the ranking order: most, least and no preference (if the student does not select the item). For each broad area, there were fifteen different items, e.g the maximum number of items a student could select under scientific activities was fifteen; if a student happened to rank all the fifteen; items as most liked, then the score would be 100 on the scientific activities as most liked, 0 under least liked, and 0 under no response or no preference column. All the other broad areas of activities in the inventory were treated similarly and a set of scores representing the different number of selections made by each student was obtained under the three columns: Most, Least and no preference for all the broad areas of activities. The high scores under the most liked column were considered as indicating a high preference or interest in that particular activity. A high score on a specific activity on the inventory indicated that the student expressed more preference for that specific type of activity. And vice-versa, if a student had a high score under the least liked column, it suggested that the student had little preference for that particular type of activity. The study focused specifically on the scientific activity scores of the students

on the inventory. In accordance with the students scores on the science Interest Inventory, male and female students in Forms III and V were divided into three groups: high, medium and low science interest groups. The highest and lowest 33.3 percent of the students' scores on the science activities contained in the inventory were accepted as students with high and low interest in science respectively. All scores ranging from 0 to 33 were grouped as low scores indicating low science interest on the inventory. Scores ranging from 34 to 66 were grouped as the medium scores while all scores ranging from 67 to 100 were grouped as high scores indicating high science interest on the inventory. On the basis of this classification, the low and high science interest group students were then tabulated accordingly into male and female groups for Forms III and V (Table 4 pg 76). The main aim for this classification

to investigate the effect of science experience on the students' science interest in the two classes. The classification provided a means of comparing the trend in the students' science interest development in the two classes.

Owing to the inability of the computer at the Ahmadu Bello University Computer Centre to handle verbal information, all the items contained in the questionnaires had to be coded into numerical form in order to use the computer for the data analysis of the study. For example, item 8 on the questionnaire which requested the students to indicate whether they would like to pursue further studies in Art subjects or science subjects was coded by giving students' Art subject, responses the code number 1 while students' responses for science subjects were given code number 2. Thus, the frequency of the different groups could be counted. (Table 17 pg 92). Similarly, items such as the career chosen by the students were also coded, alloting different numbers to all identified careers, e.g Doctor/Nurses was given the code number 1, Business was given the code number 6 and so on (Table 14 pg. 90) For all the other items contained in the questionnaire from item 9 to 12, the students were requested to rate the items in the order of A to C depending on how each item helped them to promote their science interests. Thus the order of rating was expected to be A, B and C.

Each rating was then coded alloting 3 to any item that was rated by the students as A, 2 to any item that was rated as B and 1 was alloted to any item that was rated as C. Any item that was not rated by the students was alloted 0.The different values obtained for all the ratings were then subjected to the computer analysis and the frequencies for the different items were tabulated. Thus, the maximum mean value was 3 (Table 23 pg. 104)

3. 6 Testing of the hypothesis

Hypotheses 1, 2 and 3 were tested using the analysis of variance as suggested by Connolly and Sluckin (1962) which assumed that the several groups in all samples were drawn from a common parent population. In order to test each of the hypotheses, two independent estimates of the population variance were computed. If the two estimates gave widely different results, then the hypothesis was rejected (= 0.05).

One of the estimates of the population variance was based on the variation of the measurement of means within the several groups. The other estimate was based on the variation between the group means.

If the groups were all alike, these two estimates of variance would be alike. If the variance between groups were considerably greater than those within, then, the groups were probably not samples of the same population, i.e they probably represented different populations.

Basic assumptions: Two major assumptions were made about the set of data that were submitted for the analysis of variance:

1. It was assumed that the distribution of cases within group was normal.

2. It was assumed that the cases within every one of the groups were scattered equally, i.e the variance within the groups were the same. The homogeneity of variance were crosschecked by the Bartlett's test of homogeneity of variance. The result obtained gave the F value as 0.000, p = 0.99 for the Form III group and in the case of Form V, F value = 0.10 and p = 0.75 indicating no significant differences between the variances within the groups).

As an additional check upon the result obtained using the analysis of variance for hypothesis 1, the statistic of X^2 (chi-square) was computed in order to ascertain the

extent to which the observed distribution frequency conformed to some expectations for the different values obtained in Table 4. For the purpose of the X^2(chi-square) computation, four [illegible] tables were obtained from the frequency distribution in Table 4. (The X^2(chi-square) values obtained were shown in Tables 9 and 10 [illegible] 84 & 85).

The t-test of the difference between two means was used to test the 4th hypothesis. The t-values are the distances from the mean value which correspond to the different levels of confidence (= 0.05).

In using the IBM computer for the data analysis, the Statistical Package for the Social Sciences (SPSS) programme utilizing the one-way analysis of variance and t-test sub programmes was employed. The procedure for the interpretation of the data was obtained from the method provided by Connolly and Slucking (1962). The level of significance, , was set at 0.05.

C H A P T E R IV

RESULTS AND DATA ANALYSIS

This Chapter provides the data obtained from the utilization of the procedures stated in chapter III.

4.1 SAMPLE

The sample consisted of 399 students drawn from Form III and V ranging in age from 14 to 17 in Form III and from 15 to 22 in Form V. The students were randomly selected from four secondary schools in Kaduna State. There were 220 boys and 179 girls in the sample (Table 1.)

Table 1

Total number of questionnaires and interest inventories distributed to the students in Form III and V in the Secondary Schools.

CLASS	MALE	FEMALE	TOTAL
FORM III	112	81	193
FORM V	108	98	206
TOTAL	220	179	399

In the sample, the questionnaires and interest inventories of 45 boys (20.45 percent) consisting of 28 boys (25.00 percent) from Form III and 17 boys (15.74 percent) from Form V were rejected while the questionnaires and the interest inventories of 39 girls (21.79 percent) consisting of 12 girls (14.81 percent) in Form III and 27 girls (27.55 percent) in Form V were similarly rejected (Table 2 and 3).

Table 2

Number of accepted and rejected questionnaires and interest inventories for Form III.

VARIABLES	MALE		FEMALE		TOTAL	
	Number	%	Number	%	Number	%
Accepted questionnaires and interest inventories	84	75.00	69	85.19	153	79.27
Rejected questionnaires and interest inventories.	28	25.00	12	14.81	40	20.73
Total	112	100.00	81	100.00	193	100.00

The questionnaires and interest inventories were rejected because they were completed carelessly by the students. In some cases, several pages of the interest inventories had no responses thereby rendering the inventories unscorable. In other cases, the inventories were marked with all the responses under one column instead of two, indicating that the students failed to follow the instructions properly.

Consequently, the final sample consisted of 175 boys (79.54 percent) made up of 84 boys (75.00 percent) from Form III and 91 boys (84.25 percent)from Form V; and 140 girls (78.21 percent) made up of 69 girls (85.19 percent) from Form III and 71 girls (72.45 percent) from Form V (Table 2 and 3).

Table 3

Number of accepted and rejected questionnaires and interest inventories for Form V.

VARIABLES	MALE		FEMALE		TOTAL	
	Number	%	Number	%	Number	%
Accepted questionnaires and interest inventories.	91	84.26	71	72.45	162	78.64
Rejected questionnaires and interest inventories.	17	15.74	27	27.55	44	21.36
Total	108	100.00	98	100.00	206	100.00

The scores obtained from the interest inventory and the ratings on the questionnaires were subjected to the computer analysis using the Statistical Package for the Social Sciences (SPSS) programme utilizing the one way analysis of variance and t-test sub-programmes. (Connolly and Sluckin, 1962).

On the basis of the 33.3 percent high and low scores on the scientific activities contained in the interest inventory the students in Form III and V were divided into high and low interest students in science (Table 4).

Table 4

Number of male and female students in the High and Low science interest groups in Form III and V as measured by the Interest Inventory.

	FORM III				FORM V			
Science Interest Group	MALE No.	%	FEMALE No.	%	MALE No.	%	FEMALE No	%
High	37	44.05	15	21.74	18	19.78	14	19.72
Low	18	21.43	25	36.23	53	58.27	31	43.66

In Form III there were 37 boys (44.05 percent) and 15 girls (21.74 percent) with high science interest while in Form V there were 18 boys (19.78 percent) and 14 girls (19.72 percent) with high science interest in the sample. On the other hand, there were 18 boys (21.43 percent) and 25 girls (36.23 percent) in Form III with low science interest and in Form V, 53 boys (58.27 percent) and 31 girls (43.66 percent) with low science interest. There was a significant difference in the students science interest as they were exposed to further science experience in the secondary school science programmes. The effect seemed to be more pronounced with the boys than the girls.

4.2 Results

Analysis of the students' scores on the Interest Inventory as obtained from the students' scores on the science activities under the most liked column for the Form III students showed that the mean score for the boys was 59.18 (SD = 26.43; SE = 2.88) and the range in score was between 6 and 100.

Table 5

Summary of the Form III students' Science Activities score on the Interest Inventory.

Group	N	Mean	SD	SE	Range
Male	84	59.18	26.43	2.88	94
Female	69	48.96	26.37	3.17	100
Total	153	54.57	26.81	2.17	94

The mean score for the girls on the interest inventory was 48.96 (SD = 26.37; SE = 3.17) and the range was between 0 and 100. The mean score for the entire sample in the class was 54.57 (SD = 26.81; SE = 2.17) while the range was between 6 and 100 (Table 5)

Table 6

Summary of the Form V students' Science Activities score on the Interest Inventory.

Group	N	Mean	SD	SE	Range
Male	91	36.93	27.54	2.90	100
Female	71	41.99	28.56	3.89	100
Total	162	39.23	27.95	2.20	100

In Form V, on the other hand, the mean score for the boys on the interest inventory was 36.93 (SD = 27.54 SE = 2.90) and the scores ranged between 0 and 100. while the mean score for the girls was 41.99 (SD = 28.56; SE = 3.89) and the range in score was between 0 and 100. The mean score for the entire sample in Form V was 39.23 (SD = 27.95; SE = 2.20) and the range in score was between 0 and 100 (Table 6).

4.3 ANALYSIS

To test the various hypotheses that were contained in the study the one-way analysis of variance was computed for Hypotheses 1,2 and 3 and the t-test was used to test Hypotheses 4. The values obtained from these tests were interpreted in terms of probability levels. Probability levels that were smaller than 0.05 ( ) were considered to be significant (Connolly and Sluckin, 1962).

An additional check upon the result obtained using the analysis of variance for Hypotheses 1 and 3 was computed using the X^2 (chi-square) statistic so as to ascertain the extent to which the observed frequency distribution in Tables 4 and 17 conformed to some expectations.

Some contingency tables were obtained and the X^2 value computed.

In testing the first hypothesis that stated that there was no significant difference between the male and the female students in their degree of interest in science, a one-way analysis of variance using the variance ratio denoted by F was computed from the scores on the science activities under the most-liked column (Table 7 and 8).

As could be seen from Table 7, the value for the F-test and the probability level indicated significance (P 0.05) showing that the variables; students' sex and students' science interest could not be assumed to have been drawn from a common sample.

Table 7

Analysis of Variance summary of the relation between students' sex and science interest for Form III as measured by the Interest Inventory.

Source of Variance	SS	DF	MS	F	P
Between Groups	3958.34	1	3958.34	5.68	0.018*
Within Groups	105263.19	151	697.11		
Total	109221.53	152			

* $P < 0.05$

The students' science interest differed significantly between the boys and girls in favour of the boys.

Table 8

Analysis of variance summary of the relationship between students' sex and science interest for Form V as measured by the Interest Inventory

Source of Variance	SS	df	MS	F	P
Between Groups	1013.22	1	1013.22	1.29	0.257*
Within Groups	124622.59	159	783.79		
Total	125635.81	160			

* $P > 0.05$.

From table 8, it could be seen that the value for the F-test was low (1.29) and the probability level (P) was 0.257, this indicating no significant difference between the science interest of the male and female students. The students' science interest did not differ significantly between the boys and girls in the sample.

As an additional check upon the result obtained from the above test, the X^2 (Chi-square) statistic was computed using the frequency distribution from Table 4.

Table 9

Summary of the relationship between students' sex and science interest for Forms III and V utilizing the frequency distributions obtained from Table 4.

*(i) *(ii)

	FORM III			FORM V		
	High	Low	Total	High	Low	Total
MALE	(30.1)** 37	(24.9) 18	55	(19.6) 18	(51.4) 53	71
FEMALE	(21.9) 15	(18.1) 25	40	(12.4) 14	(32.6) 31	45
TOTAL	52	43	95	32	84	116

X^2 = 8.298 df = 1 X^2 = 0.47 df = 1

P Value = 0.01, i.e P 0.05 P Value = 0.5 i.e P 0.05

Contingency tables obtained from the frequency distribution in Table 4.

** Figures in brackets indicate expected values.

From table 9 it could be seen that the value for the X^2 (8.298, df = 1 and P = 0.01) obtained for the Form III

students was high compared with the value of X^2 (0.47 df = 1 and P value = 0.50) obtained for the Form V students. This observation indicated that there was no significant difference between the students' sex in Form V and their degree of science interest. On the other hand, the high value of chi-square obtained for the Form III students indicated that there was a significant difference between the students' sex and their degree of science interest and this difference was in favour of boys.

Table 10

Summary of the relationship between the Form III and V science interest by students' sex utilizing the frequency distributions obtained from Table 4.

	*(iii) MALE			*(iv) FEMALE		
	High	Low	Total	High	Low	Total
FORM III	(24.0)** 37	(31.0) 18	55	(13.6) 15	(26.4) 25	40
FORM V	(31.0) 18	(40.0) 53	71	(15.4) 14	(29.6) 31	45
TOTAL	55	71	126	29	56	85

X^2 = 22.17, df = 1 X^2 = 0.412, df = 1

P = 0.01 i.e P 0.05 P = 0.99 P 0.05

Contingency tables obtained from the frequency distribution in Table 4.

** Figures in brackets indicate expected values.

From table 10, it could be observed that the X^2 value

(22.17 df = 1, p = 0.01) obtained for the male students in the sample for the Forms III and V was considerably high when compared with the X^2 value (0.412, df = 1, P value = 0.99) obtained for the female students in the sample for the Forms III and V. This observation indicated that the students' science interest between the Form III and V male students showed a statistical significant difference between the groups i.e., the male students' science interest appeared to be adversely affected as they were exposed to further science experience in the secondary school science programmes. However, the result obtained in the case of the female students in the sample showed that there was no significant difference between the Form III and V female students as a result of exposure to further science experience in the secondary schools.

To test the second hypothesis that stated that there was no significant relationship between students' science interest and the students' future desired career, /a one-way analysis of variance was computed from the scores on the science activities of the interest inventory and the students' declared careers on the questionnaire (Table 11 & 12).

Table 11

Analysis of variance summary pertaining to the relationship between students' science interest and the career chosen by the Form III students.

Source of Variation	SS	df	MS	F	P
Between Groups	16596.47	9	1844.05	2.85	0.004*
Within Groups	92625.06	143	647.73		
Total	109221.53	152			

* $P < 0.05$

From the figures in tables 11 and 12, the F ratio and the resultant probability level (P) indicated significance ($P < 0.05$) in Form III as well as in Form V. The results showed that the variables, students' science interest and the career desired by the students could not be assumed to have been drawn from a common population. The students' science interest and the career desired differed significantly among the students. Detailed analysis revealed that many students including students with low science interest as well as those with high science interest wanted to pursue careers

that were identified to be associated with scientific activities (Table 13).

Table 12

Analysis of variance summary pertaining to the relationship between students science interest and the career chosen by the students in Form V.

Source of Variation	SS	df	MS	F	P
Between Groups	22591.32	9	2510.15	3.70	0.000*
Within Groups	103161.23	152	678.69		
Total	125752.55	161			

* $P < 0.05$

From Table 13 it could be seen that the career desired by the students in Form III showed that 63 students (41.2 percent) desired to become doctors or nurses, 20 students (13.1 percent) wanted to be scientists, while 15 students (9.8 percent) elected to be engineers. These were careers that were identified to be associated with scientific activities.

Table 13

Number of students in Form III and V who elected to pursue scientifically oriented careers on the questionnaire.

Career chosen by students	FORM III		FORM V	
	Number	Percentage	Number	Percentage
Doctor/Nurse	63	41.2	43	26.5
Scientist	20	13.1	19	11.7
Engineering	15	9.8	12	7.4
Total	98	64.1	74	45.6

In Form V, on the other hand, the table showed that 43 students (26.5 percent) elected to be doctors or nurses, 19 students (11.7 percent) wanted to be scientists while 12 students (1.4 percent) wanted to be engineers. This gave an overall total of 98 students (64.1 percent) in Form III who elected to pursue scientifically oriented careers while there were 74 students (45.6 percent) in Form V who elected to pursue scientifically oriented careers.

This result could also be attributed to the experience to which the Form V students might have been exposed in the secondary school science programmes in addition to some other factors such as the socio-economic and home background of the students which were not considered in this study.

Table 14

Summary of the scientifically oriented careers chosen by students in Forms III and V and the students' science activities score on the Interest Inventory.

Careers chosen by students	FORM III		FORM V	
	N	Mean	N	Mean
Doctor/Nurse	63	65.54	43	49.67
Scientist	20	45.95	19	49.26
Engineering Group	15	57.87	12	56.83
Total	153	54.57	162	39.23

* Range in score was between 6 and 100

*Range in score was between 0 and 100

From Table 14 it could be seen that the Forms III students who elected scientifically oriented careers had greater preferences for scientific activities, indicating high science interest than the Form V students that elected to pursue scientifically oriented careers.

The third hypothesis stated that there was no significant relationship between students' science interest and students ambition to continue further studies in science. The hypothesis was tested by computing a one-way analysis of variance using the scores on the science activities of the interest inventory with the students' declared preference of either to pursue further studies in art subjects or science subjects. i.e. the students' science interest score on the Interest Inventory was related to the students' declared preference on item 8(AppendixB) of the questionnaire. (Tables 15 and 16).

From table 15, it could be seen that the F value was high (9.38) and the probability level (P) indicated significance ($P < 0.05$). This analysis indicated that the variables, students' science interest and students' ambition to continue further studies in science, differed significantly

in their score distribution.

Table 15

Analysis of variance summary pertaining to the relationship between students' science interest and students' ambition to continue further studies in science for Form III.

Source of Variation	SS	df	MS	F	P
Between Groups	17349.81	3	5783.27	9.38	0.000*
Within Groups	91871.72	149	616.59		
Total	109221.53	152			

* $P < 0.05$

Table 16

Analysis of variance summary of the relationship between students' science interest and students' ambition to continue further studies in science for Form V.

Sources of Variation	SS	df	MS	F	P
Between Groups	32924.25	2	16462.12	28.20	0.000*
Within Groups	92828.30	159	583.83		
Total	125752.55	161			

* $P < 0.05$

Table 17

Number of students in Forms III and V who indicated their subject group preference on the questionnaire.

Subject Group Preference by students	FORM III						FORM V					
	MALE		FEMALE		TOTAL		MALE		FEMALE		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Science	50	59.2	39	56.5	89	58.2	35	38.5	28	39.4	63	38.9
Arts	28	33.3	28	40.6	56	36.6	56	[illegible].5	339	54.9	95	58.6
Not Decided	6	7.2	2	2.9	8	5.2	-	0.0	4	5.7	4	2.5
Total	84	100.0	69	100.0	153	100.0	91	100.0	71	100.0	162	100.0

Like the Form III students the F value was very high (28.20) and the probability level (P) indicated significance (P 0,05) showing that the variables tested, students' science interest and students' ambition to continue further studies in science differed significantly in Form V (Table 16 pg. 92)

From Table 17, it could be seen that 89 students (58.17 percent) in Form III elected to continue further science studies if they had further opportunities and in Form V 63 students (38.89 percent) elected to continue further science studies if they had further opportunities. This observation further showed that in Form V, the students' interest had decreased .

As an additional check upon the result obtained for the relationship between students' science interest and students' ambition to continue further studies in science for Forms III and V, the X^2 (Chi-square) statistic was computed using the frequency distribution from Table 17.

Table 10

Summary of the relationship between students' science interest and students' ambition to continue further studies in science for the male and female students in Forms III and utilizing the frequency distributions obtained from Table 17.

	*(i)			*(ii)			*(iii)		
Subject Group Reference by students	Males and Females			Males			Females		
	III	V	Total	III	V	Total	III	V	Total
Science	(72.7)**	(79.3)		(33.2)	(45.8)		(33.5)	(33.5)	
	89	63	152	50	35	85	39	28	67
Arts	(72.3)	(78.7)		(38.8)	(45.2)		(33.5)	(33.5)	
	56	95	151	28	56	84	28	39	67
Total	145	158	303	78	91	169	67	67	134
X^2 = 14.06, df = 1 P Value = 0.001 i.e P 0.05				X^2 = 11.11, df=1 P Value = 0.001 i.e P 0.05			X^2 = 3.61, df = 1 P Value = 0.10 P 0.05		

*Contingency tables obtained from the frequency distribution in Table 17.

** Figures in brackets indicate expected values.

Table 18 (*. showed that the X^2 value (14.06, df = 1 p = 0.001) obtained for the male and female ts in the sample for the Forms III and V was high and the probability level (P) indicated significance (P 0.05). The result indicated that the proportion of students who elected to continue further studies in science was progressively decreasing with the proportion bec ng greatly decreased in Form V.

From Table 18 (*ii) and (*iii), however, it could be observed that the X^2 value (11.11, df = 1 P = 0.001) obtained for the male students was high compared with the X^2 value (3.61, df = 1, P = 0.10) obtained for the female students. The probability level (P) indicated significance (P 0.05) for the male students while in the case of the female students (P 0.05) indicating no significant difference. The result indicated that the male students'

science interest seemed to be more adversely affected than the female students as regards the trends in the students' science interest development in the secondary schools. There seemed to be indications that the present secondary school science experience is discouraging the secondary school students science interest particularly the male students.

Table 19

Number of students in Forms III and V who indicated their subject group preference on the questionnaire and the students' science activities scores on the interest inventory

Subject Group Preference	FORM III			FORM V		
	N	Percentage	Mean	N	Percentage	Mean
Science	89	58.17	54.68	63	38.89	57.36
Arts	56	36.60	40.39	95	58.64	27.72
Not decided	8	5.23	60.00	4	2.47	41.75
Total	153	100.00	54.57	162	100.00	39.23
	Range in score was between 6 and 100			Range in score was between 0 and 100.		

From table 19, it could be seen that in Form III, the group that preferred to pursue further studies in science had a mean score of 54.68, while those who preferred to study art subjects had a mean score of 40.39 and remaining group that claimed to be undecided (i.e. they were not certain whether to choose science subjects or art subjects for their further studies) had a mean score of 60.00.

The mean score for the Form III sample was 54.57 and the range in score was between 6 and 100. In Form V, the group that preferred to pursue further studies in science had a mean score of 57.36, while those who preferred to study art subjects had a mean score of 27.72 and the remaining group that were not sure whether to choose science subjects or art subject for their further studies had a mean score of 41.75 while the mean score for the total Form V sample was 39.23. The range in score for the Form V sample was between 0 and 100.

The fourth hypothesis stated that there was no significant relationship between students' science interest and their academic achievement. The hypothesis was tested using a t-test of statistical significance which was computed from the scores supplied by the students from their previous sessional examination results (the scores were derived from the teacher - made tests and not standardized tests). The critical level of significance was set at 0.05 (Table 20

Table 20

Result of the t-test showing the relationship between science interest and the students' scores in General science as reported by the Form III students. N=148.

Variable	Mean	SD	SE	T Value	df	P
Science interest score	54.65	26.82	2.21	-7.70	147	0.000*
G. Science scores	73.22	16.72	1.37			

*P < 0.05

From the table, it could be seen that the probability level (P) indicated significance showing that the variables,

students' science interest and the students' achievement in General science, differed significantly.

It should be pointed out that General Science was not normally offered as a main subject in Form V in most of the secondary schools where facilities were available for the main science subjects: Biology, Physics and Chemistry. It was also observed that many of the students who indicated that they offered General Science as a main subject failed to report their scores. Consequently, this hypothesis was not tested in Form V.

Table 21

Summary of the students' achievement in General Science as reported by the Form III students in the sample.

Variable	Mean	SD	N	Sample Percentage
Male	74.54	17.54	82	53.60
Female	71.59	15.62	66	43.10
Missing Cases	-	-	5	3.30
Total	73.22	16.72	153	100.00

The detailed analysis of the students' achievement in their respective subjects showed that in Form III more boys (53.60 percent) than girls (43.10 percent) reported their scores in General Science. Table 21

The result obtained re-confirmed the main differences that existed between the science interest of boys and girls. The differences were consistent with previous research, indicating greater overall scientific orientation among boys than girls (Meyer, 1970)

In Form V however, the result obtained showed that there was no significant difference between the male and female students science achievement in the subjects such as Chemistry and Physics contrary to reported previous research (Table 22)

Table 22

Summary of the students' achievement in Biology, Chemistry and Physics as reported by the Form V students in the sample.

1. Biology N = 111 = 68.50 percent

Variable	Mean	SD	N	Sample Percentage
Male	69.87	66.02	45	27.54
Female	64.37	12.48	65	40.44
Missing Cases	-	-	52	32.02
Total	66.05	43.32	162	100.00

2. Chemistry N = 80 - 49.22 percent.

Variable	Mean	SD	N	Sample Percentage
Male	54.66	18.85	38	23.11
Female	56.90	14.17	42	26.11
Missing Cases	-	-	82	50.78
Total	55.20	17.37	162	100.00

Table 22 (cont'd)

3. Physics N = 54 = 33.30 percent

Variable	Mean	SD	N	Sample Percentage
Male	55.36	20.06	28	17.22
Female	52.76	15.93	25	15.30
Missing Cases	-	-	109	67.48
Total	53.22	19.14	162	100.00

However, the pattern that more girls than boys preferred descriptive subjects such as biology was reconfirmed by this study (Meyer, 1970). From the various subjects offered by the Form V students it could be seen that out of three subjects: Biology, Chemistry and Physics that were offered as the main subjects in the secondary schools, Biology seemed to be the most popular among the Form V students with 68.50 percent of the students offering the subject and the girls showing greater interest than boys in the subject. Physics being the least popular with almost the same number of boys and girls offering the subject. Physics was offered

by 33.30 percent of the students in Form V. Chemistry on the other hand was offered by 50 percent of the students with girls showing greater tendency to perform better in the subject than the boys.

Table 23

Comparison of scores obtained by Form III and V students on the various variables identified as factors that help students promote their science interest in secondary schools.

For Form III, N = 153, and in Form V, N = 162

Variables	FORM III		FORM V		Difference
	$\bar{X}$	SD	$\bar{X}$	SD	
A Outer Motivation					
1. Motivation by Parents	1.24	1.00	1.59	1.03	-0.25
2. Society desirability for science	1.05	0.92	1.05	0.79	0.00
3. Popularity of science subjects	1.15	0.97	1.16	0.91	- .01
B Instructional Motivation					
1. Motivation by science teacher	2.50	0.98	2.29	1.07	0.21
2. Teachers command of subject matter	1.82	1.21	1.86	1.17	-0.04
3. Teachers personality	1.62	1.27	1.55	1.16	0.07

Table 23 (Continued)

Variable	FORM III		FORM V		
	$\bar{X}$	SD	$\bar{X}$	SD	Difference
4. Suitability of science text book	1.68	1.09	1.68	1.17	0.00
5. Extra Curricula science activities	1.12	0.96	1.30	1.04	-0.18
6. Availability ofscience laboratories	1.67	1.09	1.66	1.13	0.01
C Consultation of Authorities to solve Science Problems					
1. Consult teachers	2.42	1.04	2.27	1.09	0.15
2. Consult the science text books	1.23	0.98	1.46	1.03	-0.23
3. Consult an expert	1.18	0.97	1.14	0.90	-0.04

From table 23 it could be seen that out of the three factors identified as external motivators that help student to promote their science interest in schools, i.e.the parents' motivation, society desirability for science and popularity of science subjects, only the students' ratings of the parents motivation was high for both forms III and V students. Out of the six instructional motivations

identified as factors that help students promote their science interest, motivation by science teachers, the teachers' command of subject matter, suitability of science text books and availability of science laboratories in that order were rated high by both forms III and V students.

Out of the three possible ways of solving science problems by approach to authority, i.e. by consulting the teachers, consulting the science textbooks or consulting an expert, only the first method was rated as the best method by the students in Form III and V. This observation was similar to that reported by Meyer (1970) in his studies.

C H A P T E R V

DISCUSSION, CONCLUSION, IMPLICATION AND RECOMMENDATIONS

5.1 DISCUSSION

It was hypothesized that there was no significant difference between students' science interest and a selected number of variables such as sex, students' achievement in science, students' proposed future career and students' further ambition to continue studying science. The results of the statistical tests used indicated that some variables investigated differed significantly in the two classes that were studied.

Thus, consequently, in Form V there was no significant difference between the male and female science interest (Table 4 pg 76). In the Third Form, the students' decisions were in the formative stage whereas in the Fifth Form, students had finalized their impressions on the subjects they liked most, and the career they would like to enter

It could then be infered from the study that the secondary school science programmes to which the students were exposed seemed to have affected the science interests of the boys. However, with the girls the secondary school science experiences seemed to have smaller impact on their science interests (Table 10 pg 85).

Concerning the students' science interest and their future desired career there was a significant difference between the students' degree of science interest and the students' career desires in both Forms III and V. Thus, the second hypothesis was rejected for the two classes ($P < 0.05$). The result obtained from the analysis showed that a large proportion of the students wanted to pursue careers that

were associated with scientific activities (Table 13 pg 89) Many students elected to pursue careers that were associated with scientific activities even though many of them might not have a high degree of science interest. But probably due to the popularity of science (Table 23, section A pg 104) and the effect of technological advancements of science on our modern lives, students were motivated to choose careers that were associated with science.

On the other hand, in addition to several other factors, not identified in this study, the students' preference for scientifically oriented careers might be associated to a lack of guidance concerning careers related to the different subjects offered in the secondary schools.

The third hypothesis stated that there was no significant difference between students' science interest and the students' desire to continue further studies in science. An analysis showed that there was a significant difference between the students' degree of science interest and students' desire to continue studying science.

Thus the null hypothesis was rejected in Forms III and V ($P<0.05$).

Similarly, it was observed that in Form III, there was a significant difference between students' science interest and their achievement in science. Consequently, the fourth hypothesis which stated that there was no significant difference between students' degree of science interest and their achievement in science was rejected in Form III ($P<0.05$). The hypothesis was not tested in Form V because General Science was not normally offered as a main subject.

It should be pointed out that the significant differences reported in this study concerning the relationship between the students' interest in science and the other variables tested, were neither due to the failure of the Interest Inventory to measure the students' science interest nor lack of sincerity on the part of the students' responses to the questionnaires but to the fact that there were other factors that influenced the tested relationships. Other identified factors that might have influenced the tested relationships included individual differences in aptitudes

of the students, their general learning abilities and the the general need to achieve. For example, Frandsen (1967) discussed the correlations between the degree of interest in an area and the teachers' marks in a single course in the corresponding area and concluded that the correlations were typically very low; e.g. a student of high scholastic aptitude and low interest in physical science may, because of his high academic learning abilities and general need to achieve, earn an 'A' grade in a required course in Chemistry. Another student may despite a high degree of interest in science, because of his relatively low aptitude earn only a 'C' grade. Such discrepancies reduce an otherwise potentially higher correlation between the degree of interest in a subject area and achievement in a typical subject. The correlation that had been reported in many other studies ranged between 0.25 and 0.50. The discrepancy that was shown in this study, could therefore be explained on the basis that a students' achievement depended on so many other factors

other than the degree of interest the individual might have possessed. The performance of a student in a subject area depend therefore upon both superior intelligence and high degree of interest. Excellence in a field of study seemed to be a product both of relatively high aptitude and high degree of interest in that field of study. (Frandsen 1967).

Like the study reported by Hasan (1975), this study also reconfirmed that students' science interest was also sex-dependent but that the effect of this factor on the students' science interest depended so much on the secondary school science experience that the students were exposed to (Table 18 pg 95). Hasan (1975) from his study showed that some of the variables found to differentiate significantly between high and low science interest students seemed to be sex-dependent. The variables: students' career desired by parents, career desired by students and students' perception of their science abilities operated on male and female students. The two variables: motivation of science teachers and student participation in science activities

seemed to operate only on male students while the social desirability science variable seemed to operate on female students only.

Similarly, this study showed that if the students of Form III and V were considered as a group, the trend of students science interest development in our schools seemed to be sex-dependent. It could be seen from the study that a large proportion of the male students possess high science interest in Form III as compared with the proportion of the female students. On the other hand, in Form V, the proportion of the male students that possess high science interest was alsmost the same as the female students (Table 4 pg 76). Furthermore, this study pointed out that the male students science interests appeared to be adversely affected by their science experience in the secondary schools while the secondary school science experiences seemed to have had little impact on the female students' science interests (Table 18 pg 95).

5.2 CONCLUSIONS:

On the basis of the assumption that the students' responses to the Interest Inventory were sincere and reliable, this study provided the basis to compare students' science interest in the two grade levels of our secondary schools, i.e., the first grade being the Third Form where science was being introduced to the students and the other grade being the Fifth Form where the students were almost completing their secondary school science programmes. From the findings of the study, it could be concluded that the Form Three students who were just entering a course of study in science were very enthustiastic and were very keen to learn science. The boys in the Third Form were found to be more scientifically oriented (Table 21 pg 100), an observation which was in conformity with previous research. (Meyer, 1970). On the other hand, in the Fifth Form, the study showed that the students science interest among the male and female students was almost the same. The proportion of the boys possessing high science interest was almost the same as the proportion

of girls (Table 4 pg 76) The finding gave the indication that students' science interest could be influenced by the secondary school science programme with the girls showing little gain in science interest development while the boys' science interest seemed to be reduced by the secondary school science programmes (Table 18 pg 95)

In the study of the relationship between the students' science interest and the other variables such as academic achievement, proposed career by the students and students' ambition to continue further studies in science, significant differences were noted in both Forms III and V. Generally, however, the Form III students were seen to be more enthusiatic about furthering their studies in science (Table 17 pg 93), they seemed to be more interested in pursuing careers that were related to scientific activities than the Form V students (Table 13 pg 89)

The results obtained for the Form V students showed that there was a decline in the proportion of students that had high science interest (Table 4 pg 76),

that showed preference to pursue further studies in science (Table 17 pg 93). The study showed that as a group, there was a significant difference in the students' science interest in the secondary school. The difference in the students' science interest was, however, more in favour of the male students than the female students. Thus, it could be concluded that the present secondary school science programmes (in addition to some other factors that were not identified by this study) seemed to be discouraging the students' science interests most especially the male students. (Table 18 pg 95). The female students seemed to show a little gain in their science interest development while the boys' science interest seemed to be reduced.

Comparison between the Form III and V students' ratings on the variables that were considered to be motivating factors that help the students develop their science interests showed that there were close relationship in the ratings for both Forms III and V (Table 23 pg 104).

The study revealed the importance of certain motivating factors such as the parents' motivation, motivation by science teachers and the teacher's command of the subject matter in the development of the students' science interest interest in the secondary schools (Table 23 pg 104).

The study highlighted the need for the secondary school science programmes to be tailored in such a way that the students' science interest, once initiated in the lower classes, would be encouraged and maintained throughout the secondary school science experiences.

5.3. IMPLICATIONS AND RECOMMENDATIONS OF THE STUDY

While it is true that students come to school with many interests it is also true that interests can be aroused and cultivated by what takes place in the schools. And as the study has highlighted the students' recognition that science teachers were an important factor that helped them develop their science interests, then it seems imperative and mandatory that well

qualified science teachers should be provided for the students in the secondary schools. It is strongly recommended that both the Federal and the State Governments should step up their efforts as a matter of urgency to train qualified science teachers of all grades in order to meet the ever increasing demands for high level qualified science teachers in our secondary schools. It is also of paramount importance that inservice education should be provided for the serving science teachers so as to improve and extend their competencies for effective teaching of science. Such inservice education would also keep the teachers alert to changes in content and method. It is therefore recommended that the science teachers should be encouraged to undergo inservice courses in order to improve their professional outlook.

The study also showed that there was a significant difference in the students' science interest in the third and fifth form students particularly among the male students.

These findings, suggested that there may be some shortcomings in the content of our present secondary school science programmes and in the teaching methods being applied by the science teachers. Hence, there may be a need for further investigations into the content of our secondary school science programmes and the methods of teaching the subjects in order to identify if the shortcomings exists in the science programmes.

The study further highlighted the need for extra-curricula-science activities to be incorporated into our secondary school science programmes as a means of developing the students science interest in our secondary schools (Table 23 section 8 pg 104). Judging from the benefits the students would derive from such extra-curricula-science activities, it is strongly recommended that the science teachers in our secondary schools should encourage organization of science clubs in their respective schools. Such

science clubs would provide the students opportunity of carrying out science investigations on individual basis, thus providing them some firsthand experiences in tackling problems in science.

It should be pointed out that the Interest Inventory entitled "The Activities I like to do" Interest Inventory for Secondary Schools which was used to collect data for this study could also be used extensively to identify other areas of students' interest in other subjects that were being offered in our secondary schools other than the science subjects. Information gathered from such studies would provide useful indications in the trends of the students' interest development in the other subject areas.

There are several extensions of this study which appear warranted: Development of another interest inventory that would consist mainly of science activities on different science topic areas so as to identify those science areas the students prefer to study. Information, thus, obtained from such studies

could provide a good basis for restructuring the content of the secondr school science programme so as to be in line with the students' interests.

A further investigation of students' science interest with analysis tailored to provide response comparisons between the high and low science interests students could also be conducted. Such studies would provide a good basis for better students' science interest comparisons.

An investigation into the longitudinal study of the high science interest students and their future desired careers so as to provide the basis for appropriate guidance in the scientifically related careers. Information obtained from such a study would go a long way to assist the science teachers when counselling the secondary school students on their desired careers.

It is of paramount importance that our secondary school science programmes provide opportunity for the secondary school science students to be inspired and stimulated sufficiently so that as many students as

possible would choose a career in science. Thereby, the students would be capable of contributing their quota towards the development of the country in the field of science and modern technology.

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A P P E N D I X A

"THE ACTIVITIES I LIKE TO DO"

INTEREST INVENTORY

FOR SECONDARY

SCHOOLS

BY

MICHAEL AGBOOLA AFOLAYAN

N.C.E., B.Sc.(Hons).

"THE ACTIVITIES I LIKE TO DO"

INTEREST INVENTORY FOR SECONDARY SCHOOLS

Dear Students,

We need your help in deciding what should be done to improve our methods of teaching in the secondary schools. We want to know the different activities you are interested in doing most. Because students have different interests, there are no right or wrong answers to any of the items in this inventory. This inventory is only used for obtaining a record of your preferences. It is NOT a test. For the inventory to be useful, all that is required is for you to read the items and answer each one honestly. Do not leave any question unanswered.

As you read the items in the inventory you will note that each item consists of three statements. This is done so that you may choose the one you like to do most and the one you like to do least among three. Since there will be one you like most and one you like least, the third one will be in between in your likes and dislikes.

Included in the statements of the inventory are some activities which you may have done and some activities which you may have not done. In any item, the three statements may all seem very interesting. In any case, be sure you answer ALL the questions on the basis of which is the most and least interesting to you, among the activities.

Here is what you are to do:

1. Carefully read the three statements
2. Decide which one of the three activities described you would be most interested in doing as compared to the other two. Mark X in the box to the left of the figure which represents your preference.
3. Decide which one of the three activities described you would be least interested in doing. Mark X in the box to the right of the figure which represents your selection.

Here is an example:

Q (i) Watch a football game.
(ii) Watch an acrobatic show.
(iii) Watch a horror film.

X	i	
	ii	
	iii	X

This means that from the responses marked by the student, the student is most interested in seeing a football game, least interested in seeing a horror film, and that his interest in watching an acrobatic show is somewhere between the other two choices. Similarly, try therefore, to fill your responses to the different activities contained in the statements of this inventory.

THE ACTIVITIES I LIKE TO DO

			Most		Least
1.	(i)	Read a biography about famous scientists		i	
	(ii)	Read a biography about famous artists		ii	
	(iii)	Read a biography about famous authors		iii	
2.	(i)	Take a course in sketching or painting		i	
	(ii)	Take a course in advanced biology		ii	
	(iii)	Take a course in modern English Literature		iii	
3.	(i)	Write short stories for the local newspaper		i	
	(ii)	Write short outlines of the experiments to be performed in the science laboratory		ii	
	(iii)	Write short articles for an art magazine		iii	
4.	(i)	Work out of doors for long period on the farm		i	
	(ii)	Work on an assignment to study how the speed of light is measured		ii	
	(iii)	Work on some potraits to be shown in the art exhibition		iii	
5.	(i)	Learn how to play the piano		i	
	(ii)	Learn how to preach a sermon in the church		ii	
	(iii)	Learn how to take notes in shorthand		iii	

	Most		Least
6. (i) Take a course in advanced statistics		i	
(ii) Take a course in creative arts and painting		ii	
(iii) Take a course in advanced physics		iii	

7. (i) Go to a theatre to watch a musical concert		i	
(ii) Go to library to solve problems on statistics		ii	
(iii) Go to a Zoo to study strange animals		iii	

8. (i) Take a long walk in a rural area to see the countryside		i	
(ii) Take telephone messages in an office		ii	
(iii) Take a study in advertising techniques for a company		iii	

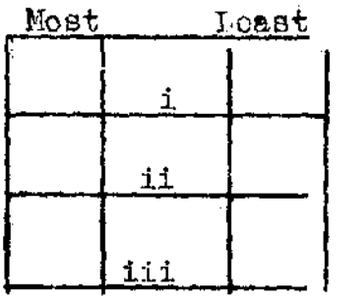
9. (i) Go to a science laboratory to perform experiments		i	
(ii) Go to a theatre to perform as a vocalist in a pop band		ii	
(iii) Go to a field to perform as a guide on a camping expedition.		iii	

10. (i) Draw cartoons for a newspaper		i	
(ii) Draw graphs based on a statistical data		ii	
(iii) Draw a design of a new machine to be built		iii	

11. (i) Perform the duty of an editor for an academic magazine.

(ii) Perform the duty of an expert on rare trees.

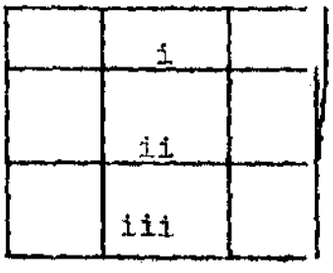
(iii) Perform the duty of a director in a musical show



12. (i) Read a book that describes the countryside

(ii) Read a book that describes the principles used in constructing utencils for the home

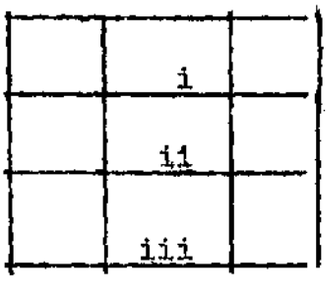
(iii) Read a book that describes the different processes involved before a book is published



13. (i) Learn how to use the computer to solve complicated mathematical problems

(ii) Learn how to operate and repair a complicated machine

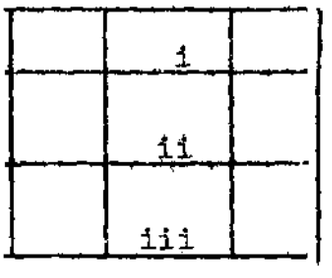
(iii) Learn how to report current events for a local newspaper.



14. (i) Make models of atoms to show how chemical elements are different.

(ii) Make models of a bridge using ordinary materials

(iii) Make models by using graphs to illustrate the relationship between the populations of different countries.

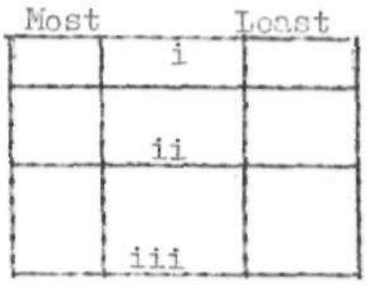


			Most		Least
15.	(i)	Take a job which requires newswriting and editing		i	
	(ii)	Take a job which requires manufacturing and assembling of small mechanical units of engines		ii	
	(iii)	Take a job which requires a lot of mental arithmetic		iii	
16.	(i)	Learn how to play a complicated musical instrument.		i	
	(ii)	Learn how to use certain scientific instruments in the science laboratory.		ii	
	(iii)	Learn how to make carving or sculptures		iii	
17.	(i)	Study the effects of various drugs on human beings		i	
	(ii)	Study office - efficiency methods		ii	
	(iii)	Study the methods of convincing people		iii	
18.	(i)	Teach a course on modern art		i	
	(ii)	Teach a course on exploration and adventures		ii	
	(iii)	Teach a course on modern music in a school or college		iii	
19.	(i)	Write short plays to be dramatized		i	
	(ii)	Write short musical plays for the orchestra		ii	
	(iii)	Write short reports on a hunting expedition		iii	

20. (i) Visit the museum to see the objects on display

(ii) Visit an art gallery to see the latest arc paintings on display

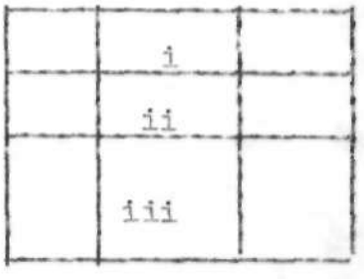
(iii) Visit the science exhibition to see the latest scientific equipments on display



21. (i) Participate in a musical play

(ii) Participate in an essay competition

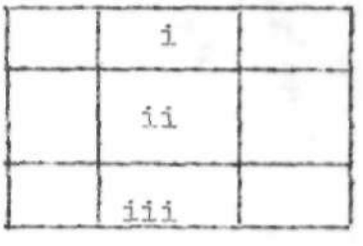
(iii) Participate in the construction of the instrument which will be used to measure the size of the moon



22. (i) Conduct a research on computer analysis

(ii) Conduct a research on methods of repairing cars

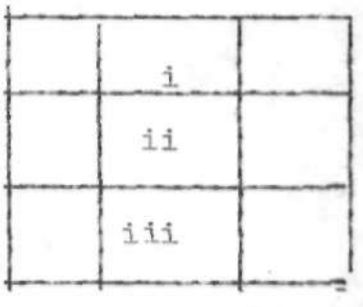
(iii) Conduct a research on traditional music



23. (i) Read a magazine that deals with the causes of various diseases

(ii) Read a magazine that deals with the summaries of many novels

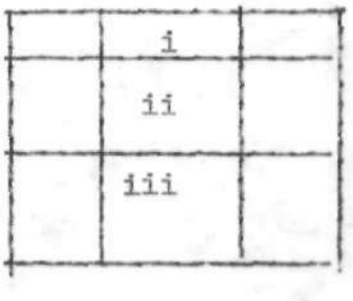
(iii) Read a magazine that deals with the history of arts



24. (i) Teach a lesson on how to write English composition in a school or college

(ii) Teach a lesson on how to design costumes for plays in a school or college

(iii) Teach a lesson on how to use the microscope to study cell division in a school or college



			Most		Least
25.	(i)	Attend lectures on how to use the computer for scientific data analysis		i	
	(ii)	Attend lectures on how to compose music		ii	
	(iii)	Attend lectures on how to raise cows, poultry and pigs scientifically to feed the nation.		iii	
26.	(i)	Publish a pamphlet that describes the activities of a manufacturing company		i	
	(ii)	Publish a pamphlet that describes the potraits		ii	
	(iii)	Publish a pamphlet that describes the activities of literary and debating society.		iii	
27.	(i)	Read a book that describes how to make people buy things easily		i	
	(ii)	Read a book that describes the journeys of the early explorers		ii	
	(iii)	Read a book that describes office routine		iii	
28.	(i)	Take a course in advanced computer science		i	
	(ii)	Take a course in business English		ii	
	(iii)	Take a course in modern music		iii	
29.	(i)	Study musical composition of different songs in order to understand them		i	
	(ii)	Study the countryside in order to explore the minerals and oil deposits		ii	
	(iii)	Study the accounting system of the company in order to audit the accounts		iii	

		Most		Least
30.	(i) Read a book on how to play the organ		i	
	(ii) Read a book on how machines work		ii	
	(iii) Read a book on how to become a writer		iii	
31.	(i) Learn how to repair a car that has broken down		i	
	(ii) Learn how to add up long columns of figures in a new, more rapid way		ii	
	(iii) Learn how to compose soul music for the popband.		iii	
32.	(i) Talk with an engineer about how an air plane works.		i	
	(ii) Talk with an office secretary about how to furnish an office with the right equipment.		ii	
	(iii) Talk with a scientist about the different samples of soil in an area by travelling with him over wide areas in the locality		iii	
33.	(i) Participate in building a device which can be used to measure how much the earth shakes.		i	
	(ii) Participate in persuading people to take a life insurance policy.		ii	
	(iii) Participate in collecting statistics on wages and prices.		iii	
34.	(i) Supervise the collection, analysis, and recording of figures on our country's trade.		i	
	(ii) Supervise the work of several typists		ii	
	(iii) Supervise the guiding and conseling of young people to select their vocation		iii	

			Most		Least
35.	(i)	Develop an accounting system for company		i	
	(ii)	Develop a settlement of an industrial dispute between the workers and their employers		ii	
	(iii)	Develop a form letter for typing notices in an office		iii	
36.	(i)	Take a course in public speaking		i	
	(ii)	Take a course in business letter writing		ii	
	(iii)	Take a course in seamanships		iii	
37.	(i)	Use a duplicating machine to make copies of the minutes of the meeting		i	
	(ii)	Use a tractor to plough the farm in the Operation Feed the Nation Campaign		ii	
	(iii)	Use an advertising technique to launch a campaign for the sale of the articles		iii	
38.	(i)	Construct new designs for mechanical toys.		i	
	(ii)	Construct a sales recording system for a store or shop.		ii	
	(iii)	Construct an approach to settling marriage problems		iii	
39.	(i)	Describe to typists how official letters are to be addressed.		i	
	(ii)	Describe to technicians how electrical appliances are to be repaired		ii	
	(iii)	Describe to farmers the importance of the Operation Feed the Nation Campaign		iii	

40. (i) Find new methods to persuade parents to release their children for the U.P.E. programme

(ii) Find new methods to file letters and keep the records of all the official documents in an office.

(iii) Find new methods to repair high quality watches and clocks.

Most		Least
	i	
	ii	
	iii	

41. (i) Take a course in advanced Chemistry.

(ii) Take a course in advanced guidance and counseling.

(iii) Take a course in advanced shorthand

	i	
	ii	
	iii	

42. (i) Organise art exhibitions of the latest paintings and carvings

(ii) Organise refresher courses for the clerks on Office-Routine and general administration.

(iii) Organise courses for the trade union leaders on how to settle disputes between the employees and the workers.

	i	
	ii	
	iii	

43. (i) Read books on literature written by Nigerian authors.

(ii) Read books on statistics written by Nigerians.

(iii) Read books on Mechanics written by Nigerian engineers.

	i	
	ii	
	iii	

	Most	Least
44. (i) Conduct research into the records of the different musical instruments used in the past .		i
(ii) Conduct research into the traditional arts of our people		ii
(iii) Conduct research using objects of different shapes to determine which one falls faster in air.		iii
45. (i) Design the cover of a book in the art studies		i
(ii) Design an editorial review system for the college magazine		ii
(iii) Design an experiment to determine how much of a given substance will combine with a fixed amount of another substance		iii

R A T I N G S C A L E :

		% Most	%Least	% No.Response
01	Scientific			
02	Artistic			
03	Literary			
04	Mechanical			
05	Computational			
06	Musical			
07	Outdoor			
08	Clerical			
09	Persuasive			

APPENDIX B

CERTIFY COPY

Name.....

Dear Students,

Please fill in the following blanks as fully and as honestly as possible. Make sure that you answer ALL the questions.

Date.....

1. Name of School.....
   .....
2. Class.....
3. (i) Sex.....
   (ii) Age..... (to the nearest birthday).
4. (i) What is your father's occupation?.....
   (ii) What is your mother's occupation?.....
5. (i) What is your future career plan after completing your education?.....
   (ii) Why do you like this type of work?.....
   .....
6. (i) What is the career plan your parents have for you in future after completing your education?.....
   .....
   (ii) Why do they want you to do that type of work?.....
   .....

7. What were your scores in the last terminal examination in the following subjects?

(i) General or Integrated science) .....

(ii) Chemistry .....

(iii) Biology .....

(iv) Physics .....

8. If you are given further opportunity in future to pursue your education, would you prefer to study Arts subjects or Science subjects?.....

(N.B. Arts subjects: English Literature, History, Geography etc., Science subjects: Biology, Chemistry, Physics etc.).

9. Try to rate the following in the order in which each one helps you to promote your interest in science (i.e. A,B,C)

(i) Your science teachers.....

(ii) Your parents.....

(iii) The society.....

10. When you are confronted with problems in science, which of the following will you like to consult in order to solve your problems in the order of preference (i.e. A,B,C,)

(i) Consult my teacher to assist me in solving the problem

.....

(ii) Consult my science text books and materials to solve the problem.....

(iii) Consult an expert to solve the problems.....

11. (a) Which of the following factors stimulates you to develop interest in science subjects? Rate them in the order of their importance to you, i.e. A,B, C.

(i) Teachers' high command of the subject matter.....

(ii) Popularity of science subjects in schools.....

(iii) Availability of equiped laboratories for performing experiments in science.....

12. (i) Your teacher's personality.....

(ii) Suitability of the science text books to the course you are taking.....

(iii) The extra curricula activities like science clubs young farmers' club etc.....

A P P E N D I X C

CERTIFY COPY

AHMADU BELLO UNIVERSITY

DEPARTMENT OF EDUCATION

Ref. DE/25.4 14th June, 1976.

The Principal,
School of Basic Studies,
Ahmadu Bello University,
Zaria.

Dear Sir,

M. Ed. Research Project

The Department of Education, Ahmadu Bello University, Zaria, requires each post graduate student working for the M.ED. degree to conduct a research project in one's area of specialization.

Some of our students whose M.Ed. research proposals have been approved by the Department, are supposed to carry out their investigations during the year.

Through this letter, we request your permission and assistance to allow MR. M. A. AFOLAYAN, a post graduate student in this Department to conduct a pilot study on his research project in your school early in July 1976. You may wish to give us a convenient date.

We shall require about fifty (50) randomly chosen students from both the Science and the Arts disciplines.

Thanking you for your cooperation.

Yours faithfully,

DR. JACK REED,
for: Professor and Head,
Department of Education

A P P E N D I X C2

CERTIFY COPY

SCHOOL OF BASIC STUDIES

A H M A D U B E L L O U N I V E R S I T Y

Z A R I A, N I G E R I A

Ref. SBS July, 16, 1976.

Dr. J. Reed,
Department of Education,
Ahmadu Bello University,
Zaria.

Dear Sir,

M.Ed. Research Project: Mr M.A. Afolayan

With reference to your letter dated 15th June, 1976, I hereby approve that the above-named postgraduate student in your department is allowed to conduct the pilot study on his research project in the School of Basic Studies this July. You may not be aware that the new students are yet to come in and so would not be possible for him to conduct the study at the time stated in your letter. As the Orientation Programme begins on the 21st of this month, it would be advisable for him to wait a week after the Orientation before such a Project is undertaken. Mr. Afolayan is advised to contact the Head of Science Division, Dr. A.K. Medugbon about the time that would be most suitable.

I sincerely hope this arrangement would be convenient for Mr. Afolayan.

Yours faithfully,

U.A. ANGULU
Principal

cc: Mr. M.A. Afolayan
Head of Science Division.

A P P E N D I X C3

CERTIFY COPY

AHMADU BELLO UNIVERSITY,
Department of Education,
Zaria.

Ref. DE/25.4

24th June, 1976.

The Permanent Secretary,
Ministry of Education,
Kaduna.

For the attention of:
The Chief Inspector of Education

Dear Sir,

M.Ed. RESEARCH PROJECT

The Department of Education, Ahmadu Bello University, Zaria requires each postgraduate student working for the M.Ed. degree to conduct a research project in one's area of specialization.

Some of our students whose M.Ed. research proposals have been approved by the Department, are supposed to carry out their investigations during the year.

Through this letter, we request permission and assistance to conduct the following research investigation in the Secondary Schools of Kaduna State.

Title of the Research Project: "AN INVESTIGATION OF FACTORS AFFECTING SCIENCE INTEREST OF SECONDARY SCHOOL STUDENTS IN THE KADUNA STATE OF NIGERIA".

Student-Researcher: MICHAEL A. AFOLAYAN (MR.).

Thanking you for your continuing cooperation.

Yours faithfully,

DR. JACK REED.
for: Professor and Head
Department of Education

A P P E N D I X C4
CERTIFY COPY

M I N I S T R Y O F E D U C A T I O N

NORTH-CENTRAL STATE

P.M.B. No. 2017

KADUNA

Ref. No NCE/CIE/A14T/Vol.1/2 28th June, 1976

The Principal,

M.Ed. Degree Research Project

I am directed to inform you that Mr. Michael A. Afolayan, a Post graduate student working for M.Ed. Degree, has been permitted to conduct a research investigation in the Secondary Schools of Kaduna State.

2. You are requested to give him your necessary co-operation.

(A. A. MANI)
Staff Inspector (Science)
For: Permanent Secretary,
Ministry of Education
Kaduna State
Kaduna.

CERTIFY COPY

A P P E N D I X C5

Ahmadu Bello University,
Department of Education,
ZARIA.

Ref. DE/25.4 August 1976.

Kufena College,
Zaria.

Dear Sir,/Madam,

M.Ed. RESEARCH PROJECT

Enclosed herewith are cerfified copies of the letter written to the Permanent Secretary, Ministry of Education, Kaduna State, seeking permission and assistance to conduct a research project in the Kaduna State Secondary Schools in connection with MR. M. A.AFOLAYAN M.Ed. Course; and the subsequent reply from the Ministry of Education, Kaduna State.

I should therefore be very grateful if you would give us a convenient date in September 1976 when you would permit MR. M. A. AFOLAYAN to visit your school in order to administer his questionaire to the Students in Forms III and V of your school.

We shall require about fifty (50) randomly chosen students from both the Science and the Arts disciplines in each of the Classes mentioned above.

Thanking you for your cooperation.

Yours faithfully,

JACK A. REED
FOR; Professor and Head
Department of Education

A P P E N D I X C6

CERTIFY COPY

GOVERNMENT GIRLS' SECONDARY SCHOOL

P.M.B. 1037

SOBA-ZARIA

Ref No GGSS/SB/99/Vol.1/97 7th September, 76.

M.Ed. RESEARCH PROJECT

Your letter No.DE/25.4 of 3rd August 1976 refers.

2. Mr. Afolayan may call in this institution at 12.00 noon on Monday, 20th September, 1976 to administer the questionaire.

3. At this point in time, I wish to request that Mr. Afolayan sends us a short report of his findings after the completion of his work as I am sure it will be of some help to us.

A. H. GANDU (MRS)
Ag. Principal.