THE RELATIONSHIP BETWEEN DIMENSIONS OF STUDENTS' MOTIVATION AND SCIENCE ACHIEVEMENT IN SENIOR SECONDARY SCHOOLS OF ABIA STATE, NIGERIA

BY

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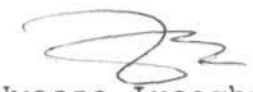
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DECLARATION

I hereby declare that this thesis has been produced by me. It has not been presented in any previous submission for higher degree to the best of my knowledge. All quotations are indicated by quotation marks and sources of information are duly acknowledged by means of references.



Nwaeze Iroegbu

CERTIFICATION

This thesis report entitled "The Relationship between Dimensions of students' Motivation and Science Achievement In Senior Secondary Schools of Abia State, Nigeria by Nwaeze Iroegbu meets the regulations governing the award of the degree of Master of Education of Ahmadu Bello University, and was approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to my beloved wife.

ACKNOWLEDGEMENT

I like to express my profound gratitude to all those who have in one way or the other been instrumental towards the successful completion of this work. I am highly appreciative of the co-operation, scholarly advice and constructive criticisms that I received from my supervisor in the person of Dr. A. A. M. Shaibu a Senior Lecturer in Science Education former Head of Science Education Section, in the Department of Education, Ahmadu Bello University, Zaria. Without his valuable counselling the realisation of this work would have been a mirage.

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ABSTRACT

This study was undertaken to find out the relationship between students' achievement in science and the dimensions of students' motivation in Abia State of Nigeria.

The respondents of the study consisted of SS 3 students from 16 senior secondary schools in Abia State. The population of the study comprised 155 Senior Secondary Schools of Abia State, Nigeria. The data for the study was collected using questionnaire with reliability cofficient of 0.65.

The Pearson's Product-Moment correlation coefficient was used to test the relationship between the dimensions of students' motivation and their Science achievements. It was also used to test the hypotheses formulated for the study, alongside the t-test distribution. All these were tested at 0.05 level of significance.

The findings of the study were as follows:

1) **There was significant relationship between parental support and the students' achievement in science.**
2) **There was significant relationship between teachers' support and the students' achievement in science.**
3) **There was significant relationship between peer-group influence and the students' physics achievement. Biology and chemistry achievements were related to peer-group**

influence but not significantly.

4) There was significant relationship between availability of resource materials and the students achievement in science.

5) There was no significant relationship between availability of career guidance services and the students science achievements.

6) There was significant relationship between test anxiety and the students' achievement in science.

7) There was significant relationship between incentive and the students' chemistry achievement. Biology and Physics achievements of the students related to incentive but not significantly.

For chemistry and physics achievements five of the null hypotheses were rejected while two were retained. On the part of biology achievement four out of the seven null hypotheses were rejected while three were retained.

In the light of the findings from this study, some of the recommendations are that:

1. parents, teachers and administrators of education should provide structure autonomy and involvement to the students. This recommendation is made because the study revealed that parental and teachers support correlated positively with science achievement. These play

facilitative roles in science achievements. Their absence led to poor performance of students.

2. the Abia State School system should employ more science teachers. Good qualified science teachers will assist the students regain confidence in themselves. This confidence will help them consider themselves competent and therefore strive for excellence.
3. science teachers with their laboratory assistants should organise science practicals constantly in all the basic sciences. This will help to keep the anxiety of the students at normal level.

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ABBREVIATIONS

SSCE:	Senior school Certificate Examination
SSS:	Senior Secondary School
JSS:	Junior Secondary School
STL:	Scientific Technological Literacy.
SES:	Socio-Economic Status
WAEC:	West African Examination Council
GCE:	General Certificate of Education
TAT:	Thematic Apperception Test.

DEFINITION OF TERMS

Basic Science: These are fundamental subjects one must know before pursuing courses in applied sciences. These are biology, chemistry and physics.

Dimension: In this study dimensions are understood as factors. Thus dimensions of motivation refer to motivational factors.

Performance: One's out put; achievement doing a piece of work one is ordered or desired to do. In this study performance is synonymous with achievement.

Achievement Motivation:

The psychological process of affective experiences with needs and the expression of those needs in the attainment of standards of excellence in a wide range of activities in the academic context.

Motivation: The stimulation to action resulting from an individual's desire to reach an established goal or purpose. It is both external and internal urge that help to sustain human behaviour.

Achievement Strivings:

Efforts or struggling made to succeed or accomplish a task.

Motives: All the forces underlying human behaviour whether physiological or psychological. They initiate, direct and sustain hebaviour.

Psychogenic Needs:

Needs that have to do with the mind, belief or mental state; that help to attain a state of self actualization.

Instinct: Natural tendency to behave in a certain way without reasonning or training.

Drive: The need that generate activity to satisfy or attain a particular goal. It is a force, thus energy is used.

Obsession: Being troubled in mind; Harassing.

Physiogenic: Relating to physiological evolution and development.

Affective - Connative Factor:

Emotional co-existing factors. Factors that have the same origin.

Ethology: The scientific study of animal behaviour. The science of the formation of human character.

Cognitive engagement:

The act or activity that involves knowledge, apprehending.

Attitudes: A learned predispositions to respond either positively or negatively.

Cognition: The process of gaining knowledge about the world through sensing, perceiving, using symbol and reasoning. Know the world through the use of one's perceptual and conceptual abilities.

Perception: The awareness of ones environment obtained through interpreting sensory data.

Peer-Group: Group of persons who constitute one's associates, usually of the same age and social stuatus.

Science Students:

In this study the science students are those students that offer at least two of the basic sciences.

CHAPTER ONE

1.1 Introduction to the study

This study is aimed at investigating the dimensions of students' motivation and their relationship with students' achievements in science subjects. There have been concern by governments (Federal and States) and individuals about the low standard of students' achievement in science subjects in schools. In a workshop organized on the future of basic sciences in Nigeria's technological development at the University of Nigeria, Nsukka, Dosumu (1983) said "the gradual decline which has been observed in the study of and pursuit of careers in the basic sciences has led to so many researches. From the results available one cannot but be concerned," Ogunyemi (1983) observed that the percentage of failures is more than those of passes in the results of the post primary school sciences. She added that this gives cause for concern. Nwosu (1994) directed that principals who read sciences should teach some periods to relieve the science teachers of much load, while principals who did not read sciences should make arrangements to see that their science teachers are not over-loaded. He also directed that six hundred science teachers be employed in Abia State School System. It can be argued that this was borne out of the government's concern over the poor performance of science students in the past Senior School certificate examination.

Akpan (1986) also said:

> "The problem of poor achievement in science, Technology and Mathematics (STM) have become too obvious and have been the concern of many conferences, policies and strategies aimed at correcting the situation."

In a recent study, Olorundare (1993) said that for the past five years, the nature, practices and the results of schools in sciences have become points of serious concern to the entire people of Nigeria. He added that the feelings of millions of parents and guardians have gone from a basic concern to obsession.

The results of Senior School Certificate Examination covering 1988 to 1995 in basic sciences combined with the General Certificate of Education Ordinary level results in the subjects for the same period is presented in Table 1.1.

Table 1.1:
ACHIEVEMENTS OF CANDIDATES IN SENIOR SCHOOL CERTIFICATE EXAMINATION (SSCE) (1988 - 1995) IN NIGERIA.

YEAR	SUBJECTS	NO. THAT SAT	NO. THAT PASSED 1-6	% THAT PASSED IN 1-6
1988	BIOLOGY	89,342	8,309	9.3
	CHEMISTRY	34,508	7,143	20.7
	PHYSICS	26,297	8,284	31.5
1989	BIOLOGY	87,710	10,350	11.8
	CHEMISTRY	35,705	3,856	10.8
	PHYSICS	28,525	2,710	9.5
1990	BIOLOGY	190,386	22,466	11.8
	CHEMISTRY	80,059	3,282	4.1
	PHYSICS	63,161	13,159	20.7
1991	BIOLOGY	285,690	72,850	25.5
	CHEMISTRY	116,256	13,253	11.4
	PHYSICS	96,742	17,026	17.6
1992	BIOLOGY	355,582	99,918	28.1
	CHEMISTRY	140,856	26,762	19.0
	PHYSICS	122,809	20,140	16.4
1993	BIOLOGY	481,034	43,271	18.7
	CHEMISTRY	170,537	39,223	23.0
	PHYSICS	152,275	37,307	24.5
1994	BIOLOGY	508,384	57,955	11.4
	CHEMISTRY	161,232	38,212	23.7
	PHYSICS	146,000	21,462	14.7

YEAR	SUBJECTS	NO. THAT SAT	NO. THAT PASSED 1-6	% THAT PASSED IN 1-6
1995	BIOLOGY	453,353	85,683	18.9
	CHEMISTRY	133,188	48,880	36.7
	PHYSICS	120,768	22,825	18.7

SOURCE: WAEC (STATISTICS OF ENTRIES AND ACHIEVEMENT)

Looking through the figures one would observe that the students' performance in the science subjects have been below 30% except in 1988 that SSCE result in Physics was just slightly above 30% and in 1995 Chemistry result was above 30%. The performance of students in Biology seem to be the poorest compared to other subjects, since it was mostly below 20%, yet candidates generally think that it is an easier option.

The basic sciences (Chemistry, Biology and Physics) are very relevant in pursuit of such courses like Medicine, Engineering, Architecture and other related fields. Hence a student has to pass these subjects at the credit level before he can be considered for admission into institutions of higher learning especially the Universities. If this poor performance in basic sciences remains unchanged it will not augur well for the desired technological development of the nation. It will mean that only a relatively small number of students from the secondary schools will continue to be qualified for enrolment into institutions of higher learning

each year. This will result in shortage of relevant manpower in the long run. For instance in a survey by Ogunniyi et al. (1992) concerning Scientific Technological Literacy (STL) in Nigeria, they found that there were gross inadequacies in human and material resources in schools, industries and other places. This according to them, hindered the promotion of science and Technological Literacy in Nigeria.

According to Olorundare (1993) the world itself is one global village and as such, the country exists among determined well-educated and strongly motivated competitors; competing with them for international standing, markets, ideas and products. The country is still largely an importer of essential commodities. If these disturbing conditions are to be checked then the standard of the educational system must be beefed up and this has to be done urgently in the areas of basic sciences, he added.

Some factors which are believed to be responsible for the poor academic performance of students in basic sciences include the following:

i) Non-availability of Resource Materials

In all works of life and every field of endeavour it is important that equipments and material resources be made available for human-beings to perform according to standard. For instance if a student comes into a class without pencil or pen and exercise book, he would not

perform adequately. Basic sciences are practical-based subjects; there are essential equipments and materials needed for the practicals to hold. These have to be provided for good performances. It was in the light of this that Tambawal (1991) said that where resource materials are not adequately provided in a school system, the teachers of such schools will not be performing their best. This will seriously affect the performances of the students adversely. Adeyegbe (1993) also said that many schools cannot boast of well equipped laboratories. In their earlier study, Adeyegbe and Olamusi (1987) observed that it is only, when West African Examination Council (WAEC) sends out her instructions on practicals to supervisors that some schools hurriedly run to purchase few laboratory equipments. Adeyegbe (1988) found that 75% of the periods allocated to practicals in sciences in Nigerian schools are used by the teachers for theory lessons. One reason behind this is shortage of facilities. According to him, lack of adequate laboratory and technical workshops is bound to affect the teaching and learning of science subjects adversely and hence the performance of students in them.

ii) Parents' apathy towards the Education of their Children

Parents who show little or no interest in the education of their children would find that the

performance of the children would need much to be desired. Madugu (1977) in his studies found out that the negative attitude of parents in Sokoto state of Nigeria led to the poor academic performance of their children. Igwe (1990) in his study also reported that family background and the socio-economic status (SES) of a home can be responsible for students poor performance.

iii) Overloaded Curriculum

In the early 1960s English and Mathematics were taught everyday of the school week. Also sciences were given at least four periods of fifty minutes per week. There was enough time to cover major parts of the science curriculum in the classroom, resulting in good performance in the basic sciences. Presently, the time-table carries technical and vocational subjects without any reduction in the secondary subjects. This has drastically reduced the number of periods and the time allotted to the sciences. Each period is hardly up to forty minutes in duration. The basic sciences are scarcely given up to three periods of 40 minutes each. This is not enough to cover the content of the curricula. Adeyegbe (1993) reporting on the senior secondary school (SSS) curricula and the students' performance said that the teachers have been grappling with the teaching and the coverage of the topics in science syllabuses within

the available time. In an earlier study Adeyegbe (1991) opined that the time available at the teachers' disposal to teach the content of the curricula is just too small. According to him there are one double and one single periods weekly for each of the science subjects.

Also in most schools the SSS 1 students do not start effective class sessions until the first half of the first term is gone. This is because they would be awaiting the result of the JSS examination. This coupled with the fact that the third term of SSS 3 is utilized for revision and the final examination which reduces the already inadequate time. Thus the major part of the syllabuses would not be properly covered leading to poor performance.

iv) Lack of clearly defined philosophical framework:

In the opinion of the researcher, science is a problem-solving tool which draws out the ingenuity, creativity and other qualities embedded in man. This enables him to conquer his environments and make life more meaningful. It makes the individual ask questions the answers to which enable him discover the treasures in nature. For science to succeed in this task it will require a clearly defined scientific philosophy to guide the teaching and learning. Researchers have commented on this. For example Okoli (1978) pointed out that the

greatest maladies in the teaching of science in the secondary schools, is that teachers do not approach it in the true spirit of science. Shaibu (1993) said;

> "There is no indication that the status-quo has changed and that it is reasonable to suppose that the solution to these maladies will remain elusive as long as the fundamental issue of the philosophical basis of teaching/learning is not adequately clarified and made explicit to the teacher and more importantly the student as well".

According to him teachers' classroom transactions sometimes do not derive from any philosophical view point of science resulting in their stirring up confusion and contradictions. To him theories of educational practice in science are only meaningful to the extent that they derive from understandable philosophy of science. On the other hand if the philosophical basis is sterile or wrong it will not augur well for effective science learning. For instance the "objective view" of science portrays science as a distant and impersonal phenomenon and gives the impression that science is not within the intellectual capability of everyone. Shaibu (1993) further said that this does not help the progress of science education in schools especially in the area of learning science concepts and the acquisition of scientific attitudes. In this condition the learner will not be contributing in the learning process.

v) The Teacher Factor:

The teacher is an important factor in any educational system. There are not enough teachers in schools who can teach the basic sciences. This is worsened by the establishment of more secondary schools called neighbourhood schools. This has also hindered performance in sciences. Assuzu (1980) in his study of quality and quantity of staff in relation to students performance in science subjects found that schools with high quality science teachers and high number of science teachers achieved better in the sciences.

vi) Quality of Students from the JSS:

The quality of students to be exposed to the Senior Secondary School science curriculum are expected to be above average in intelligence. In support of this, Adeyegbe (1993) said that the implementation of science curricula is predicted on the quality of students from the JSS level, since the SSS is supposed to be for those students who are academically able and are willing to have a complete 6-year secondary education. To ensure this, screening based on aptitude Testing ought to be done in JSS 3 to categorize the students into those that can benefit from the academic activity in SSS level and those who cannot. Adeyegbe (1993) lamented that this is not being done in the schools. Thus the SSS1 classes are

not filled with the right calibre of students.

vii) Other Factors Affecting Performance in Science

Some other factors that need mentioning include the following:

(a) Short supply of test-books, Ogunyemi (1983), Adeyegbe (1993).

(b) Irregular payment of teachers salaries which lead to constant strike actions, Ogunyemi (1983).

(c) Inadequate attention paid by students to their studies, Madugu (1977).

(d) Imposition by parents of science subjects on their children inspite of their poor aptitude for sciences Ogunyemi (1983).

(e) Predominance of expository method of teaching, Ajeyalemi (1983).

(f) Lack of motivation, Madugu (1977).

(g) Abstract nature of sciences or the apprehension that sciences are naturally difficult subjects to learn by students, Soyibo (1986).

1.2 Motivation and Achievement:

Motivation is a psychological term which many scholars have defined in different ways. Beard and Senior (1980) said that motivation is understood by the teacher as:

"the urge to work independently, applying oneself

> to his work, interest in one's task or course he has chosen, the desire for a good qualification and a good employment, the determination to pass examination, a defined goal which one has set for himself, sustainance of enthusiasm".

According to them, psychologists view motivation under two different schools of thought. Members of the cognitive school describe motivation in terms of drive, goals and needs of the learner which prompts him to act. The behaviourist orientation talk of an increase in the level of response in an organism following an increase in the stimulus. Vernon (1971) described motivation as a kind of internal force which arouses, regulates and sustains all one's important actions. To him motivation is an internal experience which cannot be studied directly. Its existence and nature is inferred from observation of behaviour. This is the type of behaviour which is persistent and involve the employment of considerable energy accompanied by the feelings of impulsion and desire. Vroom (1984) described motivation as a product of desire and expectancy. He said, "people will not change (for good) unless they want to change and they think they can change. If either the desire to change or the hope that change is possible is missing a person will not be motivated to change for better."

Abdullahi (1991) defined motivation as: "the energizing force that induces or moves an individual towards an activity". According to him, this means all the forces underlying human behaviours whether psychological motives or physiological. In

the classroom situation motivation is seen in terms of all those factors that initiate, direct and sustain learning in the individual. In this study motivation is defined as the influence that stimulates a person to action, which will bring him to an expected or determined goal or purpose. It is both external and internal urge that help to sustain human behaviour. The Oxford Advanced Learners dictionary of current English by Hornby (1963) defines performance as notable action; achievements, public exhibition, concert, doing a piece of work one is ordered to do.

Vroom (1984) defined achievement as a product of motivation and ability. According to him, behaviour is influenced not only by ability but also by how much individuals want to do certain events and how much they expect that they will do it.

In this study achievement was measured by students' scores in the various science subjects - Physics, Chemistry and Biology obtained from the standardized students' continuous assessment scores.

1.3 Dimensions of motivation

Motivational factors in education are those factors that stimulate students to learn, and that would help them achieve their goal. In this study the motivational factors to be investigated are the following:

1.3.2 Parental Support:

Academic achievement can be improved when parents are involved in the learning of their children. Abdullahi (1991) pointed out that parents' lack of interest in the education of their children could come from the fact that they perceive the school work as not likely to lead the children to the best sort of life. Therefore they do not motivate them by helping them to do their homework and in some cases they do not provide the text-books the children need. Ogunyemi (1983) pointed out that when parents do not assist their children to be punctual and regular in school, the children would most times be punished for lateness and absenteeism. This leads to improper use of their time, they could have used for reading and taking lessons. The result of this irregular presence in class will be poor performance.

1.3.2 Teachers' Support:

The importance of teachers' in motivating students cannot be overemphasised. The teacher and the students are two important factors in every educational system. Simpson (1978) indicated that the teacher is one of the most important factors in influencing students' achievement as well as the students' feelings towards science. He therefore advocated that students should appreciate the teachers' support. Brophy (1986) gave a wide array of teachers' support including guidance, sincere praise, reinforcement, interest in the

students' progress. Another suggestion by Skinner and Belmont (1993) has as its cornerstone the notion that the source of motivation is internal to the child so that when the child's basic psychological needs are fulfilled by the social environment, motivation flourishes. The students' needs, according to this perspective, include the needs to be competent, autonomous and related to other people. Teachers' support that can foster the fulfillment of the basic psychological needs of the students can be summarized as: provision of structure, autonomy support, and involvement. Structure in this context refers to the amount of information, about how to effectively achieve desired outcome; teachers can provide structure by clearly communicating their expectations, by offering help, by responding consistently to students' curiosity and by adjusting their teaching strategies to the students' level. Researchers who have worked in this area include Skinner (1991) and Schunk (1991).

Autonomy support refers to the amount of freedom a child is given to determine his/her own behaviour. Teachers can support autonomy by allowing children latitude in their learning activities and by providing connections between school activities and children's interest.

Involvement refers to the quality of the interpersonal relationship with teachers and peers. Teachers are involved with students to the extent that they take time to express affection towards them, enjoy their students' interaction with

them, and dedicate resources to their students. In this study the areas of teachers support investigated include involvement, structure and autonomy support.

1.3.3 Availability of Resources:

Resources are facilities which help in the teaching and learning of science. They include laboratory equipments, amenities like electricity and water etc. Discussing about resource materials, Tambawal (1991) said "It has become known that lack of sufficient resource materials in schools can have adverse effect on the learning experiences of students." According to him lack of these could be responsible for low performance of students. Macquade (1938) argued that a classroom, like an efficient office, is supposed to be physically pleasant, comfortable, stimulating and adaptable to the work of the students. Appraising the first cycle of operation of the senior secondary school science curricula in relation to candidates performance, Adeyegbe (1993) found that many schools in Nigeria did not have well equipped laboratories. This resulted in lack or shortage of practicals lessons essential for the understanding of the science concepts. Thus the performance of the students was below standard. Other studies that have confirmed the importance of resource materials for effective learning in the sciences include those of Assuzu (1980) and Sorunke (1982).

1.3.4 Career Guidance:

It is a laudable development that career Guidance services have been given a prominent place in the present secondary education system. The secondary school students who are mostly adolescent need leadership and direction to be useful to themselves and the society at large. Durojaiye (1972) explained that guidance and counselling formed part of the educational programme to help provide every student with special information services, opportunities to enable him/her develop his/her abilities, aptitude and capabilities to the fullest. Through guidance the student is led to discover who really he/she is and in counselling the student is led to discover and apply what he/she can do to solve problems. Madugu (1977) found that a well-planned school guidance programme would usually have three generally accepted components which are: educational guidance; vocational guidance and personal counselling. When these components are adequately harnessed in guiding the student, he will be motivated to learn. Banu (1992) reported that students' motivation will be increased towards sciences if they become aware of the numerous career opportunities existing for qualified scientists.

1.3.5 Peer-Group Attitude towards Learning and Academic Achievement:

The Peer-group is made up of associates in a profession, or of a common idealogy, interest etc. Many studies have been

carried out on the influence of peers on students' motivation in schools. The studies show that there are divergent views. On one hand some educators and social scientists have argued that peer group influence contribute to lack of effort and interest in school work, Bishop (1989), Goodlad (1984). On the other hand in another study most students said that their peers pressured them to work hard to get good grades more often than they discouraged them from school work, Brown et al (1983). A third position which results from most of the empirical research done points out that the effect of peer group influence can be either positive or negative. Its effects depend on the attitudes and values of the peers with whom the student spends most of his/her time, Epstein (1983). If these peers have little motivation to achieve in school, the students' own motivation is likely to decrease over time. If they have a high level of achievement motivation the students' motivation is likely to increase, Berndt et al, (1990). This view was also shared by Abdullahi (1991) who said that if the peer-group has poor attitude towards learning and academic achievement members would also be similarly affected.

1.3.6 Incentives:

Incentives are external conditions which arouse the interest or encourage a person to perform or respond positively. This could be in the form of praise, success,

knowledge of results (feedback) etc. Young (1941) in his review of motivation included knowledge of results among the determinants of motivation and stated that it influenced the degree of learning. Marx (1960) also included knowledge of result as a learnt drive. Researchers have also shown that reward perceived as positive feedback is motivating, Deci (1975), Weiner (1990). According to Weiner (1990) rewards for successful completion of a difficult task indicates that hard work was expended in conjunction with high ability and that this belief augments motivation.

1.3.7 Anxiety: is a feeling of general uneasiness, a sense of foreboding, a feeling of tension, shown by individuals when they think they would not be able to complete a task. These feelings are intense and affect behaviour. There are various dimensions of anxiety. There is the state anxiety explained by Shuell (1981) as that which occurs in specific threatening situations. Thus a person who is not usually anxious may become so under certain circumstances, Trait Anxiety is another type of anxiety. According to Wrightsman and Sanford (1975), it is the situation where the individual responds to unpleasant types of conditions with sweaty palms, a rapid heart beat and the feeling of foreboding. People in this state feel the anxiety more intensely than others.

Social evaluative Anxiety according to Watson and Frieud (1969), is the experiencing of distress or tension in social

situations together with a concern over receiving negative evaluation from others.

Test Anxiety: It is an emotional condition by which there is uncertainty about the future caused by the need to avoid failure in an examination situation. Wine (1971) and Sarason (1973) said "it is a situational state though specific still reflect an undifferentiated dread". Sarason (1980) said that test anxiety has become prominent because test situations occur frequently and assume so much importance in the lives of so many people. Researchers have found that highly anxious students do not perform well. Hembree (1988) found that high test anxious student performed poorly on tasks of intellectual aptitude than students who were less anxious.

1.4 Objectives of the study

The objectives of this study are:

1. To find out if motivation is associated with academic achievement in secondary school science subjects amongst Abia State Students.
2. To find out which of the dimensions of motivation under investigation associate to learning best.
3. To find out whether extrinsic motivation augments intrinsic motivation.

1.5 Statement of the Problem

It has been observed by many investigators that one of the major factors responsible for poor achievement by secondary School Students in Science subjects is lack of sufficient motivation, (Abdullahi 1991, Balarabe 1989, and Madugu 1977). This study therefore focusses on the dimensions of motivation as they relate to academic achievement of secondary school science students in Abia State. The dimensions of motivation as envisaged in this study have been discussed in Section 1.3.

The study seeks answers to the following questions:

1. What is the relationship between parental support and the achievement of their secondary school children in science subjects?
2. What is the relationship between teachers' support to the students and their academic achievement in science subjects?
3. What is the relationship between the peer-group influence and the academic achievement of secondary school students in science subjects?
4. What relationship has availability of resource materials with the academic achievement of secondary school students in sciences subjects?
5. Does Career guidance services relate with the academic achievement of the secondary school students in sciences?
6. What is the relationship between Test Anxiety and the academic achievement of Secondary School Students in

sciences?

7. What is the relationship between external incentive and the academic achievement of the Secondary School Students in sciences?

1.6 Hypotheses

The following null hypotheses were tested.

1. There is no significant relationship between parental support and students' academic achievement in secondary school science subjects.
2. There is no significant relationship between the teachers' support and the students' academic achievement in the secondary school science subjects.
3. There is no significant relationship between peer-group influence and the students' academic achievement in secondary school science subjects.
4. There is no significant relationship between the availability of resource materials and the students' academic achievement in the secondary school science subjects.
5. There is no significant relationship between availability of career guidance services and the students' academic achievement in secondary school science subjects.
6. There is no significant relationship between Test Anxiety and the students' academic achievement in the Secondary School science subjects.

7. There is no significant relationship between application of incentive and the students' academic achievement in the secondary school science subjects.

1.7 Significance of the study

The findings of this study will help:

1. to guide educational policy makers involved in decision making in Abia State on how best to improve students achievement in the basic sciences.
2. parents realise that their support to their children is important towards their academic achievement.
3. school administrators to improve personnel management in the school system.
4. students associate with peer-groups that will increase their achievement motivation.

1.8 Delimitation of the study

In this study, an attempt is made to investigate the relationship that various dimensions of students' motivation have on the academic achievement of the secondary school science students in Abia State of Nigeria. The study is limited to selected senior secondary schools in the three educational zones of Abia State. A total of sixteen (16) schools out of 155 from the three educational zones were randomly selected for the study. In these schools, the senior secondary school students were the subjects of the study.

1.9 Summary

This chapter has highlighted the concern for the poor achievement of secondary school students in sciences and the importance of basic sciences for professional courses. Some of the factors believed to be responsible for the poor academic achievement of science students were discussed. These include: non-availability of resource materials, parent's apathy towards the education of their children, overloaded curriculum, lack of clearly defined philosophical framework, the teacher factor and quality of students from the JSS. Motivation was defined as the influence that stimulates a person to action, which would bring him to an expected or determined goal or purpose. It is both external and internal urge that help to sustain human behaviour. Students' motivational dimensions discussed include: parental support, teachers' support, peer-group influence, availability of resources, incentives and test anxiety. Performance was seen as achievement and this is being measured by students' scores in the various science subjects obtained from the standardized students' continuous assessment scores.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

In this chapter relevant literature relating to the study are reviewed. These are set out under the following sub-headings:

- Ethological Evolution of Motivation
- Brief Historical Review of Motivation.
- Types of Motivation.
- Theories of Motivation.
- Extrinsic Motivation and Motivational Sources.
- Intrinsic motivation illustrated with anxiety,
- Academic Performance and Motivation.
- Summary.

2.2 Ethological Evolution of Motivation

There have been various attempts to explain the behaviour of man and animals. According to Hokanson (1969) man's behaviour is motivated by man's free will and his ability to exercise rationality. To him man reasons and evaluates alternative causes of action and makes free and rational choices. He pointed out that this rationalists' philosophy was universally accepted by the great Greek thinkers like Plato, Aristotle and others.

With the re-emergence of physical science around 17th and 18th centuries the mechanistic view of motivation emerged. For Descartee (1650)behaviour for man was the result of a complex interaction between the bodily condition and the

exercise of rationality. Hobbes (1679) held that behaviour could be accounted for on the basis of physical motion. He maintained hedonistic position in which man was viewed as being motivated by the pursuit of pleasure and avoidance of pain.

Ferguson (1976) observed that in the latter part of 19th century, motivation was conceptualized largely in terms of "instinct" (natural tendency to behave in a certain way without reasoning or training) in keeping with biological approach to the study of behaviour. This was mainly as a result of the work of Darwin (1959), in which life was viewed as involving continual competition and struggle for existing food, space etc in which the organism with the most appropriate adaptive features survived i.e. "survival of the fittest". Instinct was then preferred over the concept of will in scientific community of that period. This is because to them free-will implied lack of determinism and at that time scientist sought for deterministic causes of behaviour. Scientists later discovered a number of theoretical and practical deficiencies in the concept of instinct and abandoned it. The concept of drive replaced that of instinct. With the work of Thorndike (1911), Watson (1919) and other motivational theorists of 1920s and 1930s the concept of instinct receeded. Thereafter the concept of drive resulting from the work of Hull (1941) emerged. The meaning of the term drive was anchored on the biological system in which energy is

expended.

Freud (1915) and other early psychologists used it in this sense. After sometime, many psychologists rejected the concept of drive. They insisted that humans are more than machines or lower animals hence drive was not a suitable term to describe human behaviour, Ferguson (1976). The use of the term drive thus declined in favour of the generic term 'motivation.'

2.3 Brief Historical Review of Motivation in Education 1930-1990

Weiner (1990) made a review of motivation in education which covered a period of 60 years, from 1930 - 1990. He found that motivation lost its popularity in the field of psychology within the period, 1930 - 1970 but re-emerged as from 1980s, (Ames and Ames 1984, 1985, 1989, Ball 1982). Weiner (1990) made use of articles of Young (1941) Marx (1960) Ball (1982) and his earlier work, Weiner (1969) in Encyclopedia of Educational research. The review as it relates to the present study will be discussed to cover three main periods.

In the period covering 1930 - 1950, the major research topics include: need and activity level, incentives, knowledge of results; praise and reproof, success and failure, Young (1941). The mechanistic view of motivation was popular at

this time, (Hull 1943 Spence 1958). There was also the basic need state exemplified by Murray's writings, Murray (1938). Basic research on motivation was associated with sub-human behaviours. At this period the motivational psychologist held the view that motivation could be studied separately from learning; while educational psychologists said the study of motivation is confined within the field of learning, Weiner (1990).

In the period covering 1950 - 1970 the machine-metaphor of motivation model was linked with energy and drive levels, Marx (1960). This was illustrated by: drive and learning, fear and anxiety; arousal and reward. However, Weiner (1969) shifted from mechanism to cognition. Cognitive approaches to motivation carried the day. Researchers began to concentrate on human behaviour. Issues associated with success and failure, achievement strivings formed the heart of motivational studies, (Alkinson 1964, Weiner 1969). Attention was focussed on individual differences with persons characteristised as high or low in achievement needs and in anxiety.

The trends observed in the 1960s overlapped the period, 1970 - 1990. Achievement strivings and cognitive studies remained popular, Ball (1982). There was also the attribution theory, environmental determinants, Weiner (1990). Attention was paid to self as illustrated in self-esteem, self-efficacy, Bandura (1977) and Weiner (1990).

Weiner (1990) predicted that from 1990s to the year 2000, school motivation cannot be divorced from the social fabric in which it is embedded. This means that the social components of the environment will influence classroom motivation, hence the present study.

2.4 Types of Motivation:

Motivation is the hidden urge which impels an individual to behave in certain ways. This urge may be purely involuntary, like the need for food or it may arise from a rational decision to achieve a certain end or it may be the result of a combination of both of these factors. The nature of motivation is inferred from a range of indirect sources since its direct study is difficult. It develops during childhood and from then on it is a vital part of every day experience, Vernon (1971). Abdullahi (1991) defined motivation as the energizing force that induces or moves an individual towards an activity. According to him, this means all the forces underlying human behaviours whether physiological or psychological motives. In the Classroom situation motivation is seen in terms of all those factors that initiate, direct and sustain learning in the individual.

Murkherjee (1978) defined motivation as the phenomenon involved in the operation of drives, incentives, and motives. According to him motive is an affective-connative factor which

operates in determining the direction of an individual's behaviour towards an end or goal consciously or unconsciously apprehended. Viewing motivation in this way presents it as consisting of factors that can be controlled by the teacher in the process of learning. Thus, his definition supports the two types of motivation described by Smith *et al.*, (1961), that is, the intrinsic and extrinsic motivation. Motivation resulting from goals or purposes that are accepted from others as a result of outside influence is extrinsic motivation. Intrinsic motivation is associated with actions coming from within the person due to personal interest while extrinsic motivation is associated with rewards or incentives coming from without due to external environmental influences. This study will involve both types - intrinsic and extrinsic motivations.

Another type of motivation is achievement motivation. Motives and motivation can be used interchangeably, but for the purpose of this study motivation takes precedence. Achievement motivation is a learned disposition which provides a tendency for the individual to seek success in an achievement situation, Atkinson (1964), McClleland *et al* (1953). This disposition become stronger when there is a moderate expectation of success, and a moderately strong incentive for success.

Murray (1938) said, that the need for achievement is a desire or tendency to overcome obstacles, to exercise power,

to strive to do something difficult as well and as quickly as possible. Thus to him achievement motivation is a moving force behind the desire to overcome obstacles, or do something that is difficult as well and as quickly as possible. Arglye and Robinson (1962) opined that achievement motivation has two basic aspects, "motive to achieve - an approach motive and the 'motive to avoid failure" - an avoidance motive. Achievement motivation may be associated with a variety of goals, but generally activities which are directed towards the attainment of some standard of excellence are involved, Vernon (1971).

2.5 Theories of Motivation:

There are as many theories of motivation as there are psychologists. The theories that are reviewed here are those that relate to the study. These include: Social - Learning theory; Herzberg's Hygiene - Motivation theory; Macgregor's X and Y theory; and theories of achievement motivation.

2.5.1 Social-Learning Theory:

According to Bandura (1969) and others, the social learning theory emphasises the role of individual's past reinforcement experiences in determining their present experiences. Central to this approach are the influence of the social environment on motivation. This approach grew out of behaviouristic learning theory in which response sets are strengthened or weakened by reward value. Also the theory

puts more emphasis on the effect of the social environment in which the learning takes place. Abdullahi (1991) observed.

> "In this reinforcement model learning occurs when the stimulus acts as a reinforcer, that is, the stimulus following a response satisfies the motive. The activity itself has no motivating power rather what motivates the child is the outcome of his action. Where the outcome is enjoyable there is increased activity but where it is not activity decreased."

The motivating factor is based on application of incentives, praises, certification etc. Within this model, knowledge of results of tests is viewed as an incentive. The values the child incorporates into himself from these reinforcements motivates him. This model operates better at homes and schools where children are shown affection, dignity and respect.

2.5.2 Herzberg Hygiene - Motivation Theory

Herzberg (1959) and his colleagues, Manser and Synderman theorized that man has two different sets of needs. These needs are qualitatively different - the need to avoid pain and the need to grow or develop psychologically. From this study Herzberg came out with a view of the nature of motivation and the strategy of increasing productivity. He pointed out that the traditional approach to motivation is only concerned with circumstances or factors or rewards that go with learning while it ignores inherent factors in the learning. The latter he referred to as "hygiene" which are a sort of a "never-ending necessity for control. He contended that it is this

inherent factor in the learning itself that motivates the learner. Thus reading itself can be a motivator. Hygiene factor deals with conditions in which students' interests are considered. This can be measured by knowing what external motivational factors are available in a particular school such as health care, accommodation facilities, resources like light and water, scholarship schemes, available text-books, availability of teachers. When these things are available at appropriate time, the students will perform better.

2.5.3 McGregor's X and Y Theory:

Mcgregor (1960) proposed what he called X and Y theories. In his proposals he said that in theory X students are lazy, incompetent and need to be constantly pushed with a stick before they could perform. This type of situation could be heightened when they see studies as punishment instead of being a pleasure. In theory Y, Mcgregor suggested that students are always willing, very intelligent and resourceful and that given the right condition they find pleasure doing their learning. This supports Herzberg hygiene - motivation theory discussed earlier. This implies that effective organization of a school and conditions under which students learn would increase their performance.

2.5.4 Expectancy Theory:

This theory was postulated by Vroom (1964) and other scholars including Davis (1972). Essential to this theory is

the fact that a student is motivated to work hard if he perceives that by doing so he is likely to achieve the desired goal or reward. Also the student in a particular school works very hard in the school if he believes that the school is the type that will enable him to achieve his set goals. On the other hand the student relaxes his efforts if he feels that a particular study will not lead to his achieving the set objectives or goals. Similarly the same attitude of relaxation follows the belief that the school he finds himself would not help him achieve the set objectives. Thus the type of school and the subjects offered can motivate a student to a better performance.

2.5.5 Theory of Achievement Motivation:

Murray (1938) was the pioneer of achievement motivation. The basis of achievement concept is the psychogenic needs, according to him. He categorized the psychogenic needs into:

i) task needs which are those that affect the students' work habits. Examples include acquisition, play exposition orderliness and cognizance. The second group are those that affect the students' level of performance; for example, recognition, achievement, superiority, failure avoidance.

ii) The second category is the interpersonal needs, which he classified into those that bring people together and those that keep them apart.

McClelland (1965) also contributed to the achievement motivation theory. His studies identified three major characteristics of the self-motivated achiever which he tries to follow throughout life right from childhood. This self-motivated achiever always tries to set his own goals. He always tries to accomplish something and is very selective about the goal he commits himself to. He prefers circumstances of high achievement drive to circumstances of less achievement drive. Thus he is productive and records a lot of success. McClelland and Murray devised the Thermatic Apperception Test (TAT). This is a series of pictures that subjects are asked to look at and report what they see. The reports (stories told by the subjects) are presumed to be related to the needs of the individuals. TAT is often used as a measure of the need for achievement.

Maslow (1954) put forward a theory known as MASLOW'S HIERARCHY OF NEEDS. In this theory he contended that every human being has got five set of needs hierarchy built in him; so that the way the individual leads his life is dictated by these needs. The individual behaves in certain ways to gratify the needs. When a particular need is gratified the individual moves forward striving for the higher needs. These needs are: Physiological or biological needs, safety needs, sociological needs, self-esteem needs, and self-actualization needs. Maslow stressed the need for the satisfaction of basic physiological requirements of individuals before attending to

the affiliative, achievement or aesthetic needs. This means that Murray's psychogenic needs can only find expression after the physiolgenic needs have been satisfied. The hierarchy need of Maslow emphasises that for a student to perform well he must reach the level of self-actualization. The problem however is that students rarely reach this peak.

Hersey and Blanchard (1972) commenting on Maslow's hierarchy of need pointed out that one level of need does not need to be met completely before the next level emerges. To them Maslow's need theory is more useful on predicting behaviour on a high or low probability basis since most people are partially satisfied at each level. Alderfer (1969) modified the need theory to three need levels which are: existence needs, relatedness needs and growth needs. The satisfaction-progression process, is upward from existence needs to growth needs. There is also the frustration-regression process, in which instead of moving up the individual is forced to redirect his efforts towards the lower needs due to frustrating conditions.

2.5.6 Nigerian contributions to Achievement Motivation:

Abdullahi (1991) commenting on Atkinson's theory of achievement motivation said that the theory explains the development of motives by associating effective experiences with needs and how in time the motives are arranged in a hierarchical order of importance within the individual. This

implies that the relative position of an individual's different motives depend on the individual's experiences. He pointed out that the importance individuals attach to the achievement motive varies due to the functions of their social-cultural background or environment as well as personality traits. For example, Balarabe (1989) reported that there are significant differences between the Hausa, Ibo and Yoruba people of Nigeria as a result of their cultural up-bringing. According to Balarabe, these differences are due to the socio-economic background of the individuals rather than their ethnic group.

Balarabe (1989), still discussing Atkinson's model of achievement motivation, emphasised that Atkinson's ideas were based on approach - avoidance conflict situation with hope for success and fear of failure being the determinants of achievement motivation. These determinants are broken into:

i) the motive to succeed
ii) the probability of success and
iii) the incentive value for success, all under approach behaviour.

For avoidance behaviour these are:

i) the motive to avoid failure
ii) the probability of failing, and
iii) the incentive value for failing.

Ikeotuonye (1988) observed that human beings are continually striving because there exist within them some

needs that must be satisfied. He went on to say that these needs can be ordered in a hierarchy of potency as human motivators. The lowest in the hierarchy is the most potent and the first that must be satisfied. Considering the Nigerian situation in general and Abia State in particular the question is how many of these needs are satisfied and what role, do they play in the motivation of the science student to perform? Even in the present economic situation where many cannot afford to send their children to school and provide them with all the necessary needs in the school, their moral support will go a long way to motivate the children.

Ikeotuonye (1990) commenting on McClelland and Atkinson's theory of achievement motivation observed that students who respond to success situations by approaching such situations positively are considered to have high achievement motivation. Such students are involved more in achievement oriented tasks, persist longer at tasks and also motivated by tasks of medium difficulty. According to Ikeotuonye students who have the tendency to avoid failure have low achievement motivation. They exhibit anxiety or fear over failure in challenging tasks. Though Ikeotuonye's observation did not show any empirical evidence it is relevant to the Nigerian situation. Teachers should provide tasks of medium difficulty for better performance.

2.6 Extrinsic Motivation and Motivational Sources

Extrinsic motivation is the process whereby goal directed behaviour is sustained externally. The external motivation to be considered are those that affect the students, originating from the teacher, parents peer-group, career guidance and counselling services, availability of resources and incentives.

2.6.1 The Teacher as a Motivational Source:

Researchers have found that the teacher is important in the learning process of the students, Balogun (1985) and Okebukola (1986). It is therefore anticipated that teachers classroom behaviour would have some motivational effects on the performance of the students. For instance the teacher's confidence in themselves is bound to affect students' motivation and their performance, Bello (1986). Ozoro (1973) affirmed that even when students are intellectually bright they still need able teachers to motivate them. According to him supposedly good students either abandon the subject or perform poorly in examination when no teacher is available. Smith *et al* (1961) acknowledged that one of the teachers' role in education is to motivate the students. The task of the teacher in making motivational conditions maximally favourable to the students learning has three principal aspects, Baryln (1971). These are:

(1) "The students' motivational condition must include the specific forms of impulse that incline him to be taught

or make him receptive to the information that he is to be given.

(2) The overall arousal of the students must be kept within a range productive of alternativeness and alertness.

(3) Appropriate reinforcing condition must be provided with effective timing when desired responses are made or when key informations are imparted."

2.6.2 The Parents as Motivational Source

Madugu (1977) found out that the negative attitude of parents in Sokoto state of Nigeria, towards education led to the poor academic achievement of their children. He therefore asserted that if a child is brought up in a home where parents have high aspirations for education and success in life and take keen interest in the education of their children, the child is likely to grow up, with the determination to succeed. The child will work to live up to the expectation of the parents. This assertion had earlier on been empirically supported by Argyle and Robinson (1962). They carried out a study to identify children with achievement oriented parents as a source of achievement motivation. Five hundred Grammar School children were given questionnaire measures of achievement motivation as well as semantic differential tests to assess their relationship with parents. Their achievement motivation correlated favourably with the reported strength of parental achievement demands. In support of parents as a

motivational factor a number of other investigations have been carried out. These include those of (Floud *et al* 1957, Greffiths 1959).

2.6.3 Peer-Group Influence as a Motivational Source

Wiseman (1964) writing on the peer-group influence on learning performance said that the role of peer-groups in determining a child's aspiration is very important. Peer-group has a prominent influence on a child as he grows even to the extent that it overpowers the family influence. In learning a child will aspire to high goals if the peer-group are interested in learning, but will be ill-motivated if the peer-group discourages learning, (Berndt *et al* 1990, Abdullahi 1991). Other investigators who had argued that peer-group influence contribute to lack of interest and effort are Goodlad (1984) and Bishop (1989). However Brown *et al* (1983) in their study found that peer pressure helped students to work hard to get good grades. Studies have been carried out on the peer-group participation on the assessment of intended learning outcome. Nzuurumuike (1986) in his study with Nigerian secondary schools discovered that peer-group participation on the assessment of intended learning outcome, had motivational effects on them. This therefore improve their learning. Other studies in this area include that of Curtis (1977) and Nwana (1979).

2.6.4 Career Guidance as Motivational Source

Career Guidance services focus on the wholeness of the individual or the individuality of the learner. The importance of this service therefore cannot be overemphasised, Achebe (1986). The Federal Republic of Nigeria (1981), the all Nigerian Principals conference (1983), organized seminars and workshops throughout the country to stress the need of this service in the schools. They have consistently alerted principals of schools that the education their schools offer to their public especially within the 6:3:3:4 system will be better off with the integration of guidance and counselling services. A student who has been directed to courses which his aptitude, interest and capabilities could accommodate would be highly motivated. More knowledge of career opportunities would give him a set goal which he would be aspiring to. Dinkmeyer and Caldwell (1970) summarised what happens when guidance programme is in line with the curriculum in a school thus:

(a) the student is permitted to progress at his own rate.

(b) the emphasis is on success experiences and the recognition of the assets of the individuals.

(c) There is provision of maximum flexibility in the curriculum and an emphasis on the understanding of the individual.

(d) Curriculum is enriched to permit the greatest acceleration possible to the student. This provides for

the development of more realistic self-concept. There is provision for independent study in areas where the student has a specific or special interest.

(e) In every instance learning is varied in accordance with abilities, interests and purpose.

2.6.5 Availability of Resources as Motivational Source.

Adebimpe (1987) made the observation that the success of any educational system is largely determined by the objectives of the programme, including the availability of equipments, materials and a well designed curriculum. It is a general view that shortage of resource materials in schools have inhibitory effect on the learning process of the students, Tambawal (1991).

Dorpemu (1983) had argued that the type of school environment in which a particular learning takes place plays a vital role in the resultant outcome in the teaching and learning process. This is because the school environment would either be motivational or inhibitory. Renner (1971) had asserted that practicals in sciences assume an important role in the development of the psychomotor domain of the taxonomy of educational objectives. Researchers in the different areas of problem affecting the teaching of various school science subject have recommended the provision of laboratory resource personnel in schools and their training, Owoh (1972) Oyedepo (1972) Aina (1976).

2.6.6 Incentives.

The layman's understanding of incentives are conditions that arouse or encourage a person to fulfil some demands. According to Beck (1978) incentives are often said to arouse behaviour. They have a characteristic pulling effect. He explained that incentive is learned through experience with reward. It can be aroused whenever the appropriate stimulus conditions are present. Blair (1975) and his colleagues had earlier described incentives as things people want and desire which may be tangible as a certificate or intangible as a word of praise. According to them incentive may be actual or representational, negative or positive in that one may either seek or avoid various kinds of stimuli. Incentives can also be in the form of knowledge of result of past performance, information or feedback. (Young 1941, Marx 1960, Deci 1975, Weiner 1990).

Cahpman and Feeder (1917) carried out an experiment to see the effect of external incentives on performance. They made use of two similar groups of students. One group working under normal conditions of the classroom while the other group was motivated by external incentives. The subjects (36 boys and girls) were divided into 2 groups of 18. One group was called group A and the other group B. Group A was given the incentives which are:

i) Each individuals results of the previous test were published.

ii) On the sheets presented for the days test, the point reached on the last occasion by the subject was marked in heavy blue pencil.

iii) The general performance of the class was presented in the form of graph.

Group B was not given any of the incentives. They found that group A performed much better than group B.

2.7 Intrinsic Motivation.

Intrinsic motivation are motives that are internal which move students to a great deal of learning. Intrinsic motivation is associated with pleasure derived from the learning process itself, curiosity, the learning of challenging difficult tasks and persistence , (Harter 1981, Gottfried 1985). Syngg (1954) had pointed out that the learner was not a passive victim of the learning environment, but that intrinsic motivation, a motivation to learn springs from the learner. Thus the teacher should use the teaching method that will actively involve the learner and maintain high level of arousal.

2.7.1 Anxiety:

Anxiety is a typical example of intrinsic motivation. It is associated with failure to meet one's needs, anticipation of failure or even merely an awareness of the probability of failure. Lindgren (1967) said that anxiety is related to

fear. Sullivian (1947) described anxiety as the feeling of insecurity and psychological isolation.

2.7.2 Values of Anxiety:

Lindgren (1967) is of the opinion that anxiety has positive values. Such values include:

i) learning to live with others in conformity to laws and customs of the society. Anxiety that enables one to behave like civilized individuals in a civilized society. Lindgren called "normal" anxiety.

ii) relating to the process of providing for the future. It should be clear then that the basic need to become competent and adequate and the tendencies to develop varying degree of normal anxiety are both likely to have a significant positive effect on learning. Bugelski (1956) explained that anxiety is basic to attention which is a primary factor in learning. According to him learning takes place as people try to reduce or avoid anxiety.

Anxiety also has a negative value. There is the "neurotic" anxiety described as over abundance anxiety by Lindgren. This impaired and inhibited performance.

2.8 Academic Achievement and Motivation.

Performance in the context of this study is the students' achievement in their various science subjects, that is, how

they excelled in the science courses. Individuals are most times concerned with some standards set by themselves or others. This implies that they, according to Abdullahi (1991), are pleased with success and disappointed by failure; as they strive towards the goal. Some motivational factors that would help individuals to perform have been discussed. Their relationship to academic performance will now be reviewed in the sections that follow.

2.8.1 **Related Studies Elsewhere**.

(a) Pintrich and Degroot (1990) carried out a correlational study and examined the relationship between motivational orientations (or dimensions), self-regulated learning and the classroom academic performance of 173 seventh graders from 8 science and 8 English classes. This study took place at the University of Michigan U.S.A. They administered a self-report measure (questionnaire) of students self-efficacy, intrinsic value (incentive) test anxiety, self-regulation and the use of learning strategies. Their motivational dimensions as in this study were incentive and test anxiety.

They obtained achievement from work on classroom assignment. However they did not show whether they used a score of one assignment or average score of series of classroom assignments. They found that incentive positively related to cognitive engagement and performance. Test anxiety

was negatively related to performance on exams and quizzies.

(b) At the University of Rochester, USA; Ryan and Deci (1991) made a study of the relation between other motivational variables as mediators of parental support as perceived by the children and their academic performance. They used as their subjects 456 children in grades 3 through 6 from 20 classrooms in a large town school children. Their use of children was justified by the fact that children's self-concept are crystallizing during this period, Alexander and Entwisle (1988) and the influence of parents on achievement are clearer in elementary school pupils than in high school college students. The sample was largely white and heterogenous in socio economic status (SES). The parents involved were 436 who completed questionnaire about their parenting behaviour which was used to evaluate the validity of children's rating of parents. The children completed a self-report scale.

Their findings indicated that perceived parental autonomy support and involvement were positively associated with perceived competence control understanding and perception of autonomy. These enhanced academic performance of the children.

(c) A study on "Friends' Influence on Adolescents' Academic Achievement motivation", was carried out by Berndt *et al* (1990) at Purdue University, U.S.A. Their subjects were 118 eighth grade students (mean age: 13½ years) from two high schools. The two schools were in a county school district in

a rural area. The subjects consisted of 74 girls and 44 boys.

They paired the students according to their friends. The pairs of friends were randomly assigned either to an experimental or a control condition. In the experimental condition the friends discussed dilemma that required them to decide between two actions reflecting different levels of achievement motivation. In the control condition friends discussed topics unrelated to school. They were given a pretest in which they made decisions on six dilemmas meant for the study specifically. Following the discussion they completed a post-test in which they again responded to the motivation-related dilemmas.

The findings showed that brief discussions between friends contributed to an increase in the similarity of their decision. This was in line with the earlier studies, Espeni (1983) that showed that peer-group influence normally led to an increase in friends similarity. In this study, the discussions changed students' (adolescents') attitude towards academic achievement.

(d) Allison and Ash (1951) experimented with the effect of anxiety in learning from films. They introduced an element of anxiety into a learning situation by telling students that the film and the test would prove whether they were good or poor learners and that if students did not learn the material it would prove they did not belong in college. They were also told furthermore that the scores of each student would be read

out aloud in class. The results of this experiment indicated that raising the anxiety was accompanied by an improvement in the scores made on the test.

In another study on: Test Anxiety, (Worry and Emotionality) changes during academic Testing as a function of feedback and Test Importance, Morris and Fulmer (1976) investigated the effect of feedback on fluctuations in immediately experienced test anxiety. They made use of 55 college students who responded to a brief test anxiety questionnaire in the context of a course examination. The experimental subjects received item-by-item feed back.

They found that, Worry the cognitive component of test anxiety which had been hypothesized to be dependent on information available to the students decreased from pre-examination to post-examination in the feed back group. Emotionality the physiological component of test anxiety not directly influenced by cognitive consideration was not differentially affected.

2.8.2 **Related Studies Carried Out in Nigeria.**

(a) Abdullahi (1991) studied "motivation, attitudes and mathematics achievement among secondary school students in Minna municipality of Niger State." She made use of 305 students consisting of 165 boys and 140 girls from SS 2 classes of the schools, as the subjects.

She administered questionnaire on motivational measures

to collect data to test the hypotheses of the study. These measures were drawn from Entwistle and Duckworth (1972) scale. The motivational factors she considered included Teachers' - support, parental-control and peer-pressure. She correlated these variables with Mathematics achievement.

The study revealed that there was a significant relationship between the measures of motivation and mathematics achievement in the schools. The students who showed high achievement in Mathematics were found to be higher in teachers' support, hope for success, while peer-pressure had a negative correlation with mathematics achievement.

(b) Tambawal (1991) carried out a study in the factors affecting teachers' performance in post primary schools in Sokoto State of Nigeria. This is considered related because when teachers perform creditably it would affect the students' performance positively.

In the study, he made use of 263 teachers and 32 education officials of the ministry of education as subjects. The instrument used for data collection was a five-point Likert scale type of questionnaires. Among the variables was availability of resources. The findings showed that there was considerable amount of relationship between teachers' performance and availability of resource materials.

(c) Madugu (1977) carried out a study on the results of Sokoto State students in West African School Certificate Examination. He was to find out if lack of motivation was one

of the major factors affecting the achievement of the Sokoto State Students.

He made use of 50 secondary school teachers drawn from five secondary schools in sokoto State and 50 students of post-primary institutions in the state. The teachers were selected on the bases of seniority and years of experience in teaching in secondary schools. The students were selected by simple random sampling. Questionnaires prepared on the motivational measures considered were used in collecting data.

His findings show that most parents in Sokoto state could not support their children's academic pursuit towards Western Education. Also teachers support was lacking. An average secondary school student in Sokoto state lacked ambition. Students were therefore not motivated and this made them perform poorly.

(d) A study of quality and quantity of staff syllabus coverage and apparatus in relation to students' performance in science subjects, was carried out by Assuzu (1980) in Anambra state of Nigeria. He made use of 10 schools out of the 58 secondary schools of the state. The instrument he used for the study were questionnaire which consisted of four types. They were:

i) Staff participation in science subjects;

ii) Students' West African School Certificate (WASC) results;

iii) The list of basic apparatus as recommended by the State Ministry of Education, Enugu.

iv) Prescribed syllabus for each science subject.

His findings showed that there was a high positive correlation between the quantity of apparatus available in the school and the students performance in WASC.

(e) A study on Under-achievement in Science, students' suggestion and remedy, was carried out by Bello (1986) at Oyo state College of Education, Nigeria. The investigator made use of a Delphi study technique to collect students' perceived causes of under-achievement in science and their suggested remedy to arrest the situation. Delphi study technique was designed to obtain consensus of opinion from a group of individuals by using successive questionnaires. The subjects were 240 SS 2 students from six secondary schools in Oyo State of Nigeria. The subjects' age ranged from 16 - 22 years.

The findings showed that the students enumerated a good number of causes which the investigator contrasted into 10 major causes: such as, teachers' teaching style, poor students' study habits etc. The remedial measures suggested by the students included guidance and counselling on effective study methods, cheap and understandable text books, extra lessons, better teaching strategies and provision of laboratory equipments.

2.9 Summary.

In this chapter attempt has been made to review studies done on the motivational dimensions; parental support, teachers' support, peer-group influence, availability of

resource materials, incentives, career guidance services, test anxiety; and the relations they have with students' academic achievements. A number of literature have been referred to. These have tried to explain the meaning of students' motivation and the motivational sources. The stages motivation in education have passed through was presented in form of a historical review by Weiner (1990). Motivation was classified into three types: extrinsic motivation, intrinsic motivation and achievement motivation. Theories concerned with motivation towards academic achievement had been reviewed. These include: social-learning theory; Herzberg's Hygiene - Motivation theory, Macgregor's X and Y theory; expectancy theory and theory of achievement motivation. All the theories reviewed showed that motivation is both intrinsic (internal) and extrinsic (external). Related studies showing the relationship between the students' motivational dimensions and the academic achievements were reviewed. In most of these studies, it is observed that better academic achievement is sequel to most motivational dimensions, yet few like "neurotic test anxiety" are inhibitory. The design and methodology of this study is the topic of the next chapter.

CHAPTER THREE

DESIGN AND METHODOLOGY

3.1 Introduction

In this chapter the research design and method used for collecting data are described. Specifically it contains description of the sampling procedure, the design of the instrument and its administration in collecting data for the study. Also the procedure for analysis of the data obtained are described.

3.2 Population:

The studied population was made up of the 155 Senior secondary Schools of the three educational zones of Abia State. The three zones are: Aba, Umuahia and Afikpo zones. The total population of Science students in the State are one thousand eight hundred, (1800). (Source: State Education Management Board, Abia State).

3.3 Research Design:

This is a correlational study aimed at determining the relationship between the students motivational factors called dimensions in this study and their academic achievements in science subjects. The motivational dimensions considered are:

(1) parental support

(2) teachers' support

(3) availability of resource materials

(4) peer-group influence

(5) career guidance services

(6) incentives and

(7) test anxiety

The correlation between the mentioned motivational dimensions and academic achievement (continuous assessment scores in Physics, Biology and Chemistry) was found using Pearson Product Moment Correlation Coefficient.

3.4 Sample and Sampling Procedure.

The subjects of the study were drawn from the Senior Secondary three (SS3) Science Students. In selecting schools used in this study simple random sampling was adopted. The sampling was done by the "method of drawing from the hat". The method involved writing the names of the schools in the State according to zones in cut out pieces of papers. These papers were shuffled in an empty can and then picked one after the other. This method was used to give each school a fair chance of being selected. Sixteen schools were selected, six each from both Aba and Umuahia zones, and four from Afikpo zone. The schools selected comprised of urban and rural schools; boys and girls schools, co-educational schools; day schools and boarding schools. These are shown in table 3.1 below.

Table 3:1 Schools selected according to their zones.

S/Nos.	Schools from Aba Zone	Urban	Rural	Boys	Girls	Co-Educ.	Board. Sch.	Day Sch.
1.	National High School, Aba	√		√				√
2.	Girls' Secondary School Abayi, Umuocham.	√			√			√
3.	St. Michael's Comprehensive Sec. School, Umuehiegbu		√			√		√
4.	Ohabiam Girls' Secondary School Aba	√			√			√
5.	Ngwa High School Abayi, Aba	√		√				√
6.	Eziama High School, Eziama		√	√				√
	Schools Selected from Umuahia Zone.							
1.	Olokoro High School, Umuahia.		√			√		√
2.	Secondary Technical School, Afara-ukuu	√				√		√
3.	Girls' Secondary School, Umuahia	√			√		√	
4.	Methodist College Uzuakoli		√	√			√	
5.	Igbere Secondary School, Igbere		√			√		√
6.	Alayi Secondary Commercial School		√			√		√
	Schools Selected from Afikpo Zone							
1.	Government College Afikpo	√		√			√	
2.	Macgregor Secondary School, Afikpo	√				√		√
3.	Girls' Model Sec. School, Ovim		√		√		√	
4.	Secondary Technical School, Ovim.		√			√		√

The sample consisted of 360 students. The sample selection was based on Ball and Gall's (1971) method. It stated that twenty percent (20%) sample could be drawn from a population of up to one thousand, ten percent (10%) from population of up to five thousand and five percent (5%) from population up to ten thousand. This method is to ensure good representativeness. The 360 science students included a total of 210 boys and 150 girls. The Schools and the number of students selected according to gender is shown in table 3.2.

Table 3.2: Table Showing the number of boys and girls selected from each School.

S/Nos	Schools	Number of Students		
		Boys	Girls	Total
1.	National High School Aba	20	-	20
2.	Girls' Sec. School Abayi Umuocham.		21	21
3.	St. Michael's Comprehensive Sec. School, Umuehiegbu	5	10	15
4.	Ohabiam girls' Secondary School, Aba	-	16	16
5.	Ngwa High School, Abayi.	26	-	26
6.	Eziama High School, Eziama Aba	24	-	24
7.	Olokoro High School Umuahia	12	14	26
8.	Secondary Technical School Afaraukvu, Umuahia	19	13	32
9.	Girls' Model Secondary School, Umuahia	-	31	31
10.	Igbere Secondary School, Igbere	5	3	8
11.	Methodist College, Uzuakoli	45	-	45
12.	Alayi Secondary Commercial Sch.	4	5	9
13.	Government College, Afikpo	24	-	24
14.	Macgregor Secondary School, Afikpo	13	4	17
15.	Girls' Model Secondary School, Ovim.	-	27	27
16.	Secondary Technical School, Ovim.	13	6	19
	TOTAL	210	150	360

3.5 Instrument Design

The questionnaire was designed on the Likert 5 - point scale (see appendix A). The scales of the questionnaire are Strongly Agree (SA) Agree (A) undecided (U) Disagree (DA), Strongly Disagree (SDA). Strongly Agree (SA) attracted a score of 5 down to strongly disagree having score of 1. There were 28 items covering all the seven motivational variables. These were arranged into 7 sections with each section consisting of 4 items. The items were adapted from various instruments used to assess the students motivation. For instance items on incentives and test anxiety (13 -16, 17 - 20) from Motivated Strategies for Learning Questionnaire (MSLQ) by Eccles (1983) and Harter (1981). Items on peer-group influence (9 - 12), parental support (1 - 4) teachers' support (5 - 8) were drawn from Entwistle and Koseki (1988) scale and items on availability of resource materials (21 - 24) from Tambawal (1991). Items (25 - 28) on career guidance services were designed by the researcher using statements by Madugu (1977) who discussed very much on this topic. They were meant to test the availability of career guidance services in schools. Examples include: "My School has a Professional Guidance Councillor". "Having looked into my previous performance my School Guidance Councillor helped me in choosing my subjects." The subjects are to respond to each statement according to the extent to which they agree or disagree with it.

A panel of six experts helped to validate the instrument. The panel members consisted of three Senior University Lecturers who were specialists in each of Science Education and Educational Psychology.

3.6 Reliability of the Instrument

For the pilot study twelve students from Uturu Secondary School in Afikpo Zone were randomly selected. The questionnaire was administered to them with appropriate instruction. Their scores were used to determine the reliability of the items of the questionnaire. The reliability of the instrument was estimated by the "split-half" procedure. The two halves were obtained by "odd-even" approach. The subjects scores on the odd item were correlated with their scores on the even items using Spearman's Rank Order Correlation Coefficient. Since the split-half procedure involved reducing the number of items correlated by half the coefficient of correlation obtained was adjusted by Spearman-Brown formula stated below, Anastasi (1976).

$$r = \frac{2r_{11}^{1}}{1 + r_{11}^{1}}$$

where r_1 = adjusted coefficient

r_{11}^{1} = obtained coefficient

The adjusted coefficient (r_{11}) obtained was 0.65. This was considered satisfactory, thus the items were used in the actual study.

3.7 Administration of the Instrument.

The questionnaire was administered by the researcher to all the 360 students who formed the sample of the study, in their various Schools. They were asked to respond to the 28 items on the questionnaire as honestly as possible. A total of 360 copies of the questionnaire were given out but it was 350 that were found to be valid for use in analysis.

3.8 Procedure for Statistical Analysis.

In order to test the hypotheses already stated in chapter one, the data collected were analysed with appropriate statistical procedures namely:

(a) Pearson Product Moment Correlation and

(b) t-test.

The test of correlation between the scores in motivational dimensions and the measure of achievement of the students in the basic sciences - Biology, Chemistry and Physics were computed. The students achievement was measured by the students' standardized continuous assessment scores in the various science subjects involved. High correlation between continuous assessment scores and achievement tests have been reported, Turton (1993), Egede (1993) hence the suitability of using the former as a reliable measure of the latter.

Hypotheses 1 - 7 were tested using Pearson's Product Moment Correlation and t-test distribution.Pearsons' Product

Moment Correlation coefficient was to find out the relationship between the motivational dimensions considered and students achievements in Biology, Chemistry and Physics.

The correlation coefficient (r) obtained was subjected to t-test distribution using the formula; $t = \frac{r}{\sqrt{\frac{1 - r^2}{N - 2}}}$

where

r = Correlation Coefficient

N = number of cases computed and

N-2 = the degree of freedom (df) Yamane (1973).

The level of confidence was set at a = 0.05.

3.9 Summary

The sample for this study was drawn from sixteen (16) secondary Schools from Abia State of Nigeria. The total number of the subjects used was 360 comprised of 210 boys and 150 girls. The instruments used were drawn up based on Likert type of scale of five possible responses: Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree. The scales: Motivated Strategies for Learning Questionnaire (MSLQ), Entwistle and Koseki Scale are of known reliabilities as they have been used internationally.

The standardized scores in Biology, Chemistry and Physics (continuous assessment scores) were used as the measure of students' academic achievement in the subjects. Pearson's

Product Moment Correlation was used to find the relationship between the motivational dimensions and basic science achievements. The correlation coefficient (r) obtained was subjected to t-test distribution to test for significance.

CHAPTER FOUR

ANALYSIS OF DATA AND PRESENTATION OF RESULTS

4.1 Introduction:

This chapter deal with the analyses of the data collected. The main objective of this study was to find the relationship between dimensions of students' motivation and science achievement of Senior Secondary School Science Students of Abia State. Seven hypotheses were stated and statistically tested to find out whether any significant relationships exist between students' achievement in science and the stated motivational variables. The stated null hypotheses are as follows:

(1) There is no significant relationship between students' academic achievement in science and parental support in Abia State Senior Secondary Schools.

(2) There is no significant relationship between students' academic achievement in science and the teachers' support in Abia State Senior secondary Schools.

(3) There is no significant relationship between students' academic achievement in science and peer-group influence in Abia State Senior Secondary Schools.

(4) There is no significant relationship between availability of resource materials and students' academic achievement in science in Abia State Senior Secondary Schools.

(5) There is no significant relationship between availability of Career guidance services and students' academic achievement in Science in Abia State Senior Secondary Schools.

(6) There is no significant relationship between students' academic achievement in science and test anxiety in Abia State Senior Secondary Schools.

(7) There is no significant relationship between application of incentives and students' academic achievement in science in Abia State Senior Secondary Schools.

The hypotheses were tested using the Pearson's Product-Moment Correlation Coefficient and t-test distribution. The 0.05 significance level was adopted as the basis for rejecting or retaining the hypotheses as the case may be.

4.2 Hypotheses Testing.

In testing the hypotheses the subjects' scores in each of the motivational dimensions and their measures of achievement in Biology, Chemistry and Physics were computed. (See Appendix C for the data). Pearson's Product - Moment Correlation Coefficient was used in testing the relationship between the variables in all the hypotheses. The critical value of correlation coefficient (r) at (df=348) is (r = 0.10). This was used to determine whether the relationship was significant or not. The t-test distribution was also used to determine whether the relationship was significant or not.

The results are shown in tables 4.1 - 4.3.

Table 4.1 Correlation between motivational dimensions and biology achievement.

	Motivational Dimensions	Pearson (r)	Coefficient of Determination (r^2)	T-test Value	Remarks
1	Parental Support	0.14	0.0196	2.56	Hypothesis Rejected
2	Teachers' Support	0.10	0.01	1.94	Hypothesis rejected
3	Peer-Group Influence	0.07	0.0049	1.33	Hypothesis not rejected
4	Availability of resource materials	0.16	0.0256	2.95	Hypothesis rejected
5	Availability of Career guidance services in the Schools	0.06	0.0036	1.11	Hypothesis not rejected
6	Test Anxiety	0.33	0.1086	6.48	Hypothesis rejected
7	Incentive	0.06	0.0036	1.10	Hypothesis not rejected

t-test critical value is 1.64 at the level of significance P = 0.05
r - critical value at (df = 348) p = 0.05 is 0.10

Table 4.1 shows that the parental support had a positive correlation of r = 0.14 to biology achievement. When this was converted to t-test distribution at P = 0.05, the t-test value was 2.56, and the t-test critical value was 1.645. Thus the null hypothesis was rejected. Similarly teachers' support, availability of resource materials, test anxiety had positive correlation of r = 0.10, r = 0.16 and r = 0.33 respectively. Converting them to t-test distribution, the calculations gave the value for teachers' support as 1.94, availability of resource materials as 2.95 and test anxiety as 6.48 also at t-test critical value of 1.645. The null hypotheses 2, 4 and 6 were thus rejected. Peer-group influence had positive orrelation of r = 0.07, career services r = 0.06 and incentive

r = 0.06 with biology achievement. The calculated t-test values respectively were 1.33, 1.11 and 1.10 at the same t-test critical values. Thus the null hypotheses 3, 5 and 7 were retained.

These show that there is significant positive relationship between Parental support, teachers' support, availability of material resources, normal test anxiety and biology achievement. However peer-group influence, career services and incentive though related positively to achievement in biology, but the degree of relationship was not statistically significant.

Table 4.2 Correlation between motivational dimensions and chemistry achievement.

	Motivational Dimensions	Pearson (r)	Coefficient of Determination (r^2)	T-test Value	Remarks
1	Parental Support	0.16	0.0256	3.14	Hypothesis Rejected
2	Teachers' Support	0.13	0.0169	2.35	Hypothesis rejected
3	Peer-Group Influence	0.04	0.0016	0.75	Hypothesis not rejected
4	Availability of resource materials	0.63	0.3969	15.17	Hypothesis rejected
5	Availability of Career guidance services	0.05	0.0025	0.95	Hypothesis not rejected
6	Test Anxiety	0.17	0.0289	3.16	Hypothesis rejected
7	Incentive	0.13	0.0169	2.49	Hypothesis rejected

t-test critical value is 1.64 at the level of significance P = 0.05

r - critical value at (df = 348), p = 0.05 is 0.10.

Table 4.2 shows that all the motivational dimensions correlated positively to chemistry achievement. The results reported in the table reveal a set of results ranging from low

to moderately high correlations between the variables. Moderately high correlation coefficient of r = 0.63 was found for correlation between availability of resource materials with chemistry achievement. Low correlation coefficients were found for parental support as r = 0.16; teachers' support, r = 0.13; test anxiety, r = 0.17 and incentive, r = 0.13. Peer-group influence and availability of career guidance services had very low correlation coefficients of r = 0.04 and 0.05 respectively. The t-test calculations were done at the level of significance P = 0.05. The values obtained were: Parental support 3.14; teachers' support 2.35; Peer-group influence 0.75; availability of resource materials 15.17; Career guidance services 0.95; test anxiety 3.16 and incentive 2.49. Thus hypotheses 1, 2, 4, 6 and 7 were rejected while hypotheses 3 and 5 were retained. There is therefore a significant relationship between parental support, teachers' support, availability of resource materials, incentive, test anxiety and chemistry achievement. Peer-group influence and availability of career guidance services did not relate significantly with chemistry achievement.

Table 4.3 Correlation between motivational Dimensions and Physics achievement.

	Motivational Dimensions	Pearson (r)	Coefficient of Determination (r^2)	T-test Value	Remarks
1	Parental Support	0.16	0.0256	3.06	Hypothesis Rejected
2	Teachers' Support	0.52	0.2704	17.88	Hypothesis rejected
3	Peer-Group Influence	0.10	0.01	1.80	Hypothesis rejected
4	Availability of resource materials	0.78	0.6084	23.29	Hypothesis rejected
5	Availability of Career guidance services in Schools	0.03	0.0009	0.64	Hypothesis not rejected
6	Test Anxiety	0.18	0.0324	3.34	Hypothesis rejected
7	Incentive	0.04	0.0016	0.73	Hypothesis not rejected

t-test critical value is 1.64 at the level of significance P = 0.05
r -critical value at (df = 348), p = 0.05 is 0.10.

Table 4.3 shows the pearson's correlation coefficient and summary statistics for the motivational dimensions and physics achievement variables. For Career guidance services and incentive very low correlation coefficients of (r = 0.03) and (r = 0.04) were obtained. The correlation coefficients for parental support, peer-group influence and test anxiety are 0.16, 0.10 and 0.18 respectively. These are relatively low. Moderate and high correlation coefficients were found for teachers' support (r = 0.52) and availability of resource materials (r = 0.78). All the motivational dimensions, as in biology and chemistry correlated positively with physics achievement.

The table shows that there was significant relationship between physics achievement and parental support, teachers' support, availability of resource materials, peer-group influence and test anxiety. Thus hypotheses 1, 2, 3, 4 and 6

were rejected. Their corresponding t-test values were: Parental support 3.06; Teachers' support 17.88; Peer-group influence 1.80; availability of resource materials 23.29 and test anxiety 3.34. However availability of Career guidance services and incentive had t-test values of 0.64 and 0.73. Thus the hypotheses related to them 5 and 7 were retained. This means that they did not relate significantly with physics achievement.

The results in table 4.1 - 4.3 show that all the motivational dimensions considered correlated positively with biology, chemistry and physics achievements. Further examination of the tables show that the correlation of the motivational dimensions with biology achievement was in the low range. The highest correlation was with test anxiety, which had r = 0.33. In the case of achievements in chemistry and physics, correlation figures were spread from very low to high correlations. In these two subjects availability of resource materials had the highest correlations. It was (r = 0.63) for chemistry achievement and (r = 0.78) for physics achievement. The lowest correlation observed in all the tables is that of career guidance services (r = 0.03) for physics achievement. Detailed discussions of these results are found in chapter five.

The calculated values of correlation coefficient (r) shown in tables 4.1 - 4.3 are consistently low. The few

exceptions are: the correlation of availability of resource materials, with chemistry achievement (r = 0.63) with physics achievement (r = 0.78) and the correlation of teachers support with physics achievement (r = 0.52). The low correlations denotes that the relationship between the variables is weak. Singha (1992) said that extraneous factors influence the size of the correlation coefficient (r). According to him low correlation may have been caused by a third variable (not known to the investigator) that has effect on both variables under consideration. He also said that curvilinear relationship described as a linear one could lower the value of the correlation. Frank and Althoen (1995) observed that weak correlation coefficient may mean that the variables are not statistically related. This has lent support to the earlier conclusions on pages 67, 68 and 70. That is, that incentive, peer-group influence and career guidance services relationship to biology achievement were not statistically significant. Also peer-group influence and career guidance services were not significantly related to chemistry achievement.

The calculated coefficient of determination r^2 (see tables 4.1 - 4.3) show the variance of the academic achievements that are accounted for by each of the dimensions. That is the percentage of variance in the dependent variable that is predictable from the independent variable. For example the percentage of biology achievement (dependent

variable) that is accounted for by parental support (independent variable) is 1.96%. Thus it is observed that although the correlation coefficient (r) between parental support and biology achievement is significant; parental support could only account for 1.96% of the students' biology achievement. (r^2 = 0.0196). Similarly: teachers' support accounted for 1% of the students biology achievement (r^2 = 0.01); availability of resource materials accounted for 2.56% of the students' biology achievement (r^2 = 0.0256). Test anxiety accounted for 10.86% of the students' biology achievement (r^2 = 0.1089). This is the highest in this table. The coefficient of determination, r^2, for peer-group influence, (r^2 = 0.0049 = 0.49%), career guidance services (r^2 = 0.0036 = 0.36%) and incentive (r^2 = 0.0036 = 0.36%) show that they were clearly not statistically related to biology achievement.

In table 4.2, the chemistry achievement that was accounted for by:

- parental support was 2.56% (r^2 = 0.0256)
- teachers' support was 1.69% (r^2 = 0.0169)
- peer-group influence was 0.16% (r^2 = 0.0016)
- availability of resource materials 39.69% (r^2 = 0.3969)
- career guidance services, 0.25% (r^2 = 0.0025)
- test anxiety, 2.89% (r^2 = 0.0289)
- incentive, 1.69% (r^2 = o.0169).

In the same way, the physics achievement accounted for by the

various dimensions were:

- parental support: 2.56% (r^2 = 0.0256)
- teachers' support: 27% (r^2 = 0.2704)
- peer-group influence: 1% (r^2 = 0.01)
- availability of resource materials: 60.8% (r^2 = 0.6084)
- career guidance services: 0.09% (r^2 = 0.0009)
- test anxiety: 3.24% (r^2 = 0.0324)
- incentive: 0.16% (r^2 = o.016) (See table 4.3).

Close examination show that all the dimensions whose percentage of variance for achievement in science were below 1%, statistically were not related to the achievements. It is worthy of note that availability of resource materials accounted for; 39.69% of chemistry achievement, 60.84% of physics achievement and 2.56% of biology achievement. These show the importance of this dimension (availability of resource materials) in the learning and teaching of basic sciences.

Availability of resource materials accounted for 2.56% of biology achievement which is much lower than those in physics and chemistry achievments. This can be attributed to the fact that a lot of the resource materials required for the teaching/learning of biology are readily found. For example leaves, flowers, animals etc. This situations tends to reduce the dependence of teachers and students on manufactured equipments for purposes of teaching/learning of biology; hence the result shown in the study.

It is curious to note that availability of career guidance services did not relate significantly with achievement in any of the subjects - biology, chemistry and physics. Peer-group influence related significantly with physics achievement but not significantly with biology and chemistry achievements. Similarly incentive related significantly only with chemistry achievement, while it related but not significantly with biology and physics achievements.

4.3 Summary.

The results indicated that significant relationships existed between biology achievement and parental support, teachers' support, availability of resource materials and test anxiety. Chemistry achievement significantly related with parental support, teachers' support, availability of resource materials, test anxiety and incentive. Physics achievement related significantly with parental support, teachers' support, availability of resource materials, peer-group influence and test anxiety. The critical t-value at $p = 0.05$ is 1.64. Also the r - value ($df = 348$) at $p = 0.05$ is 0.10. It is worthy to note that when the t-test values and r - values are considered from each of these approaches the same results, as reported (tables 4.1 - 4.3) are obtained. That is to say in summary that for physics and chemistry achievements five of the hypotheses are rejected while two are retained.

For biology achievement four of the hypotheses are rejected while three are retained. It is also observed that there is reasonable agreement in respect of the hypotheses rejected or retained across the subject areas considered.

CHAPTER FIVE

DISCUSSIONS, SUMMARY OF FINDINGS, RECOMMENDATION LIMITATIONS AND SUGGESTIONS FOR FURTHER STUDIES

5.1 Introduction:

In this chapter the discussions, summary of findings, recommendations, limitations and suggestions for further studies are presented.

5.2 Discussions.

This study was designed to investigate the relationship between some dimensions of students' motivation and science achievement in Senior Secondary Schools of Abia State, Nigeria. The results are discussed below under the appropriate sub-headings.

5.2.1 Parental Support.

The results from the study revealed that there is significant relationship between parental support and the students' achievements in biology, chemistry and physics. Parental support correlated positively with biology, chemistry and physics achievements. In all the subjects areas considered therefore hypothesis 1, which stated that there is no significant relationship between parental support and academic achievement of Senior Secondary Science students was rejected. The findings of this study seem to show that parental support for their childrens' academic work is a major

factor in the successful learning of the basic science subjects in the secondary school. Also the findings suggest that parental support plays a facilitating role in science achievement. These support the observation of Ryan and Deci (1991) (See chapter 2 page 48). Their findings indicated that perceived parental autonomy support and involvement were positively associated with perceived competence control which enhanced academic achievements of the children. The findings of this study is also in agreement with that of Madugu (1977) in which he found that secondary school students in Sokoto state of Nigeria performed poorly in the School Certificate Examinations because they lacked parental support.

5.2.2 Teachers' Support.

The study showed that there is a significant relationship between teachers' support and students' achievements in science. This is indicated by the fact that "teachers' support" (as a variable) significantly related to biology, chemistry and physics achievements. Thus the hypothesis which stated that: there is no significant relationship between teachers' support for their students and their academic achievements was rejected in all cases. The t-test values were: biology 1.94, chemistry 2.35 and physics 17.88 at t-test critical value of 1.645. This results shows that teachers' support constitutes one of the requisite factors that help to improve learning of science and the achievements of students

in the subject areas.

This finding is supported by earlier studies of Abdullahi (1991) in which students with higher teachers' support achieved better in mathematics. It also showed that teachers probably showed interest in the students' progress by providing them with structure, autonomy and involvement, earlier discussed in chapter 1 (see chapter 1 page 15). This supports the view of Okebukola (1986). He observed that it is the teacher who is favourably disposed to the teaching of basic sciences that is likely to give serious attention to the students' learning of the subjects. According to him, the teacher is more likely to be resourceful. He is also more likely to make optimal use of the available resources.

Teachers' support seem to generate positive value in the students that they considered themselves competent. The students therefore strive for academic excellence.

5.2.3 Peer-Group Influence.

The findings of the study showed that peer-group influence correlated positively with biology, chemistry and physics achievements. These results show that the peer-groups appear to assist each other to study basic sciences. The peer-groups probably formed discussion groups in which they interact within the learning context of basic sciences therefore influencing their achievement in them. Yet it was only in physics achievement that the stated hypothesis was

rejected. The hypothesis which stated that there is no significant relationship between peer-group influence and academic achievement was not rejected for biology and chemistry achievements. The peer-group influence though positively related to biology and chemistry achievements, was not high enough to be significant (See table 4.1 - 4.2 of chapter 4). This means that peer-group influence and interaction may not be as of positive value to the learning of science as common sense may probably prompt one to believe or assume.

The finding is consistent with that of Epstein (1983). He found that peer-group influence can be positive towards academic achievement. Epstein pointed out that the influence of the peers depended on the attitude and values of the peers with whom students relate. Berndt *et al* (1990) similarly pointed out that if a peer-group has a high level of achievement motivation, the peers motivation to study will increase. In this study this observation appear to be true as regards the basic sciences.

5.2.4 Availability of Resource Materials.

The results of the study revealed that availability of resource materials correlated positively with biology, chemistry and physics achievements. This result showed that the availability of resource materials in the right quantity and quality may make the difference in concept presentation

and learning. This is suggested because the students response (in the questionnaire used for the study) was high showing that the resources were available, (See chapter 4 tables 4.1 - 4.3). However the utilization of available resources appear to be a factor on which this is predicated. The utilization seem to be more pronounced in chemistry and physics achievements (See table 4.2 - 4.3 of chapter 4).

The findings of this study also showed that there was significant relationship between availability of resource materials and science achievement. Hypothesis 4 was rejected for all the subjects - biology, chemistry and physics. This result was in agreement with findings from earlier studies of Assuzu (1980). He found that there was a high positive correlation between the quality of apparatus available in a school and the students achievement in sciences. Okebukola (1986) also showed that adequacy of laboratory space and materials correlated positively with biology achievement. This has helped to shed more light on the findings of this study.

5.2.5 Availability of Career-Guidance Services.

This study showed that the availability of career-guidance services correlated positively with students' achievements in all the subject areas considered. However correlation with achievement were low in all the subject areas under study, with the lowest correlation occuring in physics

($r = 0.03$). In all cases relationship between availability of career-guidance services in the schools and students' achievement was not statistically significant. Thus hypothesis five (5) was retained. This result appears to have arisen because the students seem not to have understood what career guidance services in schools is all about. Most of their responses in the questionnaire was under the scale of "undecided".

The most probable factor that gave rise to the low correlation obtained is the absence of professional school guidance counsellors in most of the schools. The researcher observed that there were no professional guidance counsellors in most of the schools he visited. In some schools where they were available their presence was hardly felt. This was caused by the guidance counsellors themselves or those they were meant to serve. The guidance counsellors have not made appreciable effort to sell their services no matter the circumstances. On the part of the school, good office accommodation were not provided the school guidance counsellors. It is almost difficult for him/her to work in open general office where every other teacher is present. The students seem to be reluctant to approach the School guidance counsellor when confused or discouraged.

5.2.6 Test Anxiety.

Test anxiety has been defined as an emotional condition

by which there is uncertainty about the future caused by the need to avoid failure in an examination situation (See chapter 1 section 1.3.7). Researchers have shown that highly anxious students do not perform well on task of intellectual aptitude: they perform poorly compared to students who were less anxious. Hembree (1988), Lindgren (1967), Sarason (1980). The results of this study show that the subjects were less anxious students. The sort of anxiety considered in this study is what can be called normal level anxiety.

Test anxiety in this study correlated positively with biology, chemistry and physics achievements (tables 4.1 to 4.3). The t-test values of test anxiety for biology, chemistry and physics achievements were: 6.48; 3.16; 3.34 respectively showing that test anxiety related significantly to science achievement. Test anxiety which is an intrinsic motivator (chapter 2 section 2.7 pages 44 and 45) is always present in students. Science classes help the student to keep the anxiety at normal level which is facilitative to learning, Lindgren (1967) (chapter 2 section 2.7.2). Science does this by relating to the process of providing for the future. This implies organising constant practical work for the students. When students are exposed to a good number of practical exercises before their School Certificate Examinations their test anxiety is kept low. This is because they would become familiar with the apparatus; how to handle them to obtain good readings. Bugelski's (1956) explanation that anxiety is basic

to attention and learning has been shown by the results in this study. This finding is congruent with that of Allison and Ash (1951) which indicated that anxiety was accompanied by improvement in achievement.

The research findings however seem to disagree with that of Pintrich and De Groat (1990) in which test anxiety related negatively to achievement on examination and quizzies. Okebukola's (1986) finding also showed that anxiety correlated negatively with biology achievement. These probably meant that they made use of high-level test anxiety students in their studies.

5.2.7 Incentives.

The findings of the study showed that incentive correlated positively with biology, chemistry and physics achievements. The correlation between incentives and biology achievement was very low (r = o,06). For physics achievement it was also very low (r = 0.04) while it was low for chemistry achievement (r = 0.13). The corresponding t-test values were : 1.10 for biology achievement, 0.73 for physics achievement and 2.49 for chemistry achievement; all at t-test critical value of 1.64. Thus incentive related significantly only with chemistry achievement. Incentives showed little relationship with physics achievement because physics is perceived as a difficult subject. Thus it is only students who are determined, that is, those with high intrinsic motivation that

opt for it. Consequently extrinsic motivation will have little or no influence on it. In the case of biology, both students and teachers believe that it is an easier option, therefore little or no incentives are applied. These findings suggest that low level of incentives were used in the study. The results were nonetheless consistent with the findings of Pintrich and De Groot (1990). They found that incentive positively related to academic achievement. According to them students who were motivated to learn by incentives got good grades and believed that their school work was interesting and important. They were more cognitively engaged in trying to comprehend the materials. They persisted in their academic work.

5.3 Summary of Findings.

The researcher focussed attention on the relationship between the dimensions of students motivation and science achievements in Senior Secondary Schools of Abia State of Nigeria. As discussed before (in section 4.2) the correlation coefficients between the dimensions and the academic achievement were found to be consistently low in most of the cases. However, when converted to t-test values and compared with the critical value of correlation coefficient ($r = 0.10$) at 0.05 level of significance, they were found to be significant as outlined below.

(1) There is significant relationship between parental

support and the students' achievement in science.

(2) There is significant relationship between teachers' support and the students' achievement in science.

(3) There is significant relationship between peer-group influence and students' physics achievement; but there is no significant relationship between peer-group influence, and biology and chemistry achievements.

(4) There is significant relationship between availability of resource materials and the students science achievement.

(5) There is no significant relationship between the availability of career guidance services and the students' science achievement.

(6) There is significant relationship between test anxiety and the students' science achievement.

(7) There is significant relationship between incentive and the students chemistry achievement. Biology and Physics achievements of the students are related to incentive but not significantly.

All these were tested at 0.05 level of significance. For chemistry and physics achievements five of the null hypotheses were rejected while two were retained. On the part of biology achievement four out of the seven null hypotheses were rejected while three were retained.

The variance of the academic achievements that are accounted for by each of the motivational dimensions in

descending order is shown in table 5.1.

Table 5.1: Percentage of Science achievements accounted for by various motivational dimensions.

Science Achievement	Motivational Dimension	% of Science achievement accounted for
Physics achievement	Availability of resource materials	61
Chemistry achievement	Availability of resource materials	40
Physics "	Teachers' support	27
Biology "	Test anxiety	11
Biology "	Availability of resource materials	3
Chemistry "	Parental support	3
Chemistry "	Test anxiety	3
Physics "	Parental support	3
Physics "	Test anxiety	3
Biology "	Parental support	2
Chemistry "	Teachers' support	2
Chemistry "	Incentive	2
Biology "	Teachers' support	1
Physics "	Peer-group influence	1
Biology "	Peer-group influence	0.5
Biology "	Career guidance services	0.4
Biology "	Incentive	0.4

Chemistry	"	Career guidance services	0.3
Chemistry	"	Peer-group influence	0.2
Physics	"	Incentive	0.2
Physics	"	Career guidance services	0.1

5.4 Recommendations.

In the light of the findings from this study, it is recommended that:

1) parents, teachers and administrators of education should provide structure, autonomy and involvement to the students. In the context of this study, structure means the amount of information about how to effectively achieve a desired outcome. The amount of freedom a student is given to determine his or her own behaviour is the autonomy. Involvement refers to the quality of interactions between the students and their teachers, peers, parents and others. This recommendation is made because the study revealed that parental and teachers support correlated positively with science achievement. These play facilitative roles in science achievement. and they related significantly with science achievement. Their absence led to poor performance of students. Text-books and other resource materials, incentives, career guidance services should be made available to the

students.

2) Abia State School system should employ more Science teachers to forestall the practice of engaging teachers who have no knowledge of science teaching. Good qualified science teachers will assist the students regain confidence in themselves. This confidence will help them consider themselves competent and therefore strive for excellence.

3) the Ministry of Education in Abia State should employ more professional guidance counsellors to beef up the inadequate number already in the schools. The researcher in his on the spot visits found that many schools had no qualified guidance counsellors. The employed guidance counsellors should be deployed to cover all the Senior Secondary Schools in the State.

4) science teachers with their laboratory assistants should organise science practicals constantly, in all the basic sciences. This will enable the student understand some difficult topics which only theoretical treatment could not. This will also help to keep the anxiety of the students at normal level.

5) private and public companies, financial institutions should help to equip the School Science laboratories with the necessary materials. This will enable science personnel organise practical works and meaningful workshops for the students.

5.5 Limitations of the Study.

The following are some of the limitations of the study:

(a) The correlation coefficients (r) obtained in this study were mostly low yet when converted they were found to be significant.

(b) Answer scripts of 10 students were not intelligible. Thus they were not used for analysis. This reduced sample size used for analysis from 360 to 350 students. This led to a reduction from the 20% population size initially intended in the research design.

(c) There were a total of 28 items in the instrument, giving rise to 4 items per dimension. These are rather too few, hence a limitation.

(d) The twelve students used for pilot study are too few. Time constraint could not allow the researcher to go for large number of students. This is a limitation of the study.

5.6 Suggestions for Further Study.

1) The researcher suggests that the study be carried out with gender factor in view. What will be the influence of sex on students' motivation and academic achievement?

2) This study can be carried out further to find out if there will be any significant difference in the dimensions of students' motivation and science achievement between high achieving and low achieving

students.

3) The researcher suggests that a further study be carried out to investigate into the utilization of available resource materials and the academic achievements of science students.

4) Further study is suggested into the career guidance services to find out how much the students are aware of its existence and the benefits they derive from it.

5) The researcher suggests that further study be carried out to find out the effect of peer-group influence in the learning of science generally and the students academic achievement in particular.

6) This study should be replicated in other states of Nigeria so as to see if similar conclusions can be reached as we now have for Schools in Abia State.

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APPENDIX A

QUESTIONNAIRE

Dear Respondent

Your class has been chosen to participate in this Research project which is investigating the dimensions of Student motivation and their relationship on the achievement of the secondary school science students in Abia State of Nigeria. The informations required in this questionnaire is purely for academic purposes. All information supplied will be treated in strict confidence. Section A requires your personal data and other related information while section B requires you to show to what extent you agree with the statement. Carefully read the statments and then show your reaction by ticking (√) under one of the letters provided in the right hand column.

SA mean Strongly Agree

A means Agree

U " Undecided

DA " Disagree

SDA " Strongly Disagree

SECTION A

Name:.....

Sex:.....

Your School:.....

.....

PARENTAL EDUCATION QUALIFICATION

(a) Mother: University Graduate

NCE .....

HND .....

OND ..... TC II .....

Others (Specify) .....

(b) Father University Graduate

NCE .....

HND .....

OND ..... TC II .....

Others (Specify) .....

Tick the right one (✓)

SECTION B

To what extent do you Agree with the following Statements?

		SA	A	U	DA	SDA
1.	My parents always make sure I do my homework without disturbance.					
2.	My parents expect me to set high standard in School work.					
3.	My parents expect me to find enough time to do my home work well.					

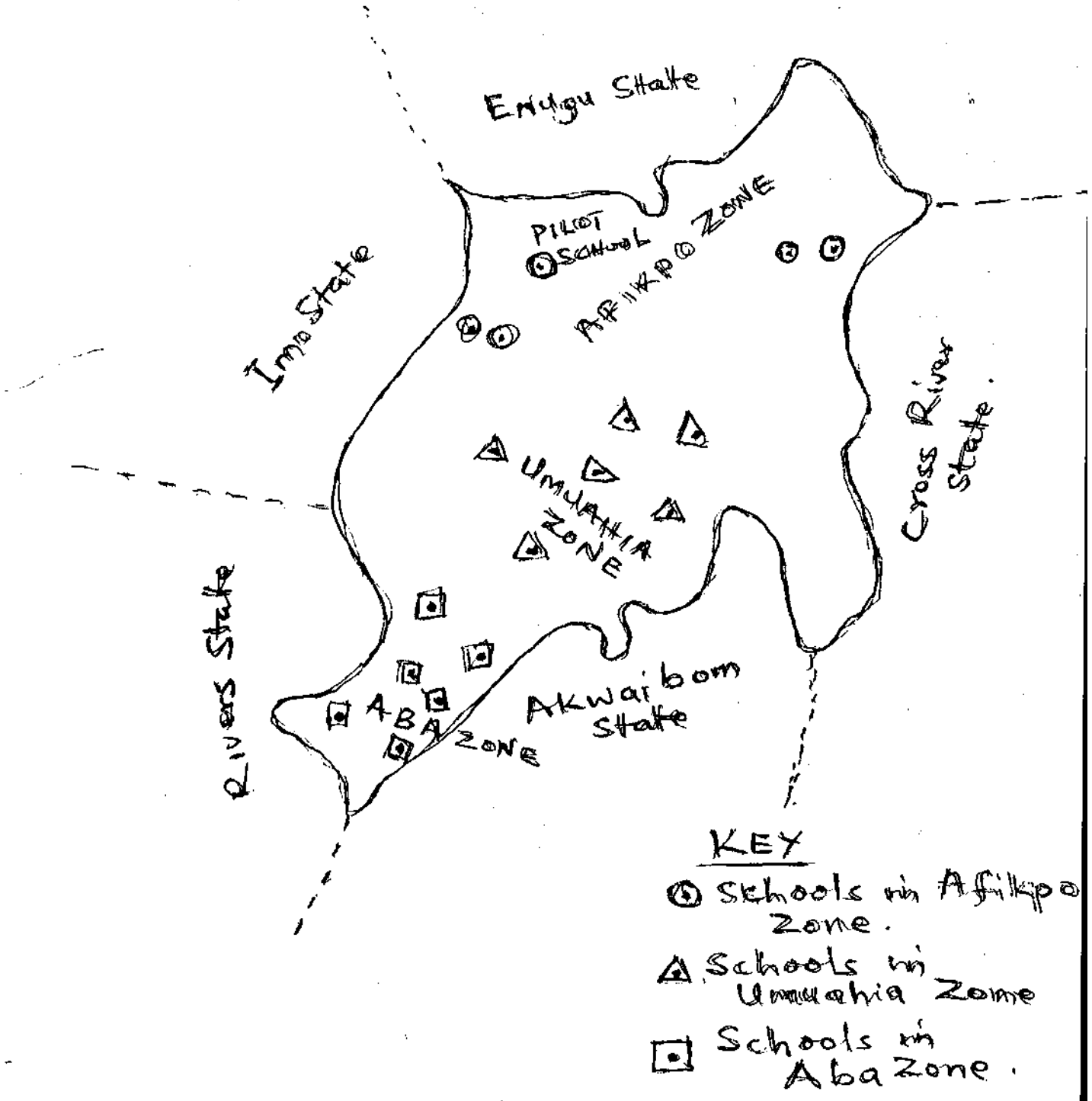
		SA	A	U	DA	SDA
4.	My parents always take my school report serious.					
5.	My teachers are always ready to listen to my problems.					
6.	My teachers are interested in me as an individual.					
7.	Nearly all my teachers give me a help in my studies.					
8.	My teachers attend classes regularly and punctually.					
9.	It is important to me to remain with my friends even if it means fooling around.					
10.	Staying with my friends often make me go late to class.					
11.	I cherish to have the same gifts that my friends have.					
12.	I am interested in my laboratory practicals because my friends are also involved.					
13.	I do not mind studying very hard if I learn something at the end.					
14.	When I receive my test papers I try to learn from my mistakes.					

		SA	A	U	DA	SDA
15.	Most of the things I learn here are going to help me solve practical problems in life.					
16.	I often choose topics I will learn something from even if they require more work.					
17.	I am so nervous during a test that cannot remember facts I have learned.					
18.	I have an uneasy upset feeling when I take a test.					
19.	I worry a great deal about tests.					
20.	When I take a test I think about how poorly I am doing.					
21.	My school has laboratories each for physics, biology and chemistry.					
22.	During practical work in chemistry everyone of us has his/her own equipment with which to work.					
23.	My school has well trained and experienced laboratory assistants.					
24.	My school labs have water and light and are spacious enough for movement.					

		SA	A	U	DA	SDA
25.	My school has a professional Guidance Counsellor					
26.	Having looked into my previous performance, my school Guidance Counsellor helped me in choosing my subjects.					
27.	I love to approach the school Guidance Counsellor when I am confused and discouraged.					
28.	I now enjoy my subjects because my interest are properly directed by the School Guidance Counsellor.					

APPENDIX B 109

SKETCH OF ABIA STATE SHOWING THE LOCATION OF SCHOOLS USED.



APPENDIX C

STUDENTS CONTINUOUS ASSESSMENT SCORES

S/NOS.	Physics	Chemistry	Biology	S/NOS	Physics	Chemistry	Biology
1.	59	68	38	55.	42	54	71
2.	56	50	29	56.	64	48	61
3.	40	55	32	57.	56	45	61
4.	17	36	28	58.	54	45	45
5.	36	43	36	59.	56	32	89
6.	47	43	36	60.	52	60	81
7.	47	-	42	61.	60	55	54
8.	59	-	42	62.	53	41	48
9.	34	51	48	63.	56	55	70
10.	55	51	64	64.	38	40	75
11.	25	35	32	65.	55	50	68
12.	37	38	40	66.	44	75	74
13.	48	42	50	67.	53	40	62
14.	44	47	49	68.	34	27	49
15.	31	-	35	69.	21	34	40
16.	48	44	37	70.	57	37	50
17.	56	62	56	71.	70	52	58
18.	36	-	47	72	40	80	38
19.	34	34	41	73.	50	85	40
20.	19	41	48	74.	70	95	98
21.	34	43	30	75.	50	90	72
22.	48	49	35	76.	55	90	47
23.	66	73	67	77.	63	60	55
24.	32	51	62	78.	35	85	56
25.	62	67	54	79.	43	80	38
26.	11	25	18	80.	65	90	74
27.	24	37	26	81.	60	48	56
28.	33	-	24	82.	70	75	66
29.	31	42	30	83.	35	90	64
30.	64	62	48	84.	75	95	76
31.	55	66	44	85.	35	90	42
32.	22	42	25	86.	55	85	44
33.	64	62	48	87.	65	90	60
34.	34	45	38	88.	55	90	70
35.	50	38	32	89.	60	90	42
36.	35	30	38	90.	65	90	72
37.	35	08	28	91.	70	95	72
38.	74	63	43	92.	25	55	72
39.	20	34	29	93.	70	95	98
40.	52	48	20	94	40	30	40
41.	56	52	34	95.	80	54	38
42.	65	60	62	96.	16	19	19
43.	60	60	58	97.	27	20	18
44.	60	70	62	98.	46	28	24
45.	78	84	70	99.	39	44	38
46.	52	64	58	100.	17	21	10
47.	72	79	75	101.	46	54	26
48.	70	65	58	102.	45	33	42
49.	58	50	60	103.	24	31	46
50.	60	79	63	104.	22	28	35
51.	62	53	72	105.	41	30	32
52.	62	61	70	106.	80	30	38
53.	54	49	30	107.	50	10	34
54.	77	85	52	108.	49	24	49

S/NOS.	Physics	Chemistry	Biology	S/NOS	Physics	Chemistry	Biology
109.	80	17	22	165.	62	49	69
110.	49	24	34	166.	58	55	66
111.	59	49	30	167.	17	36	23
112.	30	62	32	168.	37	42	63
113.	33	38	25	169.	23	61	41
114.	38	31	24	170.	51	44	56
115.	25	24	29	171.	77	76	79
116.	27	31	10	172.	51	49	53
117.	18	42	38	173.	41	50	66
118.	87	64	82	174.	31	36	29
119.	50	40	45	175.	32	11	38
120.	40	50	45	176.	40	49	51
121.	60	55	45	177.	-	48	41
122.	61	58	72	178.	30	41	68
123.	45	68	60	179.	26	50	54
124.	63	60	75	180.	35	30	38
125.	80	82	73	181.	26	25	49
126.	75	80	78	182	-		45
127.	50	48	45	183.	-		37
128.	62	55	71	184.	-		50
129.	55	50	65	185.	-		21
130.	55	60	64	186.	62	89	76
131.	55	62	50	187.	44	59	42
132.	65	60	72	188.	39	35	50
133.	74	83	61	189.	37	33	34
134.	46	55	81	190.	47	40	33
135.	70	65	78	191.	27	48	20
136.	75	70	60	192.	44	80	61
137.	80	75	70	193.	25	48	31
138.	80	75	73	194.	22	39	40
139.	80	75	70	195.	25	38	45
140.	40	35	50	196.	19	42	33
141.	45	35	50	197.	40	49	43
142.	70	58	71	198.	21	49	37
143.	45	-	65	199.	23	37	34
144.	32	48	53	200.	37	44	44
145.	34	38	50	201.	28	40	59
146.	33	44	50	202.	31	25	29
147.	35	44	45	203.	80	92	74
148.	40	38	50	204.	70	69	78
149.	39	-	23	205.	60	98	80
150.	40	32	36	206.	30	56	74
151.	53	35	33	207.	55	64	58
152.	49	42	53	208.	50	84	74
153.	29	52	48	209.	55	71	72
154.	32	46	58	210.	74	41	43
155.	48	44	43	211.	48	50	16
156.	45	39	41	212.	45	55	35
157.	55	40	55	213.	41	31	24
158.	33	38	40	214.	58	52	43
159.	48	57	71	215.	45	42	50
160.	35	50	60	216.	40	47	14
161.	25	47	63	217.	35	30	33
162.	40	26	38	218.	50	48	44
163.	59	44	57	219.	25	05	20
164.	36	39	53	220.	58	54	27

S/NOS.	Physics	Chemistry	Biology	S/NOS	Physics	Chemistry	Biology
221.	45	48	30	277.	63	56	42
222.	55	40	48	278.	58	75	71
223.	75	40	59	279.	40	60	42
224.	65	64	54	280.	54	40	38
225.	35	45	60	281.	45	55	69
226.	41	26	24	282.	55	55	74
227.	35	19	30	283.	19	40	62
228.	45	50	41	284.	65	42	35
229.	50	60	43	285.	9	50	36
230.	79	72	45	286.	40	55	54
231.	10	57	46	287.	57	68	56
232.	62	70	90	288.	54	56	68
233.	28	40	51	289.	-	41	47
234.	29	45	32	290.	14	11	38
235.	26	45	58	291.	12	23	29
236.	25	27	3	292.	11	3	19
237.	25	28	41	293.	5	3	8
238.	06	41	46	294.	41	37	44
239.	50	69	63	295.	27	27	35
240.	41	43	49	296.	42	33	40
241.	40	51	43	297.	50	32	49
242.	25	49	53	298.	36	30	47
243.	28	57	27	299.	22	28	36
244.	46	50	48	300.	24	31	45
245.	38	56	59	301.	7	5	30
246.	35	20	56	302.	30	13	57
247.	-	57	49	303.	50	55	63
248.	29	47	28	304.	35	9	52
249.	62	70	60	305.	31	12	40
250.	18	-	49	306.	25	6	32
251.	32	10	30	307.	11	22	31
252.	03	41	41	308.	36	35	47
253.	40	36	56	309.	17	12	20
254.	17	-	24	310.	45	18	34
255.	52	60	66	311.	32	15	31
256.	55	37	50	312.	55	45	55
257.	53	58	36	313.	56	88	64
258.	29	68	45	314.	53	40	56
259.	55	49	65	315.	40	50	60
260.	48	30	50	316.	34	29	43
261.	52	47	67	317.	33	31	35
262.	12	37	31	318.	50	15	58
263.	48	66	67	319.	30	10	25
264.	39	55	52	320.	21	7	33
265.	60	22	25	321.	32	15	37
266.	25	32	50	322.	19	04	31
267.	66	60	55	323.	26	7	26
268.	49	47	39	324.	28	11	41
269.	47	49	68	325.	48	37	57
270.	06	41	44	326.	52	62	57
271.	11	47	51	327.	44	37	52
272.	37	47	53	328.	43	32	48
273.	52	65	68	329.	16	6	24
274.	39	64	50	330.	22	11	26
275.	55	32	15	331.	9	16	34
276.	40	42	45	332.	13	11	14

S/NOS.	Physics	Chemistry	Biology
333.	51	35	52
334.	20	7	44
335.	69	46	44
336.	40	45	50
337.	86	61	59
338.	91	55	56
339.	32	43	41
340.	65	68	57
341.	34	60	48
342.	28	-	52
343.	49	-	59
344.	42	-	26
345.	42	-	80
346.	42	-	51
347.	35	-	74
348.	35	-	70
349.	35	-	68
350.	30	-	50

STUDENTS SCORES ON MOTIVATIONAL DIMENSIONS

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
1.	19	15	13	16	8	11	20
2.	20	16	11	17	5	14	20
3.	17	10	14	20	15	19	16
4.	18	16	12	16	18	13	17
5.	19	13	10	19	11	15	12
6.	19	7	8	9	4	9	12
7.	20	10	10	16	15	14	20
8.	19	11	4	13	6	16	19
9.	14	12	9	16	8	14	13
10.	18	13	8	16	10	15	17
11.	20	9	9	20	8	12	16
12.	20	7	8	13	15	13	13
13.	20	15	8	20	12	16	18
14.	20	7	15	18	8	12	11
15.	20	15	7	20	9	15	19
16.	20	15	12	19	17	16	20
17.	20	14	4	16	8	12	6
18.	17	12	14	19	9	11	15
19.	20	10	11	18	15	17	13
20.	20	13	10	20	7	13	14
21.	19	15	6	17	11	19	12
22.	12	9	10	10	19	18	17
23.	18	12	11	14	18	14	16
24.	20	15	10	20	17	20	15
25.	20	8	5	19	5	15	9
26.	19	12	14	20	15	18	17
27.	19	16	5	19	7	11	11
28.	20	7	10	20	12	10	14
29.	20	14	11	20	12	20	15
30.	19	13	6	18	7	13	9
31.	20	13	10	18	10	18	13
32.	18	17	8	17	10	19	12
33.	19	12	13	15	9	20	18
34.	20	18	10	16	6	20	20
35.	20	19	10	15	17	20	20
36.	19	16	8	19	6	20	18
37.	19	11	10	16	17	15	15
38.	19	17	11	16	15	20	19
39.	20	19	10	15	16	20	20
40.	18	14	10	15	17	14	17
41.	16	18	11	15	17	13	19
42.	17	18	6	16	18	8	15
43.	17	15	9	13	11	11	14
44.	20	18	15	15	19	10	14
45.	18	16	15	18	14	13	13
46.	19	20	14	20	13	12	12
47.	20	20	11	20	14	13	20
48.	18	15	5	18	17	8	9
49.	20	19	6	20	16	8	16
50.	20	18	7	16	11	8	18
51.	19	19	11	17	12	12	18
52.	20	18	9	17	12	14	18
53.	17	19	12	16	18	8	17
54.	20	17	6	18	17	8	8

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
55.	19	17	9	20	6	9	17
56.	18	14	9	12	8	5	18
57.	19	16	8	17	18	4	17
58.	20	15	12	16	11	5	17
59.	19	15	5	16	8	4	19
60.	18	10	12	14	9	8	20
61.	19	17	9	16	13	12	19
62.	18	15	12	18	12	11	19
63.	18	13	7	15	8	4	20
64.	18	15	7	15	10	5	20
65.	19	10	6	17	15	9	17
66.	18	13	11	19	14	8	19
67.	20	14	6	19	12	11	17
68.	18	18	11	15	9	13	17
69.	20	18	9	20	16	13	20
70.	18	12	9	20	12	10	19
71.	19	14	17	19	18	20	20
72.	18	13	11	15	10	17	14
73.	20	12	6	15	4	20	12
74.	18	13	13	16	14	19	18
75.	18	17	8	20	12	20	12
76.	17	11	13	17	14	17	18
77.	19	15	13	20	8	18	16
78.	18	15	8	16	10	19	17
79.	19	10	14	19	7	12	17
80.	17	11	12	15	14	16	9
81.	19	12	12	15	9	11	9
82.	17	10	9	19	12	9	15
83.	19	14	18	18	17	20	18
84.	18	13	18	15	14	18	18
85.	18	18	14	15	12	17	15
86.	20	14	6	14	7	20	12
87.	18	13	13	16	14	19	18
88.	18	17	8	20	14	18	19
89.	17	11	13	17	14	17	18
90.	18	12	11	19	15	9	11
91.	19	15	10	20	8	18	17
92.	20	16	13	16	11	9	16
93.	18	19	13	14	17	17	18
94.	17	19	12	20	18	18	11
95.	20	18	12	17	17	16	16
96.	20	20	5	20	15	5	20
97.	19	16	11	16	11	15	14
98.	16	17	13	16	15	16	16
99.	16	7	9	12	10	13	12
100.	19	19	8	16	8	19	17
101.	20	15	4	20	8	20	20
102.	20	17	14	20	14	20	20
103.	19	14	13	20	11	10	13
104.	20	13	14	19	15	17	14
105.	20	20	16	16	4	18	20
106.	18	8	10	17	12	13	10
107.	20	20	13	18	18	20	20
108.	16	16	14	16	16	12	16

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
109.	16	17	14	12	15	15	16
110.	20	19	9	17	10	12	13
111.	18	18	17	16	19	19	19
112.	20	14	4	18	7	5	8
113.	20	17	8	17	16	9	16
114.	19	12	8	19	13	11	18
115.	18	11	10	18	9	8	17
116.	15	9	9	19	13	12	18
117.	14	19	13	14	19	16	18
118.	18	19	8	20	7	12	11
119.	19	19	13	15	7	16	8
120.	20	13	11	16	19	15	16
121.	18	15	15	18	14	15	12
122.	19	16	10	20	13	13	12
123.	19	14	9	17	7	12	12
124.	19	17	11	20	12	15	16
125.	19	19	9	19	9	12	19
126.	17	19	6	20	8	9	13
127.	20	17	10	16	15	16	14
128.	18	14	8	17	9	9	12
129.	18	18	14	17	13	12	11
130.	16	20	11	20	11	11	11
131.	18	16	11	19	17	16	15
132.	15	14	11	19	7	13	14
133.	19	18	12	16	14	14	14
134.	17	16	6	18	6	13	9
135.	20	15	9	16	15	11	8
136.	20	11	6	18	14	16	17
137.	20	13	10	15	11	12	11
138.	18	10	9	16	9	16	10
139.	20	20	12	14	16	18	18
140.	20	20	18	19	20	20	4
141.	15	15	9	20	4	14	4
142.	20	20	14	20	12	17	9
143.	18	13	16	20	7	9	10
144.	20	14	4	14	8	8	6
145.	19	15	19	16	12	10	16
146.	18	17	12	16	12	6	10
147.	20	14	8	19	13	8	5
148.	20	18	16	17	13	7	5
149.	14	15	4	20	13	9	8
150.	20	13	12	18	19	9	5
151.	17	14	9	20	11	12	12
152.	16	16	17	19	14	8	15
153.	19	14	14	19	18	13	8
154.	20	15	11	19	11	8	4
155.	20	16	12	15	10	4	9
156.	18	14	10	15	18	8	4
157.	20	16	5	18	11	12	9
158.	20	14	9	20	18	16	14
159.	18	14	14	20	10	20	17
160.	20	9	8	20	15	17	20
161.	16	15	13	15	9	16	6
162.	20	14	9	16	7	18	17
163.	19	12	10	16	14	10	9

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
164.	15	14	9	15	16	14	15
165.	18	18	16	20	16	10	13
166.	17	13	16	17	16	10	9
167.	20	13	9	19	16	13	14
168.	16	11	4	19	12	20	6
169.	16	11	5	20	8	16	15
170.	19	16	8	17	11	16	8
171.	20	11	7	20	5	10	17
172.	16	12	13	20	10	13	5
173.	19	17	7	16	13	18	12
174.	17	11	13	17	9	13	14
175.	11	10	5	20	20	20	9
176.	20	14	14	16	17	18	12
177.	20	20	11	20	16	12	20
178.	20	13	8	19	16	15	14
179.	20	14	8	20	17	14	14
180.	20	16	9	19	16	13	14
181.	18	13	8	19	12	10	8
182.	19	8	6	20	12	18	18
183.	18	10	11	20	11	16	13
184.	15	16	10	16	9	15	19
185.	18	13	10	16	13	12	14
186.	20	14	8	16	11	11	6
187.	15	12	14	18	15	5	13
188.	18	17	13	16	16	15	12
189.	20	15	7	18	9	9	17
190.	18	19	9	18	8	15	16
191.	18	13	16	17	15	18	12
192.	19	14	7	20	12	11	17
193.	17	18	11	15	12	15	16
194.	19	17	6	17	14	17	16
195.	18	13	9	16	7	11	18
196.	17	15	12	15	16	18	18
197.	17	17	7	16	17	13	18
198.	18	18	13	16	13	12	11
199.	19	13	11	18	17	9	14
200.	18	15	9	20	15	10	13
201.	19	17	12	16	16	11	13
202.	17	16	9	16	14	15	16
203.	20	14	13	18	12	18	18
204.	20	13	8	20	12	10	12
205.	19	15	10	16	8	17	17
206.	19	18	7	15	12	18	13
207.	20	14	12	12	10	16	11
208.	19	18	9	14	15	17	17
209.	19	16	8	18	9	17	19
210.	17	11	6	17	10	18	18
211.	20	15	8	17	11	20	13
212.	20	14	7	15	11	20	13
213.	14	14	14	17	11	19	20
214.	19	18	9	15	10	20	18
215.	19	18	8	16	17	20	18
216.	19	17	12	16	11	20	17
217.	20	12	6	16	9	20	12
218.	19	14	6	15	8	16	17

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
219.	17	16	8	16	12	17	12
220.	20	19	12	16	10	20	19
221.	16	16	12	18	6	20	20
222.	13	17	6	16	18	19	12
223.	15	17	11	17	6	20	20
224.	15	17	8	15	11	20	20
225.	19	17	10	18	15	19	17
226.	15	9	9	18	13	17	18
227.	18	10	9	16	16	18	19
228.	15	11	12	17	12	18	17
229.	18	13	6	17	14	14	17
230.	20	16	5	20	5	15	19
231.	14	19	12	16	19	17	18
232.	20	15	8	20	8	13	20
233.	19	13	8	19	12	14	17
234.	19	15	4	19	13	12	19
235.	13	8	11	17	10	11	6
236.	20	14	11	17	9	16	20
237.	14	12	12	17	12	7	19
238.	16	16	9	18	18	12	19
239.	16	13	8	16	12	9	20
240.	16	13	8	16	8	10	20
241.	12	18	8	16	20	12	20
242.	18	10	6	18	4	4	20
243.	19	15	7	18	6	15	20
244.	18	17	8	18	6	11	20
245.	19	16	14	20	10	13	20
246.	18	14	12	17	9	11	20
247.	17	15	15	16	11	10	20
248.	18	15	6	16	4	16	17
249.	17	18	12	20	6	10	20
250.	17	14	6	14	12	6	15
251.	14	14	12	16	14	9	16
252.	17	19	11	18	12	15	14
253.	18	13	11	17	11	15	19
254.	18	16	13	14	15	10	10
255.	19	13	18	16	7	7	17
256.	18	13	9	15	10	12	16
257.	18	17	11	18	5	15	17
258.	18	17	12	20	11	13	18
259.	20	11	6	19	16	12	9
260.	18	16	11	19	16	19	16
261.	18	15	9	18	12	16	16
262.	19	13	10	19	12	14	12
263.	20	7	11	18	5	9	15
264.	20	17	8	19	12	10	18
265.	19	16	9	16	15	16	20
266.	20	18	11	19	10	18	14
267.	20	20	7	20	10	18	19
268.	19	18	5	20	14	8	20
269.	20	16	12	18	12	16	16
270.	18	11	14	16	14	18	16
271.	20	20	14	18	14	12	20
272.	18	15	5	15	17	11	6
273.	20	17	6	20	7	20	17

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
274.	20	12	10	20	20	12	20
275.	19	11	11	19	12	13	15
276.	19	17	12	18	5	18	20
277.	16	17	4	16	13	9	20
278.	20	20	5	17	5	15	15
279.	18	17	5	18	9	17	18
280.	20	16	5	19	15	17	18
281.	18	18	9	16	4	8	14
282.	19	12	13	19	20	11	16
283.	20	6	16	11	11	7	4
284.	18	15	10	16	13	9	16
285.	17	15	9	19	16	17	17
286.	18	14	6	18	9	15	13
287.	18	16	12	16	9	14	17
288.	19	17	6	18	12	17	18
289.	20	13	8	17	13	12	15
290.	19	16	15	17	15	17	19
291.	18	14	8	14	9	13	17
292.	18	15	10	15	16	15	17
293.	16	18	16	18	14	13	19
294.	17	14	14	19	13	18	11
295.	19	15	13	16	6	10	13
296.	20	17	15	14	11	17	18
297.	20	20	14	20	13	16	19
298.	16	16	13	16	12	14	14
299.	16	15	14	15	15	16	13
300.	19	10	12	20	11	19	20
301.	17	11	14	18	12	12	16
302	20	19	9	19	9	17	18
303.	17	15	12	19	17	11	13
304.	18	17	17	13	17	13	20
305.	16	17	10	19	20	11	12
306.	18	15	8	18	12	16	20
307.	20	18	15	17	8	20	18
308.	19	16	17	18	6	17	20
309.	18	13	13	16	15	16	19
310.	18	20	16	15	10	15	19
311.	19	9	10	20	12	18	20
312.	18	18	17	13	14	12	20
313.	20	18	14	17	4	12	15
314.	20	17	13	20	15	20	17
315.	19	15	10	19	10	15	8
316.	19	17	13	19	10	19	20
317.	20	16	16	18	5	14	20
318.	18	16	14	16	11	11	16
319.	19	15	9	20	18	15	20
320.	19	12	12	18	19	12	19
321.	20	18	14	17	14	14	20
322.	10	5	3	19	12	10	10
323.	19	19	17	19	18	14	20
324.	10	9	12	11	17	13	17
325.	18	14	13	13	16	14	10
326.	19	19	14	18	19	10	16
327.	18	14	16	20	18	20	20
328.	20	13	13	18	16	8	20

S/NOS.	Parental Support	Teachers Support	Peer-Group Infl.	Incentive	Test Anxiety	Avial. of Resource	Career Services
329.	20	13	11	19	16	20	18
330.	15	8	8	18	16	16	18
331.	17	12	13	18	12	10	9
332.	20	18	12	20	16	8	16
333.	20	20	12	19	17	16	19
334.	20	16	13	19	12	17	18
335.	20	15	17	18	14	18	19
336.	18	18	8	18	8	19	17
337.	16	15	9	17	10	15	17
338.	19	15	14	14	15	14	19
339.	13	19	8	17	13	9	9
340.	20	17	9	16	16	12	19
341.	20	19	5	17	13	18	20
342.	19	13	8	14	7	12	4
343.	20	19	10	14	10	14	9
344.	20	20	14	16	10	14	10
345.	20	11	9	16	11	16	16
346.	16	16	16	17	12	14	18
347.	15	16	8	14	10	13	18
348.	19	19	15	16	12	14	16
349.	20	13	7	17	15	17	18
350.	20	18	9	16	14	14	11