PSYCHO–SOCIAL FACTORS AND TEACHER–STUDENTS INTERACTION AS PREDICTORS TO INTEREST AND ACADEMIC PERFORMANCE IN INTEGRATED SCIENCE AMONG COLLEGES OF EDUCATION STUDENTS, NORTH–WEST, NIGERIA

BY

Ibrahim Justice Duwan ABDULLAHI

B.SC. Ed. (Integrated Science), ABU, 2002
M.ED (Science Education), ABU, 2014
P14EDSC 9003 (PhD Science Education)

DEPARTMENT OF SCIENCE EDUCATION,
FACULTY OF EDUCATION,
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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY ZARIA, NIGERIA, IN PARTIAL FULFILLMENT FOR THE AWARD OF DOCTORATE DEGREE IN SCIENCE EDUCATION

DEPARTMENT OF SCIENCE EDUCATION,
FACULTY OF EDUCATION,
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA

NOVEMBER, 2017

DECLARATION

I declare that the work in this thesis entitled "Psycho–Social Factors and Teacher–Students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria" has been performed by me in the Department of Science Education, Faculty of Education, Ahmadu Bello University, Zaria, Nigeria. The information derived from the literature have been duly acknowledged in the text and in the list of references provided. The thesis is a record of my own research work and no part of it was previously presented for another degree or diploma at this or any other institution.

Ibrahim Justice Duwan ABDULLAHI

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| Name of Student | Signature | Date |

PI4EDSC9003

Registration Number

CERTIFICATION

This thesis entitled "PSYCHO–SOCIAL FACTORS AND TEACHER–STUDENTS INTERACTION AS PREDICTORS OF INTEREST AND PERFORMANCE IN INTEGRATED SCIENCE AMONG COLLEGES OF EDUCATION STUDENTS, NORTH-WEST, NIGERIA" by Ibrahim Justice Duwan ABDULLAHI, with registration number P14EDSC 9003 meets the regulations governing the award of the degree of Doctor of Philosophy (PhD) in Science Education of Ahmadu Bello University, Zaria, Nigeria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This study is dedicated to my late parents Abdulrashid Abubakar and Ramatu Abdullahi Mai Kano; who contributed immensely towards my education during their life time despite all hardships and discouragement from the family and some members of the community. May their souls rest in peace.

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LIST OF ABBREVIATIONS

NCCE: National Commission for Colleges of Education

FRN: Federal Republic of Nigeria

JAMB: Joint Admission and Matriculation Board

PSSFQ: Psycho-Social Factors Questionnaire

ESTOS: Eggleston Science Teaching Observation Schedule

SISIQ: Students' Integrated Science Interest Questionnaire

ISAPT: Integrated Science Academic Performance Test

STAN: Science Teachers Association of Nigeria

MAN: Mathematical Association of Nigeria

STEM: Science Technology Engineering and Mathematics

NELS: National Education Longitudinal Studies

CAT: Chemistry Achievement Test

ACAT: Analytical Chemistry Achievement Test

PKQ: Prior Knowledge Questionnaire

SRQ: Students' Response Questionnaire

MAT: Mathematical Achievement Test

SPIQ: Students' Parental Involvement Questionnaire

SISQ: Students' Interest in Schooling Questionnaire

SSAT: Students' Science Achievement Test

PPMCC: Pearson Product-Moment Correlation Coefficient

ISCQ: Interest and Sustenance Chemistry Questionnaire

SOSAT: Social Studies Achievement Test

SISSQ: Students' Interest in Social Studies Questionnaire

IDRE: Institute for Digital Research and Educations

FIA: Flanders Interaction Analysis

FIAC: Flanders Interaction Analysis Category

FIACS: Flanders Interaction Analysis Category System

QTSI: Questionnaire on Teacher – Students Interaction

SPAT: Students Physics Achievement Test

PTQ: Physics Teachers Questionnaire

OPERATIONAL DEFINITION OF TERMS

Psycho–Social Factors: Are those factors relating to both the psychological and social aspects of an individual (parental involvement, peer group influence and academic self-efficacy).

Teacher–Students Interaction: Is the process by which teacher and students engage in a reciprocal exchange of verbal or behavioural ideas or opinions in the classroom; such that each of the two parties influences the other's ideas or opinions.

Interest: Is a feeling of concern about something that makes an individual to concentrate effort or attention on it.

Academic Performance: Is an outcome of educational programme that shows the extent to which a student has achieved his or her educational goal(s) after being subjected to examination or continuous assessment.

Integrated Science: Is a course of study in which science concepts are logically presented to students as a unified whole; through thematic approach that deemphasizes the traditional subjects' boundaries in the content and during presentation.

Academic Self – Efficacy: Is the confidence an individual has towards attaining academic goal(s). In other word, academic self – efficacy is the belief a person holds or how he/she feels about his/her academic capabilities.

ABSTRACT

The study investigates psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and teacher-students interaction (low, medium and high) as predictors of students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. The study had seven objectives and based on these, seven research questions were raised and seven corresponding null hypotheses formulated for testing. A total of 1,792 NCE II Integrated Science students from ten co-educational Colleges of Education in the area formed the population of the study. Three hundred and seventeen (317) students comprising 259 males and 58 females constituted the sample of the study. Simple random sampling technique involving fish bowl method was used in selecting the sample. The design employed in the study was a survey research design. The instruments used were Psycho-social Factors Questionnaire (PSSFQ), Eggleston Science Teaching Observation Schedule (ESTOS), Students' Integrated Science Interest Questionnaire (SISIQ) and Integrated Science Academic Performance Test (ISAPT). The reliability coefficients of the instruments were determined to be 0.80, 0.87, 0.81 and 0.74 respectively. Pearson Correlation and Regression Analyses were the statistical tools used in analysing the data. Correlation analyses were used in answering the research questions while Multiple Regression Analyses were used for testing null hypotheses 1 – 6 and Simple Linear Regression Analysis was used in testing null hypothesis 7 at $P \leq 0.05$ level of significance. The findings of the study included the following among others: there was significant positive relationship between parental involvement and students' academic performance**.** There was also a significant positive relationship between high level of teacher-students interaction and students' academic performance. Based on the findings, it was therefore recommended among others that science teachers should try to be practicing high level of teacher-students interaction in the class for better students' academic performance. Students should be enlightened on the types of peers (friends) they should associate themselves with; especially those that will help them to enhance their interest and their academic performance.

CHAPTER ONE

THE PROBLEM

1.1 Introduction

The need for a stable foundation in science for the young generation of any nation is very important for the development of science and technology, the bedrock of any developed nation. Thus, if Nigeria is to develop scientifically and technologically, the foundation of science being taught to the children must be firm. For this to happen, the teachers must be properly trained in the art of science teaching before they are sent into the classroom. In Nigeria, the basic foundation for the study of the core science subjects (biology, physics and chemistry) that are taught at senior secondary level, and later at the tertiary level, is Integrated Science. The way and manner in which science is introduced to students play a significant role in arousing their interest toward science; and this in turn may enable them to perform academically well and also think scientifically. According to Vasilia (2011), the context in which science is taught and or studied is a powerful predictor to students' interest in science subjects.

The term "Integrated Science" is defined differently by different authors. For example, Fu (2010) opined that integration when applied to science courses means, that the course is devised and presented in such a way that students gain the concept of the fundamental unity of science, the commonality of approach to problems of a scientific thought, and are assisted to gain an understanding of the role and function of science in everyday life, and the fast revolving world in which they live. Okwelle and Wali (2011) defined Integrated Science as an aggregation of subjects which demands learners' intellectual competence and ability to adjust to different situations in order to cope with the diversified areas of the subject matter. In this study, Integrated Science is defined as

a course of study in which science concepts are logically presented to students as a unified whole; through thematic approach that de-emphasizes the traditional subjects boundaries in the course content and during presentation.

Integrated Science at the Nigeria Certificate in Education (NCE) level is being offered/studied as single major (that is Integrated Science combined with another subject; known as second teaching subject), and or double major (that is purely Integrated Science without combination with any other subject). This is contained in the NCE Minimum Standard for Sciences produced by the National Commission for Colleges of Education (NCCE, 2012). Both single and double major programmes have the same admission requirements and nearly the same graduation requirements (that is minimum of 118 and maximum of 122 earned credits for single major programme and minimum of 118 and maximum of 120 earned credits for double major programme).

The objectives of teaching Integrated Science at NCE level as clearly specified in the Minimum Standard (NCCE, 2012) include:

i. enabling students gain the concept of the fundamental unity of science;
ii. installing in students a commonality of approach to problems of a scientific nature i.e. the scientific method;
iii. increasing students' understanding of the role and functions of science in everyday life and in the world in which they live;
iv. making students well informed and scientifically literate;
v. enabling student acquire and demonstrate the intellectual competence and professional skills necessary to the teaching of Integrated Science as an inquiry based subject, in conformity with National Curriculum;

vi. developing in students the ability to impart and encourage in their pupils the spirit of inquiry into living and non-living things in the environment;
vii. developing the ability and motivation in students to work and think in an independent manner and
viii. enabling students carry out scientific investigations, emphasizing co-operation, development of appropriate scientific processes and skills and improving their written and oral communication skills.

Ibidapo-Obe (2007) asserts that the major challenge for the educational system in contemporary Nigeria is the production of qualified teachers to teach at various levels of the educational system in sufficient numbers. According to Ibidapo-Obe (2007), this situation might arisen due to a combination of factors such as low recognition for teachers and the cumulative effect of several years of neglect of the education system prior to 1999, as indicated in reduced funding among others. The researcher adds that this has adverse effects on the facilities and equipments for teaching at all levels, which also has effects on the quality of the products of educational institutions, including the teachers.

The Nigeria Certificate in Education (NCE) Integrated Science teachers are being trained in Colleges of Education; and those who passed with A, B, or C grade proceed to universities for degree programme in Integrated Science. These categories of teachers (NCE graduates) are expected to teach Integrated Science at primary level (Lower Basic; Primary 1 – 3 and Middle Basic; Primary 4 – 6) as "Basic Science and Technology", and at junior secondary level (Upper Basic; JS 1 – 3) as "Basic Science". This is in compliance with the Federal Government's policy; that NCE is considered as the nation's minimum qualification for entry into the teaching profession as clearly

stated in the National Policy on Education (FRN, 2005: 19). Hence, NCE students need to be properly groomed by receiving adequate and proper training in their years in the teacher training institutions. This is to enable them lay the expected sound foundation of science by teaching the subject properly at these lower levels of education; upon which the subsequent higher levels depend. According to Olayiwola, Salawu, Oyenuga, Oyekunle, Ayansola, Olajide and Agboluaje (2011) and Irfan and Shabana (2012), the inability of science teachers to perform well in the classroom might be attributed to the problems affecting science generally. Such problems include among others; large class size, lack of or inadequate equipments and materials, lack of using appropriate teaching methods, in appropriate training background of science teachers and the societal view (value attached to) of the various science subjects.

The aforementioned problems might be the reasons why students are not passing the subject well at the Junior Secondary level; and their performance at the lower level may likely affect their performance at the subsequent higher levels. This might be the reason why more students tend to go for commercial and art subjects as they are not interested in science and science related careers due to poor science background. This practice is contrary to the Federal Government's admission policy which gives preference to science and science related subjects and areas respectively. The policy gave the percentage (%) ratio for various forms of admissions into the tertiary institutions; showing which areas of study or categories of students should be given preference. According to Fapohunda (2015), the JAMB chairman pointed out the % ratios as 60:40 (science/arts ratio), 70:30 (technology/non-technology ratio), as well as the ratio of 40:40:20 (merit, catchment and educationally less developed areas) respectively for state-owned institutions.

Duwan and Olajide (2014) observed that NCE Integrated Science teachers' self-efficacy improves when they are taught using activity-based methods such as guided inquiry. Therefore, in order to produce highly motivated, conscientious and efficient classroom teachers, the need for adequate and appropriate training of the NCE students (that is pre-service NCE teachers under training in tertiary institutions) so as to develop their confidence and effectiveness in science teaching cannot be overstated.

At NCE level, there are series of or general problems that beset the teaching of science in general and particularly Integrated Science as an innovation in the country's educational system. According to Gbamanja (1991), most of the problems arise as a result of the inappropriate training background of science teachers which is not adequate for teaching Integrated Science, lack of understanding the concept of integration in science by the teachers themselves and lack of understanding the philosophy and methodology of Integrated Science among others. Olayiwola, et.al (2011), Irfan and Shabana (2012), and Sunshine, Lawrence and Juan (2015) pointed out that the problems that affect the teaching of science generally include large class size, lack of/inadequate equipment and materials, lack of teachers' interest in the profession, insufficient quality teachers, and inadequate qualified teachers among others. As a result of these problems therefore, most teachers do not teach the subject properly. This improper teaching might result into lack of interest from the side of the students which might in turn lead to low performance in the subject. The aforementioned is in line with what Vasilia (2011) pointed out; that the context in which science is taught or studied is a powerful predictor to students' interest in science.

Academic performance is used as a measure of success in our educational institutions. So, the issue of academic performance in the Nigeria education system has been of great

concern. Bell (2015) asserted that as career competition grows ever fiercer in the working world, the importance of students doing well in school has caught the attention of parents, legislators, and government education departments alike. Academic performance is viewed by Obeka (2009) as the quality of results produced by students which reflects in the quality of their examination scores. Bell (2015) defined academic performance as how well a student meets standards set out by government and the institution itself. Academic performance is the outcome that indicates the extent to which a person has accomplished specific goals that are the focus of activities in instructional environments specifically in schools, colleges and universities (Steinmayr, Meibner, Weidinger, & Wirthwein, 2015). In this study, academic performance is considered as an outcome of educational programme that shows the extent to which a student has achieved his or her educational goals after being subjected to examination or continuous assessment.

Students' academic performance is influenced by various factors. According to Mlambo (2011), the combination of factors influencing academic performance, however, varies from one academic environment to another, from one set of students to the next, and indeed from one cultural setting to another. There are so many factors that can lead to low students' academic performance in the tertiary institutions in general and Colleges of Education in particular (Olayiwola, et.al, 2011; Irfan and Shabana, 2012 & Sunshine, et.al, 2015). These factors include lecturer's teaching method (inappropriate), too many students' enrolment (large class size), poor study habits, lack of teachers' interest in the job, poor health and nutrition, and low educational attainment and illiteracy of parents among others. In relation to Integrated Science, the researcher with his twenty seven (27) years of teaching experience realizes that, lack of students' interest in the subject

and teachers' misconception of the meaning, nature and philosophy of the subject are also additional factors that influence students' academic performance. From the foregoing, the issue of psycho-social factors and teacher-students classroom interactions may also be other factors that may likely influence students' interest and academic performance in the subject.

The concept of psycho-social factors relates to one's psychological development in, and interaction with, a social environment. The individual needs to be fully aware of this relationship with his or her environment (Onabamiro, Omoruyi, Soyingbe, and Rosiji, 2013). According to Onabamiro, Omoruyi, Soyingbe, and Rosiji (2013), it is possible to perceive the totality of human as being guided and ruled by psychological and social variables, and that the educational aspirations and accomplishments of man as a person are projected by the environment. Psycho-social factors are viewed or defined differently by different authors. For instance, Stansfeld and Rasul (2007) viewed psycho-social factors as the short hand of a combination of psychological and social factors which implies that the effect of social processes are sometimes mediated through psychological understanding. According to these authors, the social factors include general factors at the level of human society connected with social structure and social processes that impinge on or affect the individual. Psychological factors on the other hand include individual-level processes and meanings that influence mental states. Theorel (2007) defined psycho-social factors as social conditions influencing individual's psychological factors and vice versa. Another way Theorel defined psycho-social factors is that they are those factors that represent the interplay (mutual effect) between social (environment) and psychological (individual) factors. This interplay is the core of psycho-social research. In this study, the researcher views psycho – social

factors as those factors relating to both the psychological and the social aspects of an individual.

Based on twenty seven (27) years of teaching experience and the literature consulted for the purpose of this study, the researcher found out that there are a number of psycho-social factors; such as school environment, emotional satisfaction with academics, parental involvement, socio-economic status, peer group influence, study habit, parental education, family size, and academic self-efficacy among others. This study is delimited to only three of such factors: parental involvement, peer group influence, and academic self-efficacy. The study focuses on these three factors because; parents or families and peer groups are the first and second sets of people respectively children come in contact with. Hence, parents and peer groups both play a significant role in individuals' developmental process. However, while the influence of parental involvement or support in the developmental process of their children is expected to be positive; as opined by Higgins (2011), Nell (2013), and Sunshine, *et al* (2015), peer group influence can be both positive and negative due to peer pressure and peer conformity (Carman & Zhang, 2008, Tope, 2011, Jain & Kapoor, 2013). Academic self-efficacy is also considered because, self-efficacy has to do with the beliefs every individual has about his or her capability to engage in and or perform a given task. Hence, self-efficacy guides an individual's actions and efforts often reflected in the level of self-efficacy (high or low).

Teachers play a significant role in supporting students' academic and social development throughout the period of schooling. This role is best played through the interactions that take place between teachers and their students. Classroom interaction is therefore one of the primary means by which learning is accomplished in classroom.

Abarca (2004) asserted that human interaction is the process whereby two or more people engage in reciprocal action, and that this action may be verbal or non-verbal. Teacher-students' interaction is viewed differently. For instance, Inamulla (2005) viewed teacher-students interaction in the classroom as a two-way process by which each participant influences the other's behaviour. That is, students condition their teacher's behaviour and vice versa. Gardiner and Kosmitzki (2008) defined teacher-students interactions as consistent, stable, respectful, and fair interactions between teacher and students that facilitate the students' view of their teachers as a secure base. Students, who view their teachers as a secure base, are more likely to engage in help-seeking behaviours that, in turn positively correlate with students' achievement. According to Cabell, Decoster, Locasale-Crouch, Hamre, and Pianta, (2013), teacher-students' interactions can also be characterized or typified by rich communication in instructional exchanges between the teacher and students. Teacher-students interaction is also considered as real-time behavioural exchanges of teacher and students (Helena, Jan Van, Theo, Luce, Anna, & Mieke, 2014). According to Diedrich (2010), teachers can motivate their students to perform well in the classroom if they take time to build relationship and interact with the students. In this study, teacher-students interaction is viewed as the process by which teacher and students engage in a reciprocal exchange of verbal or behavioural ideas or opinions in the classroom; such that each of the two parties influences the other's ideas or opinions.

In the present study, teacher-student interaction is considered as being in three forms. That is high, low and medium. In the case where the students talk or behaviour in the classroom dominates or takes the higher percentage than that of the teacher, the interaction is described as being high. When the teacher talk or behaviour in the

classroom takes the higher percentage than that of the students, the interaction is described as being low. By the time both the teacher and the students' talks or behaviours in the classroom take proportionally equal percentage (50 %), then the interaction is said to be medium (Eggleston, Galton and Jones, 1975).

Several studies have been carried out on teacher-students' interactions in relation to students' academic performance. For example, Cataldi, Laird and KewallRamani (2009) investigated teacher- students' interactions for older students and found that positive teacher-students interactions are associated with positive academic performance for high school students. Fatokun (2012) in her study on attitude as correlate of achievement in chemistry advanced that positive teacher-students interactions affect students' performance in chemistry because it promotes their interest in learning. Also, Fatokun and Omenesa (2015) reported that students tend to perform well in the classroom when exposed to good teacher-students' interaction. Teacher-students interaction is therefore of great significance in the teaching learning process. Consistent evidence suggests that to improve students' academic performance and social skill development, we need to focus on the nature and quality of teacher-students interactions (Andrew, et.al, n d). Therefore the present study seeks to examine psycho-social factors and teacher-students interaction to see whether they can predict students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria

The success of teaching–learning process depends largely on both the teachers' and students' interests; because it motivates and compels attention. According to Trumper (2006) interest is the preference to engage in some types of activities rather than others. Kundu and Tutoo (2007) defined interest as a human sentiment that goes along with

values, attitudes, and other forms of human preferences. Interest may be regarded as a highly specific type of attitude; when we are interested in a particular type of phenomenon or activity, we are favourably inclined to attend to it and give time to it (Aggrawal, 2010). Agogo, Odoh and Simon (2014) described interest as the feeling that prompts one to spontaneous activity. It is the tendency to seek out and participate in any type of activity. In this study, interest is operationally defined as a feeling of concern about something that makes an individual to concentrate effort or attention on it.

Keeping students engaged and interested in the classroom is an essential factor in successful teaching and learning. When students are interested, they are more likely to engage in classroom activities and in the end, teaching them becomes much easier (Maltese & Tai, 2015). Mazer (2012) stated that students' interest can be triggered in the moment by certain environmental factors such as teacher behavoiur. Students who experience heightened/high emotional interest are pulled toward a subject because they are energized, excited, and emotionally engaged by the material. The increase in emotional arousal heightens/increases a student's attention, making it easier to encode more information. Mazer (2012) also pointed out that students who experience cognitive interest are pulled toward a subject because they possess a clear structural understanding of the course content. Mazer found that students who are emotionally and cognitively interested in a course are more likely to be engaged in the learning process.

Interest and achievement of students lie within the teacher and students' relationship in a given subject. According to Gafoor (n.d), and Lavonen (2009), students' interest is quite malleable and individual teachers can have a major effect on both the overall science interest and on specific topic related ones. Teachers thus act not only as role models for developing interest but also facilitate the development of interest through

meeting the basic psychological needs for competence, autonomy, and social relatedness among their students through their interaction with students in and out of the classrooms. Therefore, the present study examines whether psycho-social factors and teacher-students interaction serve as predictors of students' interest and performance in Integrated Science in Colleges of Education, North-West, Nigeria.

1.1.1 Theoretical Framework

The study is based on Erikson (1959) psycho-social theory. This theory integrates principles of personal, psychological and social development. It is mainly concerned with a psychological challenge or crisis that represents opportunities for development. This crisis is of a psycho-social nature because it involves psychological needs of the individual (that is psycho) conflicting with the needs of the society (that is social). The crisis or challenge is closely tied to social relationships and that it can be resolved by a person through his interaction with others. The theory states that developing a sense of trust, or confidence in the honesty and justice of others is the first psychological challenge facing all people; and it is especially important to infants because of their dependence on others. If infants receive consistent, reliable and predictably good care from parents, they will develop a sense of trust which they will carry with them to other relationship, and they will be able to feel secure even when threatened. But if infants receive harsh or inconsistent, unpredictable, and unreliable care, then the infants will develop a sense of basic mistrust and lack of confidence that will lead to the development of fear and suspicion of other people and the world in general. And, if the school children carry this along in their life, it may likely affect their relationships with peers and teachers, thereby affecting their interest and academic performance in a particular subject.

Erikson (1959) posited that it is critical that parents allow their children to explore the limit of their ability at a particular task. Parents need to encourage the children to becoming more independent whilst at the same time protecting them so that constant failure is avoided. Therefore, supportive parents should have the patience to allow the children to try until they succeed or seek for assistance. Erikson emphasized that if children fail at a particular task, they must not be criticized too much, rather they should be given opportunity to assert themselves. Otherwise, they begin to feel inadequate in their ability to survive, and may then become too much dependent upon others, and feel a sense of shame or doubt in their own abilities. But, if children are encouraged and supported in their independence, they become more confident and secure in their own ability to survive in the world. Erikson also asserted that teachers play an important role in children's developing independence and initiative and in the life of children in general as they teach them specific skills. If teachers are well brought up they will have good relationship with students and this will make them learn properly the skills they are taught. Also, as the children interact more with peers, their play or activities tend to become more complex and interdependent. Therefore, at the point in their lives, peer relationships are more important to them for it influences their social and academic development and this begins at start of a formal education. The children now feel the need to win approval by demonstrating specific competences that are valued by society, and begin to develop a sense of pride in their accomplishments. It is assumed that supportive and encouraging teachers, parents, peers, and siblings (brothers or sisters) play a vital role in how adolescents function in everyday living. Children, as innovative as they are, if they are encouraged and reinforced for their initiatives, they begin to feel industrious and feel confident in their ability to achieve goals. But if these initiatives are

not encouraged or reinforced by parents or teachers, then the children begin to feel inferior, doubting their own ability and therefore may not reach their potentials.

From the aforementioned of the theory therefore, if parents and teachers are not aware of their role for the social and academic development of their children and students respectively; or if the parents fail to fully involve themselves in the education of their children, the children may likely lack interest and this in turn may lead to the low performance of their children in school. Also, if teachers do not know how to catch the attention of students and arouse their interest in what they want them to learn or be taught, the more the students cannot make themselves attentive to and interested in that subject. Then, the probability for such students to perform well in school is relatively low. In this study, Erikson (1959) psycho-social theory is adapted. The study therefore investigates whether psycho-social factors and teacher-students interaction are predictors of students' interest and performance in Integrated Science in Colleges of Education, North-West, Nigeria.

1.2 Statement of the Problem

There are many factors that contribute to students' success or failure, and such factors may be social, economic and psychological in nature. Saage (2009) reported that lack of interest on the part of the students and also poor teacher-students interaction are some of the factors contributing to students' low performance in science. Studies such as Sabitu, and Nuraddeen (2010), Korir and Kipkemboi (2014) pointed out that schools, parents and teachers are responsible for students lack of interest and low performance in a particular subject. In relation to teachers, Vasilia (2011) asserted that the context in which science is taught is a powerful predictor of students' interest in and academic

performance in science subjects. Research studies carried out on psycho-social factors and teacher-students interaction in science were conducted on separate basis and focused mostly on secondary science students and outside Nigeria. However, Hawkins, Barbour, and Graham (2010) reported that teacher-students interaction is one factor that has proven to be significant in students' success in post-secondary education. However, based on the literature available to the researcher, relatively few or no research work was carried out in Nigeria regarding psycho-social factors and teacher-students interactions as predictors of students' interest and academic performance in Integrated Science in Colleges of Education. This is one of the gaps that this study intends to fill. Hence, the present study investigates whether psycho-social factors and teacher-students interaction predict students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

1.3 Objectives of the Study

The objectives of the study are to:

i. examine whether psycho-social factors of parental involvement, peer group influence and academic self-efficacy are predictors of students' academic performance in Integrated Science in Colleges of Education, North-West, Nigeria;
ii. determine the way psycho-social factors serve as predictors of students' interest in Integrated Science in Colleges of Education, North-West, Nigeria;
iii. find out the psycho-social factor(s) that serve as predictor(s) of academic performance of male and female students in Integrated Science in Colleges of Education, North-West, Nigeria;

iv. investigate whether all the levels of teacher-students interaction serve as predictors of students' academic performance in Integrated Science in Colleges of Education, North-West, Nigeria;

v. assess the levels of teacher-students' interaction that are predictors of students' interest in Integrated Science in Colleges of Education, North-West, Nigeria;

vi. investigate the levels of teacher-students' interaction that serve as predictors of academic performance of male and female students in Integrated Science in Colleges of Education, North-West, Nigeria, and

vii. examine whether students' interest in Integrated Science serves as predictors of their academic performance in the subject.

1.4 Research Questions

The following research questions are set to guide the study:

i. Which of the psycho-social factors positively predict students' academic performance in Integrated Science in Colleges of Education?

ii. Which of the psycho-social factors positively predict students' interest in pIntegrated Science in Colleges of Education?

iii. Which of the psycho-social factors serve as predictor(s) of academic performance of male and female students in Integrated Science in Colleges of Education?

iv. What levels of teacher-students interaction contribute to the prediction of students' academic performance in Integrated Science in Colleges of Education?

v. How do the levels of teacher-students interaction positively predict students' interest in Integrated Science in Colleges of Education?

vi. Which of the levels of teacher-students interaction serve as predictor(s) to academic performance of male and female students in Integrated Science in Colleges of Education?

vii. How does students' interest in Integrated Science positively predict their academic performance in the subject?

1.5 Null Hypotheses

Based on the research questions stated, the following null hypotheses were formulated and tested at $P \leq 0.05$ level of significance:

H_{O1}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' academic performance in Integrated Science in Colleges of Education.

H_{O2}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science in Colleges of Education.

H_{O3}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science in Colleges of Education.

H_4: There is no significant relationship between the levels of teacher-students interaction (low, medium and high) and students' academic performance in Integrated Science in Colleges of Education.

H_{O5}: There is no significant relationship between the levels of teacher-students interaction and students' interest in Integrated Science in Colleges of Education.

H_{O6}: There is no significant relationship between the levels of teacher-students interaction and academic performance of male and female students in Integrated Science in Colleges of Education.

H_{O7}: There is no significant relationship between Colleges of Education students' interest in Integrated Science and their academic performance in the subject.

1.6 Significance of the Study

The findings of the study will hopefully uplift the status of Integrated Science education in the following ways:

Integrated Science Teachers: the findings of the study will hopefully Benefit Integrated Science teachers in Colleges of Education who interpret the curriculum and build students' knowledge and character. This can be achieved as the teachers observe, incorporate and emphasize on the psycho-social factors and the level (s) of teacher-students interaction that have the efficacy to enhance students' interest and academic performance.

Integrated Science Students: the study may Benefit the students by making them to be aware of the psycho-social factors that have influence on their interest and academic performance. Knowing such factors can help them identify their strengths and weaknesses that interfere with their interest and academic performance in Integrated Science.

Parents: the findings will be of Benefit to parents who expect a lot from their children/wards and expect them to perform well in school. That is, with this study's insight, parents will be able to understand the psycho-social factors that influence students' interest and academic performance. Understanding of such factors will hopefully help parents to give all the necessary support, encouragement and counselling to their children/wards regarding their school and or academic matters.

Curriculum Planners: the findings of the study will provide curriculum planners with a clear perception of what can be done to enhance students' interest and academic performance in Integrated Science in Colleges of Education; more especially in relation to psycho-social factors and teacher-students interaction in the classroom.

Textbook Publishers: the findings of this study will be of useful to textbook publishers as it will assist them in selecting the social and psychological factors as well as the level(s) of teacher-student interaction to be incorporated in their publications; making reference to students' interest and academic performance in Integrated Science at Colleges of Education.

Professional Bodies: the findings will be useful to various professional bodies such as Science Teachers Association of Nigeria (STAN), Mathematical Association of Nigeria (MAN), and Nigeria Educational Research and Development Council (NERDC) among others; who are concerned with research outcomes especially in the areas of instructional innovation for effective teaching and learning. This can be achieved as such bodies use the findings of the study to organize workshops, seminars, and conferences on the issue of psycho-social factors and teacher-students interaction as predictors of students' interest and academic performance in Integrated Science in Colleges of Education.

Researchers: the study will Benefit fellow researchers as the findings may serve as foundation for further studies on psycho-social factors and teacher-students interaction as correlate of students' interest and academic performance in Integrated Science and in other science subjects as well in Colleges of Education. The findings of the study will also add new information to the existing literature in Integrated Science education.

1.7 Basic Assumptions

The assumptions made in this study are that:

i. Psycho-social factors are not correlate to interest and performance in Integrated Science among NCE students
ii. Teachers in Colleges of Education under study interact effectively with their students.
iii. Teacher-students interaction has no any influence on students' interest and performance in Integrated Science in Colleges of Education
iv. Colleges of Education in the North-West geographical zone of Nigeria are equivalent academically. This is because they use the same syllabus (Minimum Standard) and operate under the same guidelines being produced by the National Commission for Colleges of Education (NCCE).

1.8 Scope of the Study

The study is delimited to NCE II Integrated Science students of both Federal and State Colleges of Education in the North-West geographical zone of Nigeria. The zone is composed of seven states: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zampara. Out of these states, three were randomly selected and used as the sample for the study. They are Kano, Katsina and Zamfara states. The colleges are relatively equal as they

both run the same Integrated Science programme among others. Also, they operate under the same guideline(s)-Minimum Standards for Nigeria Certificate in Education (NCE) produced by the NCCE. The researcher decided not to use NCE I or III students because, NCE I students are just new to the system and their newness in Integrated Science course at NCE level may likely affect the result of the study. NCE III students on the other hand have limited time because they were on teaching practice throughout the first semester, and as they returned for the second semester they would be busy trying to catch up with the syllabus so that they could be fully prepared for their final examination.

The study comprises two (2) independent variables (psycho-social factors and teacher-students interaction) and two (2) dependent variables (interest and academic performance). Although there are a number of psycho-social factors such as school environment, emotional satisfaction with academics, parental involvement, socio-economic status, peer group influence, and academic self-efficacy among others, this study is delimited to only three of such factors: parental involvement, peer group influence, and academic self-efficacy. The study focuses on these factors because; parents or families and peer groups are the first and second sets of people respectively children come in contact with. Hence, both parents and peer groups play a significant role in individuals' developmental process. Academic self-efficacy is also considered because; self-efficacy has to do with the beliefs every individual has about his or her capability to engage in and or perform a given task. Hence, self-efficacy guides an individual's actions and efforts often reflected in the level of self-efficacy (high or low). As regard to teacher-students' interaction; the second independent variable, the study focused on the three levels (i.e. low, high and medium) that such interaction has.

Four (4) instruments are used to generate data for the study. They are: (1). Psycho-Social Factors Questionnaire (PSSFQ); which is a 5 point Likert-type questionnaire consisting of twenty (20) items/statements. (2). Eggleston Science Teaching Observation Schedule (ESTOS) for teacher-students interaction. (3). Students' Integrated Science Interest Questionnaire (SISIQ); with twenty (20) items/statements. Like PSSFQ, this instrument is also a 5 point Likert-type questionnaire. 4). Integrated Science Academic Performance Test (ISAPT). The test is made up of thirty (30) items and each has four (4) options (A – D) in the multiple choice objective test formats. All the data collected through the aforementioned instruments are analysed using Regression Analysis.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

The research work investigates psycho-social factors and teacher-students interaction as predictors to interest and performance in Integrated Science among Colleges of Education students, North-West, Nigeria. In this chapter, review of related literature was carried out under the following sub-headings:

2.2 Nigeria Certificate in Education (NCE) Integrated Science Programme

Integrated Science programme is one of the innovative ideas brought about with the view to improving science education (teaching about science concepts). It is the science of the junior secondary schools of Nigeria; now called Basic Science and Technology at

this level of education (Duwan, 2014). The course is being offered at Colleges of Education and some Universities in Nigeria. The essence is to produce qualified teachers who can handle the teaching of the subject both at Primary and Junior secondary levels; so that sound foundation for the study of the separate science subjects such as biology, chemistry, physics among others is laid. At the College/Nigeria Certificate in Education (NCE) level, the course is being run under the auspices of the National Commission for Colleges of Education (NCCE). It is being offered/studied as single major (that is Integrated Science combined with another subject; known as second teaching subject), and or double major (that is purely Integrated Science without combination with any other subject). This is contained in the NCE Minimum Standard for Sciences produced by the National Commission for Colleges of Education [NCCE] (2012). Both single and double major programmes have the same admission requirements and nearly the same graduation requirements (that is minimum of 118 and maximum of 122 earned credits for single major and minimum of 118 and maximum of 120 earned credits for double major).

The Nigeria Certificate in Education (NCE) Integrated Science programme has its own philosophy, objectives and mode of teaching as specified in the NCE Curriculum popularly known as the Minimum Standards (NCCE, 2012).

The philosophy of the NCE Integrated Science is anchored on the following areas:

a) fundamental unity of science;

b) the use of scientific method as a common approach in solving problems and

c) the role and function of science in everyday life.

Integrated science has been described as that science which has not been disintegrated. It supposes to be an approach to the study of the environment, free of the limitation imposed by the separate subject disciplines (biology, physics and chemistry among others). This is not to decry or openly criticise the importance of a subject discipline approach; which clearly has its uses. However, at the level of readiness for learning of secondary school students, the boundaries between the disciplines can only appear as artificial, man-made constructs which interfere with unified view of nature as a whole, when children bring to the classroom with them.

Integrated science emphasizes those concepts which are common to all of science, the process of science and the skills associated with them. The great themes of science such as energy, field and particle theories, conservation, balance and cycles in nature are also emphasized as it's the relevance of science in everyday life. Integrated science also emphasizes inquiry into the nature of the environment. The scientific method of inquiry can be learned by everyone and a prime aim of the programme is to provide students with an introduction to this method and allow them to follow their own inquiries. The method of inquiry has cognitive practical aspects. These cognitive aspects include the ability to formulate questions, to identify variables and design experiments, to interpret results, recognize patterns, generate hypothesis, draw conclusions and develop theoretical models. The practical skills include general skills such as ability to observe and to measure, and more specialized skills in the handling and use of laboratory apparatus, living material and chemical.

In preparing teachers of Integrated Science, NCCE (2012) stated that the principal objectives include the following:

i. enabling students gain the concept of the fundamental unity of science;

ii. installing in students a commonality of approach to problems of a scientific nature i.e. the scientific method;
iii. increasing students' understanding of the role and functions of science in everyday life and in the world in which they live;
iv. making students well informed and scientifically literate;
v. enabling student acquire and demonstrate the intellectual competence and professional skills necessary to the teaching of Integrated Science in Primary and Junior Secondary Schools, as an inquiry based subject, inconformity with National Curriculum;
vi. developing in students the ability to impart and encourage in their pupils the spirit of inquiry into living and non-living things in the environment;
vii. developing the ability and motivation in students to work and think in an independent manner and
viii. enabling students carry out scientific investigations, emphasizing co-operation, development of appropriate scientific processes and skills and improving their written and oral communication skills.

The most basic and fundamental approach (Mode of Teaching) to the teaching of Integrated Science at NCE level as stated by the NCCE (2012) is that it must be activity-based at all points. This has been reflected in the time allocated to the various courses. Practical work is not listed separately since it forms an integral part of the teaching programme and can be assessed as part of the continuous assessment scores for the programme. It has long been noted that students *'teach as they have been taught'*. The aim of this programme is to capitalize on this phenomenon so that graduates of the

programme will continue with the activity-based approach when they reach schools to teach pupils.

The development of the science skills of observing, classifying, measuring, organizing, formulating hypothesis, experimenting and interpreting data and reporting results should be a major aim. A brief checklist for an activity-based approach to learning science according to NCCE (2012) is that students should be:

a. handling material, living and non-living;
b. designing, making or manipulating apparatus using a variety of materials including 'junk' items;
c. moving around freely and finding the materials they need
d. discussing their work with each other and the teacher;
e. busy doing things they feel are important;
f. trying to work out for themselves what to do, from step to step and not expecting to be told what to do;
g. puzzling over problems;
h. comparing their ideas or observations with those of others;
i. embarking on Field Trips and
j. excursion to places where students can observe science in operation/action to enhance better understanding of science (NCCE, 2012).

As asserted in the Minimum Standard (NCCE, 2012), Integrated Science should be taught in such a way that the students:

a. take the initiative in suggesting what to do and how to set about it;
b. try out ideas to see what happens;
c. observe things closely for watching, listening, touching, smelling;

d. try different ways of approaching a problem;
e. classifying things according to their properties or characteristics;
f. make sure they record what they find out or observe;
g. use instruments for aiding observation and measurement;
h. devise and apply tests to find out what things will do;
i. make predictions of what they expect to happen;
j. look for evidence to support the statements they make;
k. try to explain their observations and
l. confirm their findings carefully before accepting them as evidence;
m. have workshop's experience and practice.

The present study is an analysis of Psycho-Social Factors and Teacher-Students Interaction as predictors to Interest and Academic Performance in Integrated Science among Colleges of -Education Students, North-West, Nigeria.

2.3 Academic Performance in Science

The issue of students' academic performance remains at top priority for the concerned individuals such as educators, trainers, and researchers among others. Bell (2015) asserted that as career competition grows ever fiercer in the working world, the importance of students doing well in school has caught the attention of parents, legislators, and government education departments alike.

Academic performance is viewed or defined differently by different authors. For instance, Obeka (2009) viewed academic performance as the quality of results produced by students which reflects in the quality of their examination scores. Bell (2015) defined academic performance as how well a student meets standards set out by government and the institution itself. According to Steinmayr, Meibner, Weidinger, and Wirthwein

(2015) academic performance is the outcome that indicates the extent to which a person has accomplished specific goals that were the focus of activities of instructional environments specifically in school, college and university. In this study, academic performance is considered as an outcome of educational programme that shows the extent to which a student has achieved his or her educational goals after being subjected to examination or continuous assessment. It can also be considered as a means for making a difference locally, nationally and globally.

Since academic performance can be considered as a means for making a difference, it is therefore important for students to perform well in school because this is the foundation for most of their accomplishments in life, ranging from furthering their education to securing employment. Sunshine, Lawrence, and Juan (2015) asserted that academic performance is one of the major factors considered by employers in employing workers. According to Ali, Jusoff, Ali, Mokhtar, and Salamat (2009), students' academic performance plays a significant role in producing best quality graduates who will become great leaders and manpower for the country thus responsible for the country's economic and social development. However, there are many factors that affect students' academic performance in a subject or topic. Some of these factors as stated by Sunshine, Lawrence, and Juan (2015) include home-related factors, school related factors, and teacher-related factors among others. In their separate studies, Olayiwola, et.al (2011); Irfan and Shabana (2012) stated that there are so many factors that can lead to low student's academic performance in the tertiary institutions. These factors include: lecturer's teaching method (inappropriate), too much students' enrolment (large class size), poor study habits, lack of teachers' interest in the job, poor health and nutrition, and low educational attainment and illiteracy of parents among others. According to Afolabi (2009) several factors have been identified to cause low performance of

students in science and science related subjects. Afolabi and Audu (2007) asserted that among the problems or factors identified to cause poor students' performance include inadequate teaching strategies, poor laboratory facilities, lack of fund and poor quantitative ability. In relation to Integrated Science, lack of students' interest in the subject and teachers' misconception of the meaning, nature and philosophy of the subject, are additional factors. From the aforementioned, it is clearly seen that students' academic performance may be influenced by various factors. But according to Mlambo (2011), the combination of factors influencing academic performance, however, varies from one academic environment to another, from one set of students to the next, and indeed from one cultural setting to another.

Other studies were also carried out on different factors as they influence students' academic performance. For example, Roberts (2007) determined three groups of nine factors based on affective, cognitive and behavioural skills for optimization of learning that affect the quality of academic performance: aptitude (ability, development and motivation); instruction (amount and quality); and environmental (home, classroom, peers and television). Farooq, Chaudhry, Shafiq, and Berhanu (2011) examined different factors such as parents' education level, parents' occupation and their socio-economic status among others; influencing academic performance of secondary school students in a metropolitan city of Pakistan. The result revealed that socioeconomic status, parents' education and parents' occupation all have effects on students' academic performance, but parent occupation has the list effect. Ganyaupfu (2013) investigated the differential effectiveness of three teaching methods (teacher-centred, student-centred, and teacher-student interactive methods) on undergraduate students' academic performance in three fields of specialization (Human Resource Management, Accounting and Marketing Management). The results demonstrated that teacher-student

interactive method was the most effective teaching method, followed by the student-centred method, while the teacher-centred method is the least effective teaching method. The study carried out by Irfan and Shabana (2012) investigated communication, leaning facilities, proper guidance, and family stress as factors affecting students' academic performance. The result of this study indicated that communication, learning facilities and proper guidance showed positive impact on the students' academic performance while the family stress showed negative impact on the students' academic performance. But, in relation to communication, the significant level is high, meaning that communication is more important factor that affects students' academic performance.

Keeping in view all these discussions about the factors that affect or influence students' academic performance, the issue of psychosocial factors and teacher-students interaction may be other factors. Therefore this study attempts to examine psychosocial factors and teacher-students interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria

2.4 Concept of Psycho-Social Factors

For a concept to be psychosocial, it means it relates to one's psychological development in, and interaction with, a social environment. The individual needs to be fully aware of this relationship with his or her environment. In view of the aforementioned, Onabamiro, Omoruyi, Soyingbe, and Rosiji (2013) stated that it is possible to perceive the totality of human as being guided and ruled by psychological and social variables , and that the educational aspirations and accomplishments of man as a person are projected by the environment.

Psycho-social factors are viewed or defined differently by different authors. For instance, Stansfeld and Rasul (2007) viewed psycho-social factors as the short hand of a

combination of psychological and social factors which implies that the effect of social processes are sometimes mediated through psychological understanding. According to these authors the social factors include general factors at the level of human society connected with social structure and social processes that impinge on or affect the individual. Psychological factors on the other hand include individual-level processes and meanings that influence mental states. Theorel (2007) defined psycho-social factors as social conditions influencing individual's psychological factors and vice versa. Another way he defined psycho-social factors is that they are those factors that represent the interplay (mutual effect) between social (environment) and psychological (individual) factors. This interplay is the core of psycho-social research. In this study therefore, the researcher is adopting Theorel's definition of psycho-social factors.

Although there are a number of psycho-social factors such as school environment, emotional satisfaction with academics, parental involvement, socio-economic status, peer group influence, study habit, parental education, family size, and academic self-efficacy among others, this study is delimited to only three of such factors (parental involvement, peer group influence, and academic self-efficacy). The reason is that these factors seem to have direct bearing with students, in that they are more likely to influence their interest and performance in a particular subject(s) than other factors. This study therefore attempts to investigate whether psychosocial factors and teacher-students interaction predict students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria

2.4.01 Parental Involvement

Family is one of the fundamental factors which contribute to child development. It is the child's first social and educational environment. In this regard therefore, parents are

seen as their children's first teachers whose responsibility is to lay sound foundation for their future education. Parents have ambition for their children to achieve great accomplishments in school. According to Hong (2012) all parents want their children to succeed at school, but not all parents are successful in facilitating this success. Nyarko (2011) and Tope (2012) asserted that, to be successful in their higher education and life, however, adolescents and young adults need trusting, supporting and caring relationships with their families, especially with their parents. These types of relationships have impact on the development of children's personality traits, as well as social and academic achievements. As is evident from the foregoing, the importance of parental involvement in the general education of their children cannot be overstated. This involvement will help in bringing the children's family closer to the school thus enabling the children to see the relationship between the school and the home, and put more effort towards their academic success.

Parental involvement has been defined in several ways. For example, Hill and Tyson (2009) are of the view that parental involvement includes the parents who provide a home environment which promotes structure and minimally aids the students during homework. Maintaining these relationships with the school proved to be essential to the students' academic success. According to Jeynes (2010), parental involvement is the parental participation in the educational processes and experiences of their children. It also refers to parents' participation in activities which are related to the child's school and educational experiences. Higgins (2011) defined parental involvement as how involved students perceive their parents to be in their academic career, which include discussions about high school preparation examinations. This author opined that parents who express the importance of examinations may have an effect on the students' and their overall desire to understand their school work and homework assignments. In

addition to school discussions, parents who are involved with their students' personal life can affect the students completing their homework. Being involved in their children's life can possibly make parents aware of stressors such as the students not being able to understand a difficult concept being taught in class; friendships falling apart or poverty. Focusing on these stressors can prohibit one from completing tasks they have set for themselves. Sunshine, et al (2015) defined parental involvement as the activities that parents engage in at home and at school and positive attitudes parents have towards education.

Discussing on the importance of parental involvement to children's education, Dwyer and Hecht in Higgins (2011), stated that the parental involvement blusters or strengthens the relationship between the school, teachers, parents, and students as everyone displays an active interest in the welfare of the students' academic success. The authors added that parental involvement reduces a student's potentiality to drop-out of school because they understand the amount of time their parents have invested in their success. According to Nel (2013), there are multiple Benefits to a child's education when his parents decide to become more involved. The author added that research studies show that the children of parents who are more involved in their schooling display higher cognitive and language skills than children whose parents lack involvement. However, Nel (2013) ascertained that lack of this parental involvement is one of the biggest challenges schools face. Due to lack of support or too much interference from the parents the academic learning process of the students is disturbed and delayed. This also puts a lot of stress on the teachers trying to support the students in achieving to the best of his or her abilities as well as managing the parents on the side. Despite the fact that parents have a significant impact on children's academic success, parental involvement in the education of their children remains the most

underrated influential factor. In their study, Korir and Kipkemboi (2014) stated that it is unfortunate that many adolescents do not have parents who are actively involved in their lives. Most parents do not provide appropriate supervision, and are unable to clearly communicate their values. This puts these adolescents in an even greater danger of giving into negative peer pressure. Hence parental involvement is one of the selected psychosocial factors to be examined in this study along with teacher-students interaction to see whether they have the potentiality of predicting students' interest and academic performance in Integrated Science in colleges of education, North-West, Nigeria.

2.4.02 Peer Group Influence

As a psycho-social factor, peers group influence (or peer pressure) also influences students' performance in science and science related subjects as well as other school subjects. Peer group plays an important role in influencing the life style of an individual. This influence can be positive or negative depending on the nature (that is bahaviour or attitude) of the group. An individual has to adapt to the type of behaviour or attitude of the group in order for him or her to be accepted as part of the group.

Peer group influence refers to how a peer group acts in encouraging a person to change his or her attitudes, values in order to confirm to group norms (Kirk, 2000). According to Castrogiovanni (2002) peer group is a small group of similar age, fairly close friends, sharing the same activities. Peer influence involves changing one's behavoiur to meet the perceived expectations of others (Burns & Darling, 2002). Korir and Kipkemboi (2014) stated that adolescents ask questions relating to social identity theories such as, "Who am I?" and "what do I want out of life?" Feeling to be part of a group, be it the stereotypical jocks, or punks, allows adolescents to feel like they are on the way to answering some of these questions. Given that adolescents spend twice as much time

with peers as compared to parents or other adults is reason enough to study the influence or pressures that peers place on each other. In general, most teens accept peer pressure on fairly insignificant things like music, clothing or hairstyle. But, when it comes to more important issues like moral values, parents still remain more influential than peer group (Black, 2002).

Generally, peers are seen as role models by many students. Lockwood and Kunda (2002) are of the view that role models can be classified into positive role models and negative role models. To these authors, positive role models are individuals who have achieved outstanding success and are widely expected to influence others to pursue similar experience. While negative role models refer to the individuals who have experience misfortunes and are widely expected to motivate people to take the steps necessary to avoid similar unpleasant outcomes. It is believed that peer influence can have both positive and negative effects on students' academic performance and interest as well. It is therefore high time for students/individuals to make useful decisions about their commitment to academic performance. In this regard, teachers, parents and even peers all have the potential to provide students with suggestions and feedback about what they should think and how they should behave among their peers and in social situations in general. The present study is therefore investigates psychosocial factors and teacher-students interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.4.03 Academic Self-Efficacy

Academic self-efficacy is another important psycho-social factor that influences students' academic performance. The concept of self-efficacy is based on Bandura's (1977) social cognitive theory which has been useful in examining people's belief. The

term self-efficacy has been defined differently by different authors. For example, Bandura (1986) defined self-efficacy as the judgment of one's capacity to accomplish a certain level of performance. Housego (1992) defined self-efficacy as a degree of preparedness by virtue of training, experience, or talent. According to Salamah, Wahl, and Abrian (2003) self-efficacy is the confidence that one has in carrying out specific behaviours. From the afore mentioned definitions of self-efficacy, academic self-efficacy is defined in this study as the confidence and readiness an individual has towards attaining academic goals. In other word, academic self-efficacy is the belief a person holds in his or her ability to achieve academic goals or outcomes. The level of self-efficacy possessed by individuals can be low (weak) or high (strong). According to Adeyemo (2001), people with low self-efficacy generally avoid task, but will engage in task if their self-efficacy is high. He added that a strong sense of academic self-efficacy enhances students' academic accomplishment, quality of functioning and personal well-being.

Research on self-efficacy beliefs in academic setting is thriving, but general problem is that even average ability students are sometimes known to perform poorly in specific subject areas while performing up to standard in others (Onabamiro, et al, 2013). Bandura (1977) believes that the higher the self-efficacy the individuals have for the specific task the more likely those students will be able to succeed at that given task. Recent studies showed that self-efficacy holds significant power for predicting and explaining academic achievement (Onabamiro, et al, 2013).

2.4.1 Psycho-Social Factors and Students' Academic Performance in Science

Various psycho-social factors have been studies as influencing academic performance, and the influence of each of such factors on academic performance have been reported

independently. For instance, Hill and Tyson (2009) found that different forms of parental support, such as structurally sound educational activities in the home or taking frequent educational trips among others promote an enhancement in academic performance. In addition, parental emphasis on the importance of academic performance produces an increase in homework performance. Students who feel their parents take an active interest in their education appear to excel academically because of this understanding. Parental involvement in regard to academic performance is needed at all levels of education. That is all students from nursery school up to the university level need this support and attention. According to Higgins (2011), parents who take active interest in their children's academic performance are reinforcing the necessity for them to perform well in school. Students with parental involvement in their education tend to have better academic performance and are not likely to drop out of school (Adeyemo, 2007).

A growing body of literature supports the relationships between parental involvement (as a psycho-social factor) in the education of their children and their academic performance. For instance, Higgins (2011) investigated the association between parental involvement, family rules, family resources, and homework with academic performance. The results of the study showed positive association between parental involvement and family resources on homework, which also had a positive association with academic performance. Daniela and Daniela (2013) examined the relationship between parental involvement, attitude and children's school performance. The authors found that parental involvement was highly correlated with children's academic performance. Milad and Sayid (2011) investigated the relationship of parental involvement with children's academic performance. The results indicated that parental involvement and academic performance have positive and significant correlation. The

results also showed that the academic performance of children in family with high parental involvement is better than children in family with low parental involvement. Nel (2013) examined the effect of parenting style on academic performance of early years of education. The findings showed that there was significant correlation between parenting style and academic performance. Twum-Ampofo and Osei-Owusu (2015) carried out a study to establish predictors to academic performance among senior high school (SHS) students in the Ashanti Mampong Municipality of Ghana. The findings showed that parental involvement, parental academic ambition for their children, per group influence, the child's academic ambition, and the child's effort as the correlates of academic performance. The results also indicated that parental involvement, sex of the child, the child's academic ambition and the child's effort as the main predictors to academic performance.

In their related study, Akhtar and Aziz (2011) examined the effect of peer and parents pressure on the academic performance of university students. The findings of the study revealed that parents pressure (parental involvement) effect positively and peer pressure (peer group influence) effect negatively the academic performance of students and especially female university students. No effect of peer group influence and parental involvement was found on the academic performance of male students. Moula (2010) investigated the relationship between academic performance motivation and home environment among standard eight pupils. To him, home environment consist of five factors (parental encouragement, parents' occupation, parents' education, family size and learning facilities at home). The findings of this study showed that four factors (parents' occupation, parents' education, family size and learning facilities at home) significantly affect the performance motivation and parental encouragement was the only factor which showed low correlation with academic motivation. Opdenakker and

Damme (2005) conducted a research study "enhancing effort and performance: the importance of parental involvement and home school partnerships". The findings revealed that parental involvement and activities like coaching and support to the formal education of their children have a positive effect on effort and performance of children; even though it has weak relationship with the parents' socio-economic status. This study seeks to examine the relationship of parental involvement in the education of their children with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria to see what the result would be.

Peer group influence is another psycho-social factor which can also have impact on students' academic performance. In their separate studies, Fryer and Torelli (2005) and Cooley (2007) asserted that different peers exert different degrees of influence on individual outcomes. Peer effects in education are generally accepted to be of importance. Despite this belief there is no general consensus on the direction of the effect peers have on one another (Vardardottir, 2012). According to Zhang (2010), the effect of peer groups on students academic performance play a prominent role in education policy debates. Understanding the structure and magnitude of peer effects is therefore a critical ingredient in evaluation these policies. Lam (n. d) stated that peer effects are important predictors to students' outcomes. A typical student learns from discussions with classmates and can be affected by their personalities and attitudes toward learning. Students can also be motivated simply by working next to each other. Zitzmann (2005) pointed out that research has established a significant link between peer relationships and children's academic performance; providing further support of the importance of these relationships. In a related study, Kang (2006) pointed out that studies concerning the effects of peers on students' academic performance have been relatively few, but they recently receive growing attention.

Studies that examined whether peer group has influence on students' academic performance include among others; Sajjad, Riasat, Amir, Abdul, Aamir, and Minaz (2013) who investigated the impact of peer groups on the academic performance of secondary school students. The authors found that peer groups have significant effect on the students' academic performance. Study conducted by Kang (2007) showed large positive effects of peer groups on students' academic performance. Jain and Kapoor (2013) investigated the impact of study groups and roommates on academic performance. They found that informal social interaction with roommates has a significant positive impact on academic performance while study group peers have no significant impact, a result driven by group heterogeneity in ability. The authors also found that lower ability students Benefit from high ability students but not vice versa. In his longitudinal study, Zitzmann (2005) examined the relations between children's peer relationships and academic performance. The results indicated that better academic performance was associated with greater peer acceptance, more friends, and less rejection by peers in each grade and when averaging over the four-year period. The results also showed that girls performed academically better than boys in the years in which they have more friends and are not rejected by their classmates.

Other studies were also carried out by different authors on the impact of peer groups on academic performance. For example, Carman and Zhang (2008) in their study of classroom peer and academic performance: evidence from a Chinese Middle School, pointed out that adolescents who have a high conformity to unconventional peer behaviour tend to have lower grade point average (GPA) than those who have lower level of conformity. Bellemare, Lepage, and Shearer (2009) conducted a study on peer pressure, incentives and gender: an experimental analysis of motivation in the work place. The results showed that very high and very low level of peer pressure (peer group

influence) can significantly decrease the productivity of workers. Tope (2011) investigated the influence of peer group on adolescent's academic performance in some selected schools in Osun State, Nigeria. Based on the results of the study the author stated that peer group could either positively or negatively influence the academic performance in school. John and Linnanmaki (2013) conducted a longitudinal study on the role of peer groups in adolescent students' academic self-concept and mathematics performance. The findings indicated that a reciprocal relationship exists between academic self-concept and mathematics performance on student level. The present study therefore attempts to examine whether peer group influence has the potentiality of predicting students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Academic self-efficacy is also other psycho-social factor which a growing body of literature supports its relationships with students' academic performance. For instance, in a study carried out but by Chermers, Hu, and Garcia (2001) academic self-efficacy was shown to be a major factor of academic performance. The authors asserted that a combining factor to academic success is the individuals' level of self-efficacy. Students with high academic self-efficacy have shown to perform better academically. Poul (2006) conducted two incremental validity studies on academic self-efficacy as predictor to college outcomes. The results of the study suggested that academic self-efficacy beliefs predict college students' performance. Ramos-Sachez, and Nichols (2007) examined the difference in academic self-efficacy levels between first generation (students without a college graduate parents) and non-first generation college students (students who have a college graduate parents), and the possible impact on academic performance. The results showed that non-first generation students had higher levels of academic self-efficacy and outperformed first generation college students academically.

Adeyemo and Adetona (2007) investigated the influence of parental involvement on academic self-efficacy and found authoritative parenting style and academic self-efficacy were significantly predictors to students' academic performance. Aguayo, Herman, Ojeda, and Flores (2011) investigated the correlation of self-efficacy with academic performance among Mexican American immigrant and non-immigrant students. They found that self-efficacy was strongly correlated with academic performance for non-immigrant students. However, the results showed no significant correlation between self-efficacy and academic performance for immigrant students.

Other studies include those of Galyon, Blondin, Yaw, Nalls, and Williams (2012) who investigated the relationships among academic self-efficacy and students' class participation, examination performance and GPA. Galyon et al found a stronger relationship between academic self-efficacy and academic performance than with class participation. Khan (2013) carried out a study to find a relationship between students' academic self-efficacy, stress coping skills, and academic performance. He found that academic self-efficacy was positively correlated with the grade point average [GPA] (performance). Saunders, Davis, Williams, and Williams (2004) examined gender differences in self-perceptions and academic outcomes among African American High School students. The result of the study showed that higher grade point averages (performances) were more strongly associated with greater self-efficacy for females than for males. Shkullaku (2013) examined gender difference in self-efficacy and academic performance. The results suggested that there was a significant difference between males and females in self-efficacy, but there was no significant difference between males and females academic performance. The results also indicated that there was a significant relationship between the students' academic self-efficacy and their academic performance. In a separate study, Yazachew (2013) investigated the level of

students' self-efficacy, gender difference in self-efficacy and academic performance and also relationship between self-efficacy and students' academic performance. The results showed that there was no significant difference in the self-efficacy between sexes, but there was a statistically significant difference in the academic performance between sexes. Also, a significant relationship exists between students' academic self-efficacy and their academic performance. Abd-Elmotaleb and Saha (2013) conducted a study to examine the mediating influence of academic self-efficacy on the link between perceived academic climate and academic performance among university students. The result of the study revealed that academic self-efficacy significantly related with students' academic performance. Goulao (2014) carried out a study to examine the relationship between academic self-efficacy and academic performance in adult learners. The results revealed that students' level of self-efficacy is high and a significant relationship exists between self-efficacy and academic performance. The present study examines Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interaction as Predictors to Students' Interest and Academic Performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.4.2 Psycho-social Factors and Students' Interest in Science

Although many psycho-social (psychological and social) factors can contribute to students' lack of interest and engagement in their courses or academic work, lack of full or adequate parental involvement/support in the education of their children and peer group influence could be vital reasons for students' disinterest and disengagement there by performing poorly in school. Family background is the key to students' life and one of the most important influences on students' learning. The environment at home serves

as the first and primary socialization agent and has a great influence on a child's interest in school and career aspirations for the future.

On the issue of interest, Oyenuga and Lopez (2012) asserted that home plays a significant role in this regard as many parents may discourage or encourage their children towards a particular subjects or career. In their longitudinal study in science education, Alexander, Johnson, and Kelley (2012) suggested that children's interest development largely relies on parents' ability to answer science-related questions at home. But additional research is needed that will incorporate various forms of psycho-social factors with parental involvement to examine their broader connections to students' science interest and academic performance in science. According to Tucker-Drob (2014), students' science interest was more strongly linked to actual science performance when the students come from home and school environment that were rich in resources. McClnerney, Dowson, Young, and Nelson (2005) conducted a study with high school students on their self-esteem and interest in school work, their expectancy of high school completion and their perceived support from parents (parental involvement), peers (peer group influence) and teachers (teacher-students' interaction) for their expectancy. The results showed that parents, teachers and peer support all had significant positive impact on students' interest in school work and on academic performance as well.

Related studies were also carried out by Shumow, Lyutykh, and Schmidt (2011) who investigated predictors and outcomes of parental involvement with high school students in science. The authors found that parental involvement at home is related positively to students' interest in science and hard work in science class. Sothy and Whitney (2015) investigated parents' and teachers' support as predictors to students' interest in Science Technology Engineering and Mathematics (STEM) among Cambodian middle school

students. The results suggested that parents and teachers played an important role in students' interest in STEM education and parents' support seemed to have greater influence on STEM interest compared to teachers' support in science. Olusola, Taofeek, and Olumide (2015) conducted a study on parents and students interest as predictors to students' academic performance in agricultural science in selected secondary school. The authors found that parental interest determines parental involvement and parental attitudes towards a student's schooling often reflected in their level of financial, moral, and material support and engagement.

As a psycho-social factor, peer group influence plays a vital role in both social and academic development of an individual. Students' interest in a particular course or task is greatly influenced by the students' peer groups. Although, based on the literature and the background information, there are studies conducted to investigate the relationships between peer group influence and students' interest in science, such studies are relatively few. The followings are among other studies. For example, Hidi and Renninger (2006) pointed out that engaging in discussion, regardless of whether others agree or disagree, keeps individual actively engaged with the topic or activity. Staying engaged through discussion, especially with peers may influence one's evaluation of interest, particularly if that engagement generates deeper knowledge or promotes new ways of thinking about the topic. Walker (2006) stated that it is clear that successful school students Benefit from supportive peers who express in various ways that they share students' commitment and interest in education. Report from Bradley and Taylor (2008) suggested that peer effects are so important in estimating interest in education. According to Harackiewicz, Duric, Barron, Linnenbrink-Garcia, and Tauer (2008), interest also predicts greater likelihood of pursuing similar class and career path. In their

study, Thoman, Smith, and Silvia (2011) opined that when interested, students exert greater effort and persist longer with a given topic.

In other related studies, Thoman, Sansone, Fraughton, and Pasupathi (2012) asserted that students' interest can be influenced by a number of factors in the learning environment. Structural features of the learning task or learning context that trigger attention, evoke surprise, arouse curiosity, allow for positive efficacy, or show how the material is relevant to everyday life can make a topic more interesting. In their separate studies, McCashin (2009) and Ciani , Ferguson, Bergin, and Hilpert (2010) pointed out that other people can also influence students' interest. For instance, parents, teachers, and peers can promote interest by pointing students in the right direction, helping them overcome obstacles, and supporting students' choices and the creation of new identities as students pursue where initial interest leads.

According to Thoman, et al (2012) peer groups influence students' liking and enjoyment of school, so knowing peers interest or opinion of a topic could influence students' interest. McCashin (2009), Pasupathi, and Hoyt (2009) and Renninger (2009) also carried out separate studies and they all reported that the potential for others to influence one's interest may be especially important to consider within education. Particularly for students in their teens (years between 13 and 19) and early 20s who are beginning the process of deciding career paths, the reactions of peers when they talk about class topics and activities may be important contribution to determine their developing interest. In their study, Furrer, Skinner, and Pitzer (n. d) stated that an extensive body of research suggests the importance of high quality peer relationships for students' interest, school engagement and academic performance. Students who experience lower quality relationships with their peers by rejecting or isolating them

from participating in social activities are more likely to become disinterested in schooling and vice versa.

Still on the issue of interest in relation to psycho-social factors, other research studies have investigated the relationships between students' academic self-efficacy and their interest. For instance, Niemivirta, and Tapola (2007) examined how possible changes in self-efficacy and interest during a task relate to each other and whether such changes independently predict overall task performance in mathematics. The results showed that changes in self-efficacy and interest were positively correlated. So (2009) investigated the effects of performance goal orientation and self-efficacy across grade levels; to verify correlations among performance goal orientation, self-efficacy, course interest and academic performance (GPA); and examine predictors to academic goal orientation and self-efficacy on course interest and academic performance across grade levels. The results indicated that students' course interest is positively correlated with their academic self-efficacy regardless of grade levels.

In their similar study, Tella, Tella, and Adeniyi (2011) investigated locus of control, interest in schooling and self-efficacy as predictors to academic performance among junior secondary school students. The authors also correlated the three independent variables and found that a significant positive correlation exists between students' academic self-efficacy and their interest in schooling. Sha, Schunn, Bathgate, and Ben-Eligahu-Eligah (2015) carried out a study to investigate whether children's perception of family (parental) support is important for both choice preferences to participate in optional learning experiences and engagement during science learning and whether the effects on choice preferences and engagement are mediated through effects on children's interest and self-efficacy in science. All the variables were also correlated and the results showed that there was a statistically significant correlation between self-

efficacy and students interest in science. The present study is an analysis of Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interaction as Predictors to Students' Interest and Academic Performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.5 Concept of Teacher-Students Interaction

Teacher-students' interaction is very important for successful teaching and learning. This interaction occurs every day in the classroom activities between the teacher and the learners. Thus teacher- students' interactions are crucial for effective classroom learning. Dahiru (2004) describes teacher-students' interaction as the process of imparting and exchange of ideas, information and feelings between teacher and students. Teacher-students' interaction is defined by Gardiner and Kosmitzki (2008) as consistent, stable, respectful, and fair interactions between teacher and students that facilitate the students' view of their teachers as a secure base. Students, who view their teachers as a secure base, are more likely to engage in help-seeking behaviours that, in turn positively correlate with students' achievement. Cabell, Decoster, Locasale-Crouch, Hamre, and Pianta, (2013) stated that teacher-students' interactions can also be characterized or typified by rich communication in instructional exchanges between the teacher and students. Teacher-students interaction is also considered as real-time behavioural exchanges of teacher and students (Helena, Jan Van, Theo, Luce, Anna, & Mieke, 2014). According to Cheruiyot (2015), interaction is commonly defined as a kind of action that occur as two or more objects have some effects upon one another. The idea of a two-way effect is essential in the concept of interaction, as opposed to a one-way causal effect. Education with its correlated activities of teaching and learning process involves interaction between teacher and students as channels of realizing its

objectives. Interaction occurs every day in teaching and learning process. It is managed by everyone, not only by the teacher in the classroom, but also the students. This interaction is usually used to express their ideas together.

The teacher–student interaction/relationship is one of the most powerful elements within the learning environment. In their separate studies, Hughes and Chen (2011); Roorda *et al*. (2011); Spilt, Koomen and Thijs (2011) asserted that teacher-students' interaction is a major factor affecting students' development, school engagement and academic motivation, and it forms the basis of the social context in which learning takes place. According to Hughes and Chen (2011), supportive and positive relationships between teachers and students ultimately promote a "sense of school belonging" and encourage students to "participate cooperatively in classroom activities". Classroom interaction refers to a technique consisting of objective and systematic observation of the classroom events for the study of the teacher's classroom behaviour and the process of interaction going on inside the classroom (Eriba & Achor, 2010). Matelo (2006) described classroom interaction as a classroom process in which teachers and students have a reciprocal effect upon each other through what they say and do in the classroom. It is an interpersonal transaction between the teacher and the students which occurs at different levels. This encompasses a lesson situation during which the teacher and the students through their verbal and non-verbal actions have reciprocal effect on each other. In particular, the relationship between students and their teachers is an essential part of teaching and learning process, and it is expected to have a great effect on their lives.

Olajide (2002) asserted that science educators today are making conscious effort to evolve strategies which will improve communication skills of science in order to develop students 'communication skills. In other word, in order to have the right type of

learning environment, the process of communication between teachers and students must be carefully planned. In a study carried out by Larson (2011) it is stated that, in fact, nowadays, the existence of positive interactions/relationships inside the classroom is considered as possibly one of the most influential factors in learning; given that it can affect, either in a positive or negative way, students' performance and willingness to work as well as improve their knowledge and social skills. From the aforementioned, Nugent (2009) suggested that by creating a sense of well-being in their interactions, teachers can motivate students during the learning process. A positive teacher-students interaction therefore, is crucial inside the classroom. Due to the impact this interaction may have, then, it is necessary for teachers to understand that students need to feel comfortable with, and confident in, the teachers with whom they are learning. That is, teachers need to be aware of the impact of the emotional dimension in their science classroom.

The quality of teacher-students classroom interaction is a fundamental medium for the development of students' interest in a particular subject as well as the academic performance in that subject. When the interaction between teachers and students becomes poor in the classroom, students may not be interested in the lesson and as such both teachers and students will suffer the consequence. In this case, Change (2009) believed that motivational and disciplinary problems with students are among the most upsetting issues teachers will face. As a result, Klassen, Perry, and Frenzel (2012) asserted that teachers can take students' disinterest or hostility as a personal affront-evidence that students do not like them thereby impinging on teachers needs for relatedness.

Cheruiyot (2015) stated that interaction is viewed as significant because it is argued that:

a) Only through interaction, the learner can break down the Teaching/Learning structures and derive meaning from classroom events.

b) Interaction gives learners the opportunities to incorporate Teaching/Learning structures into their own speech (the scaffolding principles) and

c) The meaningfulness for learners of classroom events of any kind, whether thought of as interactive or not will depend on the extent to which communication has been jointly constructed between the teacher and learners (Kaur and Tetla, 2015).

Beyazkurk and Kesner cited in Cheruiyot (2015) are of the view that teacher–student interaction is very important in the teaching and learning process because students Benefit from this interaction at both the social and academic levels. Such interaction is referred to as "classroom interaction" and is defined as the process of face-to-face interaction.

There are two types of interactions that could occur in any classroom, either verbal channelled through written or spoken words or non-verbal channelled through tough, proximity, eye contact, facial expression and gesturing. The focus of the present study is on verbal interaction that occurs in the Integrated Science lessons as most interactions that occur in any classroom are mainly verbal. Cheruiyot (2015) stated that it is not possible to record every detail of what happened in the classroom, hence more research was devoted to teacher and student talk. According to this author, the advantage of taking more interest only in verbal behaviour was because of its relative easiness to record. The major reason for lack of concern with non-verbal behaviours can be traced from the difficulties in categorisation, the elusiveness of meaning on non – verbal messages and seemingly the subordinate function the non-verbal behaviour plays in classroom settings (Cheruiyot, 2015).

Verbal interaction is anything that is being uttered. Verbal interaction in classroom comprises of teacher's question, teacher's statement, student's question, student's statement and silence or confusion (Tay & Mohammad, 2008). There are two main subcategories of teacher's questions, i.e. teacher's questions related to content/science process skills; or not related to content/science process skills. The teacher's statement are subcategorized as teacher's statement related to content and science process skills, pupils' statement, pupils' questions, or teacher giving instruction. As for pupils' questions, there are two subcategories; either pupils' questions related to content or science process skills; or not related to content or science process skills. Pupils' statements are either related to teacher's question or statement; or related to content. Finally, silence or confusion category comprises of silence with teacher's activity or pupil's activity, wait-time one, wait-time two, confusion due to pupils' activity and confusion due to other than pupil's activity. Ndirika (2009) defined teacher-students' verbal interaction as the use of words to promote collaborative and cooperative exchange of ideas between teachers and students.

A number of research studies have been carried out on teacher-students' interactions in relation to students' academic performance or otherwise. For example, Hai and Lim (2006) studied effectiveness of interaction analysis feedback on the performance and observed that there was a significant correlation between the teacher-students interaction (feedback) and students' academic performance and more favourable attitudes after teachers were given feedback. Inamullah, Hussain and Ud Din (2008) explored teacher-students verbal interaction in the using the Flanders Interaction Analysis system (FIA). The results showed that teachers talking time in the secondary level classroom was more than two-thirds of the total class time. Ndirika (2009)

investigated the effect of teacher-students' interaction on academic performance among Integrated Science students of different class-sizes and ability groups in Junior Secondary School and found a significant difference in the performance of male and female students taught with high level of teacher-students verbal interaction; with male performing better than the females. The results also showed that there was no significant difference in the performance of male and female students when taught with low and medium levels of teacher-students verbal interaction.

In their study, Javid, Babelan and Namvar (2013) examined the state of teacher-students verbal interaction during teaching process and its relationship with academic performance. The findings of the study indicated that teachers who pay attention to students when they speak and are not self-centred play a significant role in students' academic performance. The results also showed a meaningful correlation between the ten (10) verbal interaction categories of Flanders observed and students' academic performance. In a related study, Aboho, Dodo and Isa (2014) investigated teacher-students class interaction on academic performance of senior secondary school students and found that teacher-students interaction has a significant impact on the academic performance. Cheruiyot (2015) conducted a study on classroom verbal interaction patterns in relation to students' performance in Physics and observed that verbal interaction has some influence on learners' performance. But, schools which used indirect verbal interaction (such as praises or encourages, accepts or uses ideas of students, and answers students' questions among others) performed better than those using direct verbal interaction (such as lectures, gives directions, and criticises or justifies authority among others). Therefore this study attempts to examine whether Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interactions can serve as Predictors to Students'

Interest and Academic Performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.5.1 Classroom Interaction and its Measuring Levels

The importance of social interaction in the teaching – learning process cannot be over stated. To understand the process of social interaction, many social scientists such as Hough and Ober (1966), Flanders (1970) and Eggleston, Galton, and Jones (1975) among others have studied and developed various ways of studying interpersonal interactions. Classroom verbal interaction has three levels (i.e. low, high and medium). The interpretation of theses levels is that when students' talk in the classroom is higher than that of the teacher (that is above 50 %); this signifies high teacher-students interaction. Where the teacher and students' talks are equal (that is 50 % each), this indicates medium teacher-students interaction. But if teacher's talk in the classroom is higher than that of the student (that is above 50 %), is an indication of low teacher-students interaction.

For long, many researchers have been studying and analyzing or measuring such interaction using different instruments in order to reflect upon the quality of teaching. For instance, Inamullah, Hussain and Ud Din (2008) studied teacher – students' verbal interaction using Flanders Interaction Analysis Coding System; and used percentages to analyze the data. Ndirika (2009) studied teacher – students' verbal interaction using Eggleston Science Teaching Observation Schedule (ESTOS) and the data collected on interaction was analyze d using ANOVA and t – test statistics. Javid, et al (2013) studied teacher – students' verbal interaction during teaching process using Flanders Interaction Analysis Category System (FIACS); a ten (10) category system. The data for this was measured using descriptive statistics, significance of correlation and multiple

regression tests through descriptive and correlation methods. Aboho, et al (2014) analyze d teacher – students' class interaction using self structured Questionnaire on Teacher – Students' Interaction (QTSI); with 30 items, 4 – point Likert Scale type. The data was analysed using Chi – Square and t – test statistics. Cheruiyot (2015) studied classroom verbal interaction patterns using a modified version of Flanders Interaction Analysis Category (FIAC). Pearson Correlation was used to analyze the data.

In the present study, teacher – students' verbal interaction is investigated using Eggleston Science Teaching Observation Schedule (ESTOS) developed by Eggleston, Galton and Jones, (1975). The data was analysed using Multiple Regression Analyze s. This involved observing Integrated Science teachers and students when teaching in the classroom. The Science Teaching Observation Schedule was designed to permit systematic record of spontaneous acts and or behaviour and scrutinizing the process of instruction. This is usually done by taking into account small bits of interaction that take place between teacher and students during classroom instruction. Eggleston Science Teaching Observation Schedule (ESTOS) is a thirteen (13) category system for categorising teacher – student talk. It is a modification of Flanders' ten (10) – Category System of Interaction Analysis. There are several other category systems being used all over the globe, many of which are expansion of the Flanders (1970) system. The ESTOS however is considered to be the most suitable observation schedule for this study because it is flexible and easy to record observations and gives room for modification. The researcher modified the ESTOS instrument so as to make it fit in Integrated Science where demonstrations and practical activities are crucial to the teaching of the subject.

2.5.2 Teacher-students Interaction and Students' Academic Performance in Science

Teacher-students interaction is of great importance in the development of any school subject. When interaction between teacher and students is good, it might facilitate teaching and learning and this would likely lead to better accomplishment. Therefore, in order to improve the teaching and learning context of science, the need for teachers to create conducive environment as well as positive interactions and inter relationships among teachers and students cannot be overstated. Literature revealed that positive, strong, and supportive interactions and or relationships between teachers and students are fundamental to the healthy social and academic development of all students in schools. For instance, O'Conner and McCartney (2007) asserted that some types of classroom interactions can have a positive effect on various outcomes, including students' academic development, achievement and attitudes toward learning. Baker, Grant, and Morlock (2008) believed that most research regarding teacher-students interaction support students' academic and social development at all levels of schooling. According to O'Conner, Dearing, and Collins (2011), positive teacher-students interactions and or relationship enable students to feel safe and secure in their learning environment, and provide scaffolding for important social and academic skills.

Several studies were carried out on teacher-students' interactions in relation to students' academic performance. The findings of such studies revealed that positive teacher-students' interactions have the potential to influence a student's academic performance. For example, Murray, and Malmgren (2005) conducted an intervention study aimed at improving academic outcomes (performance) for low-income students via teacher-students interaction. The results showed that students who participated in the intervention significantly improved their GPA (performance) over the course of five

months. The results also indicated that positive teacher-students interaction/ relationship can improve academic skills in students as early as middle school and as late as high school (Murray, & Mamgren, 2005).

Cataldi, Laird and KewallRamani (2009) investigated teacher- students' interactions for older students and found that positive teacher-students interactions are associated with positive academic performance for high school students. In a similar study, Fraser, Till, Aldridge and Widia (2010) examined the influence of instructor-students interpersonal interaction on students' academic performance at the university level in Indonesia. The results of the study showed that there is a significant relationship between the instructor-students interpersonal relationship and students' academic performance.

Other related studies were also carried out by Debora, Helma, Jantine and Frans (2011) who investigated the associations between affective teacher-students relationship on students' school engagement and academic performance. The results indicated that there is statistically significant association between teacher-students interactions and academic performance. Ilias and Mdnor (2012) examined the influence of teacher-students interaction in the classroom bahaviour on the academic performance and students' motivation. The findings of the study showed that there is positive significant relationship between teacher-students interaction and students' academic performance. Fatokun (2012) in her study on attitude as correlate of achievement in chemistry among secondary school students in Nasarawa State, advanced that positive teacher-students interactions affect students' performance in chemistry because it promotes their interest in learning. Also, Gallagher (2015) asserted that positive teacher-students interaction/ relationships can impact students' social and academic outcomes, and thus reduce dropout rates. According to Henry, Knigh, and Thornberry (2012) the common reasons for dropout include low level of family support, low academic performance, poor

relations with peers and adults and low interest in academics. Fatokun and Omenesa (2015) conducted a study on the effects of prior knowledge and classroom interactions on students' achievement in chemistry and found that students tend to perform well in the classroom when exposed to good teacher-students' interaction. The present study seeks to investigate Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interaction as Predictors to Students' Interest and Academic Performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.5.3 Teacher-students Interaction and Students' Interest in Science

Forming good relationships and personal interaction between teachers and students are very important for arousing students' interest as well as for successful teaching and learning process. Hence teachers have a great role to play in this dimension. In this case, there is the need for teachers to ensure that classroom activities or tasks are significant to students as this has implications for the development of students' social and academic abilities. According to Liberante (2012), as students realise that their work is meaningful and relevant to their own lives, this provokes their interest and greater engagement with the tasks at hand, and willingness to perform to their fullest potential. Churchill, Ferguson, Godinho, Johnson, Keddie, Letts, Mackay, McGiill, Moss, Nagel, Nicholson, and Vick (2011) asserted that forming relationships between teachers and students provides teachers with opportunities to understand and connect with students' interest, preference, opinions, cultures and emotions and plan for this in their teaching.

Keeping the aforementioned in mind, teachers play a significant role in the interest of students in a particular subject. Oyenuga and Lopez (2012) reported that students' hatred for some school subjects was a result of poor instructional strategies by the

teachers. In their study, Onah, and Ugwu (2010) pointed out that interest of students lie within the teacher and students relationship in a given subject. Effective learning in the classroom depends on the teachers' ability to maintain the interest that brought students the course in the first place. Thus teachers play a vital role in effecting classroom changes (Barberos, Gozalo, & Padayogdog, 2015).

Interest as a powerful dictator and a motivational trait in the learning process gives an individual a tendency to seek out and participate in any type of activity or task. According to Gafoor (n. d), students' interest toward studying science has been a substantial feature of the works of science education research community for more than quarter of a century. Now, mounting evidences of decline in the interest of young people in pursuing science emphasize its current importance. The National science survey (Shkullaku, 2005) has indicated that interest in science as well as satisfaction with the quality of science teaching declined as the age increased. Students' interest is quite malleable and individual teachers can have a major effect on both overall science interest and on specific topic related ones (Gafoor, n. d). The author added that a single teacher can have quite different effects while teaching different topics in different ways and also teaching the same topic to different classes. Thus a teacher can bring about changes in students' interest. McClnerney, Dowson, Young and Nelson (2005) conducted a study with high school students on their self-esteem, and interest in school work, their expectancy of high school completion and their perceived support from parents, teachers, and peers of the expectancy. They found that of the entire factors considered, support from teachers had the strongest impact on students' interest and performance.

In a related study, Sternberge and Grigorenko (2007) posit that leading by example is one of the strongest environmental influences available to a teacher. Therefore students

are very sensitive to what teachers valued. Lavonen (2009) stated that in order to develop interest, students should have possibilities to meet role models and participate learning activities which support the development of basic psychological needs for competence (task, constructive evaluation), autonomy (plan, take responsibility) and social relatedness (get benefit from learning together). Teachers thus act not only as role models for developing interest but also facilitate the development of interest through meeting the basic psychological needs for competence, autonomy and social relatedness among their students through their interaction with students in and out of the classroom.

Researchers have examined how teachers can increase students' interest and engagement in the classroom through their interaction with the students. For example, Mazer (2012) reported that students' interest can be triggered in the moment by certain environmental factors such as teachers' behaviours. The author discovered that students who experienced high emotional interest are pulled toward a subject because they are energized, excited, and emotionally engaged by the materials. This increase in emotional arousal increases a student's attention, making it easier to encode more information. Mazer found that teachers immediacy behaviours stimulate emotional arousal in students, which leads to greater emotional interest and engagement. Teachers' immediacy behaviours are enacted or displayed through verbal and non verbal behaviours (actions) that generate perceptions of psychological closeness between the teacher and students.

Mazer (2012) also found that students who experience cognitive interest are pulled toward subject because they possess a clear structural understanding of the course content. Teacher clarity behaviour can increase cognitive interest because they make information more organised and or comprehensible for students. Those behaviours can occur verbally as teachers talk about course material, and non-verbally, through

teacher's use of power point display, handouts and notes on the board. Mazer further found that students who are emotionally and cognitively interested in a course or subject are more likely to engage in the learning process.

From the foregoing, it can be deduced that teachers are communicators, immediate personal symbols of the educational process, and figures that can through their interactions with students ignite in the students an interest for a particular subject area. Through teachers' relationships and personal interactions with students their behaviours can positively impact students in ways that have immediate and long lasting effects on students classroom environment where emotional and cognitive interests can be properly developed. This study therefore examines Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interaction as Predictors to Students' Interest and Academic Performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.6 Interest and Academic Performance in Science

Interest is the feeling that promotes individuals to spontaneous activities. It is a tendency to seek out and participate in any type of activity. The term interest is viewed differently by different authors. For example, Imoko and Agwagah (2006) defined interest as a subjective feeling of concentration or persisting tendency to pay attention and enjoys some activities or contents. Kundu and Tutoo (2007) viewed interest as a human sentiment which goes along with values, attitudes and other forms of human preferences. This means that interest motivates and compels attention. According to Aggarwal (2010) interest is a powerful dictator and motivator in the learning process. Mangal (2010) sees interest as the key factor and driving force that helps us to pay attention and remain engaged in our attended activities. Interest is not static; rather it is dynamic for it changes as a result of maturation, learning and other internal and external

environmental factors. In their study, Okigbo and Okeke (2011) asserted that interest is an important variable in learning because, when one becomes interested in an activity, he or she is likely to be more deeply involved in that activity. These authors added that interest is the mother of attention and once there is direct interest, attention is obvious and learning is assured. Interest aroused to learn a particular subject should be sustained for more enduring learning. According to Peter, Odoh, and Ben-Eligahu (2014), interest and its sustenance begin at the nursery and primary school, through secondary school before career choices are made at the tertiary school level.

Adam and Robert (2015) opined that keeping students engaged and interested in the classroom is an essential factor in successful teaching and learning. These researchers also pointed out that this approach seems obvious to educators because, if you get students interested they are more likely to engage in classroom activities. In the end, teaching them becomes much easier. However, capturing students' interest and keeping them engaged is not so simple, especially when what they need to learn involves large amount of information and complicated associations (Adam & Robert, 2015). The authors added that when students are intensely interested in an activity or topic they take in challenging learning situations without hesitation. In his separate study, Tucker-Drob (2014) stated that it seems logical that student who is interested in science as an academic subject would also know a lot about science. The results suggested that individual science performance may be influenced by personal interest. The results also showed that students with high levels of interest in science are able to turn their scientific interest into actual science knowledge to a greater extent. According to Linvill (2014), students' interest has been found to be important communication-related trait linked to student' classroom outcomes, including students' learning, students' retention, and students' performance at large.

Several research studies have been conducted to investigate the relationships between students' interest and their academic performance. For instance, Heinze, Reiss, and Franziska (2005) investigated the relationship between students' interest in mathematics and their academic performance in the subject. They found that correlation between interest and academic performance was stable. Therefore, interest in mathematics could be regarded a predictor for mathematics performance. Uhumuabi and Umoru (2005) examined the relationship between interest and academic performance in mathematics and sciences. They found that the performance of students in mathematics and sciences depend largely on students' interest they generate while studying these subjects. The results also indicated that intrinsic and extrinsic interests are important predictors to academic performance in mathematics and sciences. Oba (2005) carried out a study to investigate some students-personal variables as predictors to mathematics performance in secondary schools. The results showed that there is a significant relationship between students' interest and their mathematics performance. Chadha (2007) in his study stated that when a chemistry teacher rewards students for performing homework and other class works regularly, the students are bound to consistently do well. To this author, prompt marking and grading of students' class works sustain their interest and enhance performance in the subject. Olatoye and Ogunkola (2008) investigated the relative and combined influences of parental involvement and interest in schooling on science performance of selected junior secondary school students. The results suggested that there was a significant relationship between students' interest in schooling and science academic performance, as well as between parental involvement and academic performance in science.

In other related studies, Harackiewicz and Hulleman (2010) examined the relationship between interest and academic performance and found that students' interest was

correlated with both academic and laboratory performance. Onah and Ugwu (2010) investigated factors which predict performance in secondary school physics and found that interest of students in physics had no significant effect on their academic performance in the subject. Tella, Tella, and Adeniyi (2011) studied locus of control, interest in schooling, and self-efficacy as predictors to academic performance among junior secondary school students. The three independent variables were correlated and the results showed that there was a significant positive correlation between students' interest in schooling and their academic performance. Lawanto, Santoso, and Liu (2012) conducted a study on understanding of relationship between interest and expectancy for success in engineering design activities in grade 9 – 12. The results revealed that there was a significant relationship between students' interest in the engineering design task and their expectancy for success. The results also indicated significant relationship between each construct of the interest and expectancy components.

Similar studies were also conducted by other researchers to establish the relationships of students' interest with their academic performance. For example, Peter, Odoh, and Ben(2014) investigated interest and sustenance as correlates of students' performance in senior secondary school chemistry. The results showed that there was a significant relationship between students' interest and their performance in chemistry. Tucker-Drob (2014) found that students' science interest was more strongly linked to actual science performance when the students came from home and school environments that were rich in resources. But this was also true when the students came from countries that were economically more prosperous (with higher gross domestic product). The researcher also found that science interest and science knowledge (performance) were not related at all for students from poor countries. In the context of poor family, school, and national socioeconomic conditions, students' interest in science is unrelated to

science academic performance (Tucker-Drob, 2014). Essien, Akpan, and Obot (2015) examined students' interest in social studies and academic performance in tertiary institutions. The results of the study revealed that students' interest in social studies significantly relates to their academic performance in the subject.

In their study, Olusola, Taofeek, and Olumide (2015) examined parents and students' interest as predictors to students' academic performance in agricultural science in selected secondary schools. The authors found that parents' interest will significantly influence students' academic performance in agricultural science. Also, Olusola, Taofeek, and Olumide (2015) found that students' interest will significantly influence their academic performance in agricultural science. The study did not examine peer group influence and academic self-efficacy as did in the present study by examining psycho-social factors: parental involvement, peer group influence and academic self-efficacy and teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. Thus, the study is different from Olusola, Taofeek, and Olumide (2015) in terms of level, subject area

2.7 Overview of Similar Studies

A number of studies have been conducted both in Nigeria and abroad; that are relevant to the present study. Most of such studies revealed mixed results with regard to psycho-social factors, teacher-students classroom interactions as correlates of students' interest and their academic performance. Such studies include the following among others:

Higgins (2011) investigated the association of psychosocial factors (parental involvement, family rules, and family socio-economic status & homework) with academic performance using 3,932 participants from the National Education Longitudinal Study (NELS), eastern Kenturky University. Questionnaire was used to

measure parental involvement, while Achievement Test was used to measure academic performance. The researcher employed bivariate correlation analysis between parental involvement and homework, family socio-economic status and homework, homework and academic performance. The results showed that parental involvement and family socio-economic status were positively correlated with academic performance. The study did not examine peer group influence and academic self-efficacy as part of the psycho-social factors and also teacher-student interaction; which the present study did. Also, bivariate correlation analysis was used to analyze the data, and in the present study multiple regression analysis was employed. The present study investigated psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and teacher-students interaction as predictors of students' interest and academic performance in Integrated Science among colleges of education students in North-West, Nigeria.

Milad and Sayid (2011) examined the role of parental involvement in children's academic performance using 200 boys in Tehran, Iran. The researchers used questionnaire to measure parental involvement and previous semester examination marks/scores in literature and mathematics were used to measure academic performance. Correlation research design was adopted for the study. The statistical tools used to analyze the data were t-test statistic and Pearson correlation at $p \leq 0.05$ level of significance. The results showed that parental involvement and academic performance have positive and significant correlation. The results also revealed that the academic performance of children in family with high parental involvement is better than children in family with low parental involvement. This study also did not examine the psycho-social factors of peer group influence and academic self-efficacy and teacher-students interaction as well. t-test and Pearson correlation were used to analyze the data, and the

present study used multiple regression procedure in analyzing the data. This is the gaps the present study intends to fill by investigating whether psycho-social factors of parental involvement, peer group influence and academic self-efficacy and teacher-students interaction predict students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Akhtar and Aziz (2011) conducted a study on the effects of peer group(s) and parental pressure (involvement) on the academic performance of university students. The authors used 156 masters' students from the International Islamic University, Islamabad as the sample for the study. Descriptive survey research design was adopted for the study and questionnaire (opinionnaire) was used as the research instrument. Pearson correlation was employed in analyzing the data on peer pressure (peer group influence) and parent pressure (parental involvement). The following are the results/findings of the study:

i. Parental involvement showed significant positive relationship with academic performance of the university students.
ii. Peer group influence affects negatively the academic performance of the university students.
iii. Gender-wise, parental involvement indicated significant positive relationship with academic performance of female university students but it has no relationship with academic performance of male students.
iv. Peer group influence showed negative relationship with female students' academic performance and no relationship with the academic performance of male students of the university.

This study was carried out at university level and outside Nigeria, and did not investigate academic self-efficacy and teacher-student interaction as correlate of students' interest and academic performance. The present study intends to fill this gap

by investigating whether psycho-social factors of parental involvement, peer group influence and academic self-efficacy and teacher-students interaction as well are predictors of students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Twum-Ampofo and Oei-Owusu (2015) investigated the predictors to academic performance among senior high school (SHS) students in the Ashanti Mampong Municipality of Ghana. These authors used 571 students as the sample size for the study. The study was a descriptive and correlation research design. Questionnaire was used as the instrument for data collection. The data was analysed using Pearson correlation and regression analysis. The results revealed that parental involvement, parents' academic ambition for their children, peer influence, the child's academic ambition and child's effort as the correlates of academic performance. The results also showed that parental involvement, sex of the child, the child's academic ambition and the child's effort are the main predictors to academic performance. The present study seeks to examine whether psycho-social factors and teacher-students interactions predict students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Different researchers conducted different studies to examine the relationships between peer group influence and academic performance. For instance, Zitzmann (2005) investigated the relations between children's peer relationships and academic performance, using 585 participants involving children's parents and teachers of these kindergarten children. The author used interview and questionnaire to generate data for the study from the children and their teachers respectively. Multiple Correlation Analyze s was employed. The correlations or the results provided positive association between peer relationships and academic performance. This study failed to examine

parental involvement and academic self-efficacy and teacher-students interaction as correlate of students' interest and academic performance as, the present study did. Thus, the present study examines Psycho-Social Factors of parental involvement, peer group influence, and academic self-efficacy and also teacher-students' interactions as predictors to students' interest and academic performance in Integrated Science; using 317 participants from Colleges of Education, North-West, Nigeria.

Sajjad, et al (2013) investigated the impact of peer group on academic performance. The authors used 300 secondary school students. Questionnaire was instrument used for data collection. Simple percentage, correlation analysis and linear regression were the statistical tools used to analyze the data. The results revealed that peer groups have significant effect on the academic performance. The results also showed that female students performed better than male students. This study attempts to find out whether psycho-social factors and teacher-students interactions correlate with interest and academic performance in Integrated Science among Colleges of Education students, North-West, Nigeria.

Korir and Kipkemboi (2014) examined the impact of school environment and peer group influence on the students' academic performance. Two hundred and ten (210) students from Sabatia District of Vihiga County, Kenya, were used as the sample for the study. Correlation research design was adopted for the study. Questionnaires were used as the research instruments for data collection. Multiple regressions statistical tool was used to analyze the data. The results indicated that school environment and peer group influence made significant contribution to the students' academic performance. This present study analyses psycho-social factors and teacher-students interactions as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

On the issue of academic self-efficacy, another psycho-social factor, several studies were also carried out to establish its relationships with academic performance. For example, Adeyemo and Adetona (2007) studied the influence of parental involvement on academic self-efficacy of 264 undergraduate students in mathematics. Correlation research design was adopted for the study. The results showed that academic self-efficacy and authoritative parenting style were significantly predictors to students' academic performance. The current study investigates whether psycho-social factors and teacher-students interactions predicts students' interest and academic performance in Integrated Science in North-West, Nigeria

Khan (2013) conducted a study to find a relationship in the college academic setting between academic self-efficacy, stress coping skills, and academic performance. He used 66 undergraduate students from a university in north western United States. The instruments used were the questionnaire for self-efficacy and participation and GPA for academic performance measurement. Pearson correlation was used to analyze the data at $p \leq 0.05$ level of significance. The results indicated that academic self-efficacy was positively correlated with the grade point average [GPA] (performance). The present study investigates among other things the relationship of academic self-efficacy with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria to see what the result would be.

Shkullaku (2013) examined gender differences in self-efficacy and academic performance among Albanian students from two (2) major universities in Tirana, Albania. The sample size used was 180 students selected from first, second and third level studies. Questionnaire was used to measure self-efficacy and the GPA of the first semester to measure the academic performance of the participants. Pearson correlation was used to measure the relationship between self-efficacy and academic performance,

and t-test was used at $p \leq 0.05$ level of significance to compare male and female participants in self-efficacy and academic performance. The results of the study showed that there was a significant difference between males and females self-efficacy, but there was no difference between male and females' academic performance. A significant relationship was also found between the students' academic self-efficacy and academic performance. The study did not involve parental involvement and peer group influence as correlate of students interest and academic performance as did in the present study. This study investigates psycho-social factors of parental involvement, peer group influence and academic self-efficacy as predictors of students' interest and performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Yazachew (2013) investigated the level of students' self-efficacy, gender difference in self-efficacy and academic performance and also the relationship between self-efficacy and academic performance for second year students in the fall of 2012 in Analytical Chemistry 1(AC1), at the Debre Markos College of Teacher Education (DMCTE), Ethiopia. The researchers used 100 students as the study subject. Self-efficacy questionnaire and Analytical Chemistry Achievement Test (ACAT) were used as the instruments for data collection. The statistical tools used were the t-test and Pearson correlation at $P \leq 0.05$. The results revealed that there was no significant difference in the self-efficacy between sexes, but there was a statistically significant difference in academic performance between sexes. Also, the results indicated that a significant relationship exists between self-efficacy and academic performance. This study seeks to investigate the correlation between psycho-social factors and teacher-students interactions (independent variables) and students' interest and academic performance (dependent variables) in Integrated Science in Colleges of Education, North-West, Nigeria.

Goulao (2014) examined the relationship between self-efficacy and academic performance in adult learners. The sample size used was 63 students of both genders, selected from the first years of undergraduate studies. Questionnaire was used to measure self-efficacy and the overall students' academic performance was measured by their total grade from 2 different types of evaluation. That is, one from one final face to face exam (100 %) and another from two criteria – two online works (e – folio, 40 %) during the semester and a final face to face exam (p – folio, 60 %); as the researcher calls them. Pearson correlation and t-test were used to analyze the data. The results showed that students' level of self-efficacy is high and that a significant relationship exists between self-efficacy and academic performance. The present study is an analysis of psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

On the issue of interest, Niemivirta and Tapola (2007) investigated how possible changes in self-efficacy and interest during a task relate to each other and whether such changes independently overall task performance in mathematics. A sample of one hundred (100) 9^{th} grade students (56 girls and 47 boys) was used. Likert scale questionnaires for self-efficacy and interest were used to for data collection. Pearson correlation using univariate and bivariate latent growth curve model were used for the analysis. The results showed that stronger self-efficacy was related to higher interest. The results also indicated that increase or decrease in self-efficacy during the task was related to increase/decrease in interest and vice versa. This means that the relationship between self-efficacy and interest is proportional in that changes in one construct result in parallel change in the other. This study therefore seeks to investigate psycho-social

factors and teacher-students' interactions as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

So (2009) examined the effects of performance goal orientation and self-efficacy across grade levels; to verify correlations among performance goal orientation, self-efficacy, course interest and academic performance (GPA) and to examine predictions of performance goal orientation and self-efficacy on course interest and academic performance across grade levels. The sample size used was 347 medical students. Questionnaires for self-efficacy and interest and achievement test were used as the instruments for data collection. One–way ANOVA, Pearson correlation analysis and multiple regression analyze s were used to analyze the data. The results suggest that students' course interest is positively correlated with their academic self-efficacy. This study investigates psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and teacher-students' interactions as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Tella, Tella and Adeniyi (2011) carried out a study to investigate locus of control, interest in schooling, and academic self-efficacy of students as predictors of academic performance among junior secondary school students in Osun State, Nigeria. The three independent variables were also correlated. Five hundred (500) students comprising of 300 boys and 200 girls were used as the sample for the study. Questionnaires were used to generate data regarding the independent variables and for the dependent variable (academic performance) students' scores from their previous promotion examinations in English language, mathematics and integrated science were used. Ex-post-factor research design was adopted. Multiple regression analyses, multiple correlation and

ANOVA statistical tools were employed to analyze the data. The results from the correlation analysis of the three independent variables (locus of control, interest in schooling and self-efficacy) and the dependent variable (academic performance) indicated that there was a significant and positive correlation between students' interest in schooling and their academic self-efficacy and academic performance as well. The study did not examine parental involvement, peer group influence and teacher-students interaction as predictors of students' interest and academic performance. The present study seeks to fill this gap by examining psycho-social factors of parental involvement, peer group influence and teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Sothy, and Whitney (2015) examined parents and teachers support as predictors to students' interest in Science Technology Engineering and Mathematics (STEM) education among Cambodian middle school students. Survey design was adopted for the study and questionnaires for parents and teachers' support and classroom observation were the instruments for data collection. Bivariate correlation analysis and multiple regression analyze s were used as the tools for data analysis. The results showed that parents and teachers played a significant role in students' interest in STEM education and that parents' support seemed to have greater influence on STEM interest compared to teachers support in science. In other word, parents and teachers' support in mathematics, and teachers' support in science were predictive of STEM interest as shown by multiple regression analyze s. The present study examines the relationship of psycho-social factors and teacher-students' interaction with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria to see what the result would be.

Sha, Schunn, Bathgate and Ben-Eligahu (2015) conducted a study on whether the students' perception of parents/family support is important for both choice preferences to participation in optional learning experiences and engagement during science learning and whether the effects on choice preferences and engagement are mediated through effects on students' interest and self-efficacy in science. Seven hundred and two (702) 6^{th} grade students and two hundred and eighty four (284) 5^{th} grade students from eastern and western United States (US) respectively were used as the sample for the study. Structural equation modeling was applied for the data from two different contexts. Also, zero order Pearson correlation between all the variables was employed. The results from the zero order correlation suggested that a statistically significant correlation exists between students' self-efficacy and their interest in science. The present study attempts to investigate among other things the relationship of academic self-efficacy with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria to see what the result would be.

Teacher-students classroom interaction is another independent variable which a number of studies were carried out to establish its relationship with students' interest and their academic performance. For example, Fraser, Jill, Aldridge, and Widia (2010) investigated the relationships between instructor-students interpersonal interaction and students' academic performance at the University level in Indonesia. Four hundred and twenty two (422) students participated in the study. The instruments used to collect data for the study were questionnaire for teacher interaction and attitude scale. The data for the study were analysed using Multiple Analyze s of Variance (MANOVA), correlation analysis and regression analysis as well. The findings suggest that there was significant relationship between instructor-students interpersonal interaction and the students' academic performance. This present study seeks to investigate psycho-social factors and

teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Ilias, and MdNor (2012) examined the influence of teacher-students interaction and the classroom behavoiur on academic and students' motivation in teachers' training institute in Malaysia. The sample for the study was 92 students. The research was a quantitative study and correlation analysis was employed as statistical tool for data analysis. Questionnaires were used as the instruments for data collection. The results showed that there is positive relationship between teacher-students interaction and students' academic performance. The present study examines among other things the relationship of Teacher-Students' Interaction with students' academic performance in Integrated Science in Colleges of Education, North-West, Nigeria, to see whether the result would be the same or otherwise with those of Fraser, Jill, Aldridge, and Widia (2010), Ilias, and MdNor (2012).

Fatokun and Omenesa (2015) investigated the effect of prior knowledge and classroom interactions on students' academic performance in chemistry; using 93 Senior Secondary (SS II) students in Dutsin-ma, Katsina State, Nigeria. Pretest and posttest quasi-experimental design was adopted. Chemistry Achievements Test (CAT) and Prior Knowledge Questionnaire (PKQ) were the instruments used to collect the data for the study. The data were analyzed using Analysis of Variance (ANOVA) and Analysis if Covariance (ANCOVA). The results of the study suggested that those students taught using teacher-students interactions tend to perform significantly higher than those taught using demonstration method. The present study aims to investigate the relationship of Psycho-Social Factors and Teacher-Students' Interaction with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

In relation to students' interest and their academic performance, various studies were also conducted to establish the relationships between the two variables. For instance, Oba (2005) examined some students' variables as predictors to mathematics performance in secondary schools in Central Cross River State, Nigeria. The author used a sample of 550 students drawn from a population of 7,360 students. He used Students' Response Questionnaire (SRQ) and Mathematics Achievement Test (MAT) as the instrument for data collection. The findings showed that only two of the seven students-personal variables measured (interest and achievement motivation) of the subject had a significant relationship with the students' mathematics performance. This investigates psycho-social factors and teacher-students' interactions to see whether they are predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Olatoye and Ogunkola (2008) investigated the relative and combined influences of parental involvement and interest in school on science performance of selected junior secondary schools in Ogun State, Nigeria. The researchers used 360 students as the sample size. The research design adopted for the study was ex-post-facto. Two sets of questionnaires; Students' Parental Involvement Questionnaire (SPIQ) and Students' Interest in Schooling Questionnaire (SISQ) along with Students' Science Achievement Test (SSAT) were used as the instruments for data collection. The statistical tools used to analyze the data were regression analysis, Pearson Product-Moment Correlation Coefficient (PPMCC) and t-test statistic. The results of the study showed that there is a significant relationship between students' interest in schooling and science academic performance as well as between parental involvement and science performance. The current study seeks to analyze Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interaction to see whether

there exist a relationship among these variables and between them and students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Onah, and Ugwu (2010) investigated factors which predict performance in secondary school physics in Ebonyi north educational zone of Ebonyi State, Nigeria. The sample size used was 220 (200 students and 20 physics teachers) participants. Questionnaires were used to collect data for the study and T-scores and F-distribution were used in testing the hypotheses. Also, step-wise multiple regression analyze s were used to analyze the data on performance in relation to school location, teacher qualification, sex, interest, and laboratory facilities as predictors. The authors found that, of all the factors measured, interest and school location are the ones that had no significant effects on academic performance in physics. This study investigates psycho-social factors and teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Peter, Odoh, and Ben-Eligahu (2014) examined interest and sustenance as correlates of students' performance in senior secondary chemistry in Ogbadibo Local Government Area of Benue State, Nigeria. The research design adopted was descriptive survey and 242 chemistry students of Senior Secondary II (SS II) were used. Interest and Sustenance Chemistry Questionnaire (ISCQ) was used as the research instrument. Pearson Product-Moment Correlation Coefficient (PPMCC) and t-test were used to analyze the data. The results showed that there was a significant relationship between students' interest in chemistry and their academic performance in the subject. This present study also investigates the correlation between psycho-social factors and teacher-students' interactions and students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Essien, Akpan, and Obot (2015) conducted a study to investigate students' interest in social studies and academic performance in tertiary institutions in cross Rivers State, Nigeria. The researchers adopted Ex-post-facto research design, and seven hundred and fifty three (753) NCE II students drawn from a population of 1,343 students from College of Education (COE), Akanmkpa and Federal College of Education (FCE), Obudu participated in the study. The instruments used for data collection were Students' Interest in Social Studies Questionnaire (SISSQ) and Social Studies Achievement Test (SOSAT). Pearson Product-moment correlation analysis was employed in analyzing the data. The results suggested that there was a significant relationship between students' interest in social studies and their academic performance. The present study examines psycho-social factors and teacher-students' interactions as predictors of students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. Essien, Akpan, and Obot (2015) study is therefore different from the present one because, it was conducted in South-East, Nigeria, while the present study is in North-West, Nigeria. The sample used was 753 students while the present study used 317 students as the sample. Pearson correlation was used while in the present study multiple regression analysis was used. The study used Ex-Post-Facto research design, while the present study used survey research design.

Olusola, Taofeek, and Olumide (2015) investigated parents and students' interest as determinants of students' academic performance in agricultural science in selected secondary schools in Oyo metropolis, Oyo State, Nigeria. Survey research design was adopted for the study. Eighty (80) students participated in the study, and structured questionnaires were used to collect data. The data collected were analysed using simple frequency percentage and chi-square. The authors found that that both parents and students' interest significantly influenced students' academic performance in

agricultural science. The present study investigates psycho-social factors and teacher-students' interactions as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Ndirika (2009) examined the effect of teacher-students interaction on academic performance among Integrated Science students of different class-sizes and ability groups in Junior Secondary Schools (JSS) in Giwa Education Zone, Kaduna State, Nigeria. The author employed a nine group comparative experimental research design for the study. A sample of four hundred and eighty (480) junior secondary school II (JSS II) students were drawn and used from the population of three thousand eight hundred and fifty JSS II students. The instruments used for data collection were Integrated Science Achievement Test (ISAT) and Eggleston Science Teaching Observation Schedule (ESTOS). Analysis of Variance (ANOVA) and t – test statistics were the statistical tools used in analyzing the data. The findings of the study revealed that there was a significant different in the performance of male and female students taught with high level of teacher-students verbal interaction with the males performing better than females. The results also showed no significant difference in the performance of male and female students when taught with low and medium teacher-students verbal interaction. This study also seeks to investigate whether psycho-social factors and teacher-students' interactions could serve as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Javid, Babelan and Nmvar (2013) investigated the state of teacher-students verbal interaction during teacher teaching process and its relationship with academic achievement of middle school students in Ardabil, Iran. The author used seventy six thousand three hundred participants as the sample for the study (300 were middle school

teachers and 76,000 were the middle school students attending the classes of the selected teachers). Descriptive – correlation design was employed in the study. The data collection instruments used were documents for recording students achievement scores, factor analysis rank table, French and Galway non-verbal communication scoring system and Flanders Interaction Analysis Category System (FIACS). The researchers employed descriptive statistics, significance of correlation, and multiple regression tests through descriptive and correlation methods. The results revealed that teachers who pay attention to students when they speak and are not self-centred play significant role in students' academic performance. The results also showed a meaningful correlation between the ten (10) verbal interaction categories of Flanders observed and students' academic performance. This study therefore investigates psycho-social factors and teacher-students' interactions as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

Aboho, Dodo and Isa (2014) investigated teacher-students class interaction on academic performance of senior secondary school students in Economics in Benue State, Nigeria. Survey design was adopted for the study. Three hundred and ninety (390) senior secondary school II (SS II) Economics students who were randomly selected from the population of three thousand nine hundred (3,900) SS II students participated in the study as the sample. Out of this number, 240 were male and the remaining 150 were female students. Questionnaire on Teacher-Students Interaction (QTSI) with 30 – items, 4 – point Likert Scale type was used to collect data for the study. Chi – Square and t – test statistics were used to test the hypotheses for the study. The results showed that teacher-students interaction has a significant impact on the students' academic performance. In the present study, the researcher investigates the correlation between psycho-social factors and teacher-students' interaction as the independent variables and

students' interest and academic performance in Integrated Science as the dependent variables in Colleges of Education, North-West, Nigeria.

Cheruiyot (2015) examined classroom verbal interaction patterns in relation to students' performance in Physics in Baringo Central Sub – County in Kenya. A total of six (6) Physics teachers from six stratified randomly selected schools were involved in the research. A modified version of Flanders Interaction Analysis Category (FIAC) was used in form three students of the selected schools. Students Physics Achievement Test (SPAT) and Attitude Scale (AS) were the instruments the students responded to, while Physics Teachers' Questionnaire (PTQ) indicating their views on interactions in Physics classrooms was administered to Physics teachers. Inferential statistics of Pearson correlation was used to determine the relationship between classroom verbal interaction patterns and students performance in Physics. t–test was used to compare means of students' performance in SPAT. The qualitative data from Likert Scale was analyzed by tallying the number of similar responses. The study findings revealed that verbal interaction has some influence on the learners' performance. But schools which used indirect verbal interaction (such as praises or encourages, accepts or uses ideas of students, and answers students' questions among others) performed better than those using direct verbal interaction (such as lectures, give directions, and criticises or justifies authority among others). The study examined teacher-student interaction as one whole or a single variable, while the present study examines teacher-students interaction in terms of or as being low, medium and high. This study investigates the relationship of Psycho-Social Factors (parental involvement, peer group influence and academic self-efficacy) and Teacher-Students' Interactions with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria.

2.8 Implications of Literature Reviewed for the Present Study

This study has reviewed literature on the previous works done related to psycho-social factors and teacher-students interactions as they influence students' interest and academic performance. The literature reviewed have provided some insights into the effectiveness of psycho-social factors and teacher-students interaction on students' interest and academic performance, and this has some implications on the present study. Many research works done examined the effect of two or more psycho-social factors and teacher-students interaction differently; as they relate to students' interest and academic performance, which is quite different from the present study which seeks to investigate whether psycho-social factors and teacher-students interaction predict students' interest and academic performance.

Essien, Akpan, and Obot (2015) worked on interest and academic performance among Social Study students in Colleges of education in Cross River State, Nigeria. Seven hundred and fifty three students participated in the study. Pearson Correlation was used to analyze the data. The findings revealed that there is a significant relationship between students' interest in Social Studies and their academic performance. Although the present study involves students of Colleges of Education (NCE II), it is carried out in Integrated Science and in North-West, Nigeria. The study is therefore different from Essien, et al (2015) in terms of sample size and statistical tool(s) used, location and subject area as well.

Trumper (2006) and Onah, and Ugwu (2010) are among the researchers who worked on Physics at secondary school level. Olusola, Taofeek, and Olumide (2015) worked on secondary school Agricultural Science. Mbugua et al (2012) worked on secondary school mathematics in Kenya. Yazachew (2013) looked at the relationship between self-efficacy, academic achievement, and gender in Analytical chemistry at College of

Teacher Education, Debre Markos, Ethiopia. The researcher used 100 students as the study subject. Pearson Correlation and t-test were the statistical tools used. The findings revealed that there was a significant relationship between self-efficacy and academic performance. The study did not examine parental involvement and peer group influence as correlate of students interest and academic performance as did in the present study. Thus, the study is different from the present in terms of sample size and statistical tools used, and location as well. Hence, this study examines parental involvement, peer group influence, academic self-efficacy and teacher-students interaction as predictors of students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria..

Shkullaku (2013) examined the relationship between self-efficacy and academic performance among university students in Tirana, Albania. Ganyaupfu (2013) carried out his study with undergraduate students in South Africa.

Most of the research works done on psycho-social factors and teacher-students interaction as correlates of students' interest and their academic performance involved primary school pupils and secondary school students and were outside Nigeria. Such studies were carried out either in mathematics, biology, physics, or chemistry and other school subjects and relatively very few or none in Integrated Science at NCE level. Farooq, Chaudhry, Shafiq, and Berhanu (2011) worked on secondary school students in Pakistan and examined different factors (parent education, parent occupation, and students' self-efficacy among others) that influence academic performance in mathematics and English. The present study is carried out in Nigeria; therefore it is different from Farooq, et al (2011) work in terms of location. Worked by Peter, Odoh, and Ben(2014) and Fatokun and Omenesa (2015) among others were on secondary school chemistry.

Tella, Tella, Adeniyi (2011) worked with junior secondary school students in Osun State (South-Western Nigeria), and investigated students' interest in schooling, locus of control and self-efficacy as predictors to their academic performance in English Language, Mathematics and Integrated Science. Multiple regression analyses, multiple correlation and ANOVA statistical tools were employed to analyze the data. The results indicated that there was a significant and positive correlation between students' interest in schooling and their academic self-efficacy and academic performance as well. The study did not examine parental involvement, peer group influence and teacher-students interaction as predictors of students' interest and academic performance. The present study seeks to fill this gap by examining parental involvement, peer group influence, academic self-efficacy and teacher-students' interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. Thus, the study is different from Tella, et al's (2011) in terms of variables, level, location and somehow statistical tools used.

Inamullah, Hussain and Ud Din (2008) worked on teacher-students verbal interaction at secondary level in light of Flanders Interaction Analysis Coding System in Pakistan. 625 participants were used as the sample. The present study is carried out in Colleges of Education in North–West, Nigeria; using Eggleston Science Teaching Observation Schedule (ESTOS) as the instrument for data collection on teacher-students verbal interaction. 332 participants were involved in the study. Therefore, the present study is different in terms of level, location, sample size used and the instrument used for collecting data on teacher-students verbal interaction.

Ndirika (2009) investigated the effect of teacher-students interaction on academic performance among Integrated Science students of different class-sizes and ability groups in Junior Secondary School (JSS) in Giwa Education Zone, Kaduna State,

Nigeria. Four hundred and eighty (480) students were used as the sample size for the study. Analysis of Variance (ANOVA) and t-test were used as the statistical tools. The findings of the study suggested that gender wise; there was a significant relationship between male's performance and high level of teacher-students interaction. Although the present study is also in Integrated Science, it is different from Ndirika's (2009) because it is done in Colleges of Education in North-West, Nigeria using 332 participants as the sample for the study; as per as teacher-students interaction is concern. Thus the difference is in terms of level, location and the sample size used. However, the study is similar to Ndirika's (2009) in terms of the instrument (ESTOS) used to collect data for the study and the subject area as well.

Javid, Babelan and Namvar (2013) investigated the state of teacher-students verbal interaction during teaching process and its relationship with academic achievement of middle school students in Ardabil, Iran, using76, 300 participants. The present study is carried out in Colleges of Education, North-West, Nigeria, using 329 participants. It is therefore different in terms of level, location and the sample size used. Aboho, Dodo and Isa (2014) worked with senior secondary school students and investigated the effect of teacher-students classroom interaction on academic performance in Economics in Benue State, Nigeria. 390 participants were involved in the study. The present study is carried out in Integrated Science using 329 participants from Colleges of Education in North-West, Nigeria. Thus the study is different in terms of the subject area, level, location and the sample size used among others.

Cheruiyot (2015) studied the classroom verbal interaction patterns in relation to students' performance in Physics in Baringo Central Sub – County, Kenya. A total of 6 physics teachers participated in the study, while in the present study 15 teachers and 317 students were involved. Pearson correlation and t–test were used as the statistical tools

and in the present study multiple regressions was employed. A modified version of Flanders Interaction Analysis Category (FIAC) was used and the present study used Eggleston Science Teaching Observation Schedule (ESTOS). The study findings revealed that verbal interaction has some influence on the learners' performance. The study examined only teacher-students interaction and was treated as one whole or a single variable, while the present study examines teacher-students interaction in terms of or as being low, medium and high levels along with other variables. Hence, the present study investigates Psycho-Social Factors of parental involvement, peer group influence and academic self-efficacy and teacher-Students' interaction as predictors of students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. Therefore, the study is different from Cheruiyot's (2015) in terms of subject area, level and location, statistical tools used and somehow instruments.,

The aforementioned researchers did not look at the psycho-social factors and teacher-students interactions as predictors to students' interest and academic performance in a single study. Moreover, based on the literature available to the researcher, relatively few or no research work was done in Nigeria in relation to psycho-social factors and teacher-students interaction as predictors to students' interest and academic performance in Integrated Science in Colleges of Education. Thus, the present study fills this gap by investigating whether psycho-social factors and teacher-students interaction predict interest and performance in Integrated Science among Colleges of Education Students in North-West, Nigeria.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This study examined psycho-social factors and teacher-students interaction as predictors of interest and academic performance in Integrated Science among Colleges of Education students in North-West, Nigeria. In this chapter, the methodology is presented under the following sub-headings:

3.2 Research Design

3.3 Population of the Study

3.4 Sample and Sampling Techniques

3.5 Instrumentation

3.6 Pilot Testing

3.7 Administration of the Instruments

3.8 Data Collection Procedure

3.9 Procedure for Data Analysis

3.2 Research Design

The design employed in this study is a survey research design. It is a research strategy that enables the researcher to correlate the relationship between or among variables. According to Ojo (2010), survey research design is a method that gives opportunity of evaluating the existing condition. Abdu (2014) opined that the goal of survey research is to discover the ongoing situation or practice and explain "what happened". In this study, the researcher investigated variables that he has no control which interplay and are

responsible for measurable observations in a system. Four variables; two independent and two dependent were involved in the study. The independent variables are psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and teacher-students interactions (low, medium and high), while the dependent variables are students' interest and academic performance in Integrated Science. The design was used to investigate whether relationships exist or not between these variables. Three hundred and seventeen (317) NCE II Integrated Science students participated in the study.

3.3 Population of the Study

The population of the study comprised all the NCE II Integrated Science students in the Colleges of Education (COE) that operate coeducationally under the area of study (that is, the North-West, Nigeria) and at the same time offer Integrated Science. The area consists of seven (7) states (see appendix A) with a total of twelve (12) Colleges of Education. The colleges are categorized into Federal (FCE) and State (COE)-owned. Out of this number, only one College that is Federal College of Education (Technical), Gusau, Zamfara State is a single sex (female) College. Also, only one out of the twelve (12) Colleges of Education (that is COE, Birnin Kebbi, Kebbi State) in the area is not offering Integrated Science as at the period of this study. Therefore, only ten (10) Colleges of Education in the area formed the population of the study. The total number of the population is 1,792, consisting of 1,158 male and 634 female students. The detail of the population is presented in Table 3.1.

Table 3.1: Population of the Study

			NCE II Integrated Science Students Enrolment		
S/N.	**State**	**College**	**Male**	**Female**	**Total**	**Remark**
1.	Jigawa:	COE, Gumel	38	22	60	State
2.	Kano:	COE, Kumbotso	212	84	296	State
		FCE, Kano	44	22	66	Federal
		FCE (T), Bichi	120	25	145	Federal
3.	Kaduna:	COE, G/Waya, Kafanchan	103	51	154	State
		FCE, Zaria	91	228	319	Federal
4.	Katsina:	COE, Dutsin-ma	05	20	25	State
		FCE, Katsina	259	100	359	Federal
5.	Sokoto:	COE, Sokoto	152	69	221	State
6.	Zamfara:	COE, Maru	134	13	147	State
Total		**10**	**1,158**	**634**	**1,792**	

Source: National Commission for Colleges of Education (NCCE), Abuja, Nigeria and Integrated Science Departments of the Colleges under the area of study (2016).

3.4 Sample and Sampling Techniques

To select the sample of the study from the population, cluster/area sampling was first employed by dividing the population into sampling units. That is, States (7 in number), and Colleges of Education operating coeducationally; and at the same time offer Integrated Science (10 in number). Simple random sampling involving fish bowl method was then used to select three (3) out of the ten (10) Colleges and use them as the study subjects. This was done by writing the name of each of the Colleges on a piece of paper as they appear in Table 3.1 above, to have a total of ten (10) pieces of papers

representing the ten Colleges. The pieces of papers were then squeezed and put into a container and shaken to mix properly. Three (3) students were then asked to randomly select a slip one after another from the container. When each student made his selection, the researcher then opened the picked slip and record the College that appear therein. Afterward, the paper was squeezed again by the researcher and returned to the container so as to give the Colleges equal chance of being selected. The selection of three (3) Colleges only as the sample was based on Roscoe's (1975) suggestion that at least 10% of a total population can be taken as sample size. In this study, the 10% of the total population (1792) is 179.2. Five lecturers from each of the three sample Colleges were also randomly selected to be used in observing teacher-students interaction that takes place in the classroom. Altogether, 15 lecturers were used. The Colleges selected are College of Education (COE), Maru; represented by a letter 'A', Isa Kaita College of Education (IKCOE), Dutsin-ma; represented by a letter 'B', and Federal College of Education, Technical (FCET), Bichi; represented by a letter 'C'. The three Colleges had a total number of three hundred and seventeen (317) students. Out of this number, two hundred and fifty nine (259) were male students, while the remaining fifty eight (58) were females. This sample size is viable for the study also going by Roscoe's (1975) and Sambo (2008) suggestions. Intact classes of all the three Colleges were used because, some school authorities might be unwilling to allow a researcher disrupt their normal schedule by making random selection and rearrangement of classrooms as pointed out by Sambo (2008). The detail of the sample is presented in Table 3.2

Table 3.2: Sample for the Study

S/No.	College	NCE II Integrated Science Students Enrolment		
		Male	**Female**	**Total**
1.	A	134	13	147
2.	B	05	20	25
3.	C	120	25	145
	Total	**259**	**58**	**317**

3.5 Instrumentation

For this research work, the following instruments were used to generate data:

a. Psycho-social Factors Questionnaire (PSSFQ)

b. Eggleston Science Teaching Observation Schedule (ESTOS)

c. Students' Integrated Science Interest Questionnaire (SISIQ) and

d. Integrated Science Academic Performance Test (ISAPT)

3.5.01 Psycho-social Factors Questionnaire (PSSFQ)

The psycho-social factors questionnaire is one of the essential instruments used to generate data for the study of this nature. It is a 5 point Likert- type questionnaire developed by the researcher himself. The instrument comprises of two (2) sections, A and B. Section "A" focuses on the demographic information such as name of college and gender among others. Section "B" consists of the instruction and the questionnaire items which deal with statements related to parental involvement (seven items/statements), peer group influence (seven items), and academic self-efficacy (six items). Thus, the instrument is made up of twenty (20) items/statements altogether; and

each has five (5) options which are: strongly agree (5), agree (4), undecided (3) disagree (2), and strongly disagree (1). See appendix B.

3.5.02 Eggleston Science Teaching Observation Schedule (ESTOS)

The second instrument used for the study is the Eggleston Science Teaching Observation Schedule (ESTOS) developed by Eggleston, Galton and Jones (1975). The instrument deals with on – the – spot (face – to – face) observation of science teachers during science lessons. In this case, a record of a lesson is produced by noting when any one or more of the interaction categories occur in each three minutes "time intervals". Thus in a lesson lasting for one hour (60 minutes), there would be twenty "three minutes time interval" (that is, 20 x 3 = 60 minutes). In each of these three minutes time intervals, one or more of the aspects of interaction categories (see appendix C) might occur and would be noted. One aspect of the interaction categories is "teacher praising or encouraging students". In this aspect, the teacher praises or encourages students' action or behaviour. This can be done through jokes that release tension, not at the expense of other individuals. Nodding head or saying "good attempt" or "go ahead, tell us more about it" or "try again", and so on are included. However, if one kind of interaction occurs a number of times in any one time interval all occasions after the first are ignored. In order to estimate the frequency of use of any category the fraction is calculated using:

$$\frac{\text{Number of time intervals in which observation occur}}{\text{Total number of time interval observed}} \times \frac{100}{1}$$

Thus, if in 20 time intervals observed the behaviour occurred in ten (10) of these, the estimated frequency of use of this category would be:

$$\frac{10}{20} \times \frac{100}{1} = 50\ \%$$

As earlier mentioned elsewhere in this research work, the interpretation is that:

1. Where students' talk is higher than that of the teacher (that is above 50 %), this signifies high teacher-students interaction;
2. Where teacher and student talks are equal (that is 50 % each), this indicates medium teacher-students interaction;
3. Where students' talk is less than that of the teacher (that is below 50 %), is an indication of low teacher-students interaction.

The aspects of the interaction highlighted in the schedule adopted by the researcher were first formed by Hough and Ober (1966) with the reliability coefficient of 0.76 and Eggleston, Galton, and Jones (1975) with the reliability coefficient of 0.74. The schedule was used by Olajide (1987), Tambaya (2007) and Ndirika (2009). The reliability of this instrument was also re-determined by Ndirika (2009) and obtained a value of 0.85. The aspects of the interaction include:

1. Teacher aspect/Teacher talk:– accepts feelings, praises or encourages, accepts or uses ideas of students, asks questions, lectures, answer students' question, give directions, criticizes or justifies authority and corrective feedback.
2. Student aspect/student talk:– Student talk–response, student talk–emitted, students' questions and silence or confusion.

The detail of the aspects of interaction to be observed by the researcher is presented in appendix C. The observation was carried out by the researcher and the two observers (research assistants); where they all followed five different lecturers to their individual lecture classes in each of the sample Colleges. During each of the lesson period, the researcher and his assistants observed and took a record of any of the aspects of the interaction categories (that is teacher talk/student talk) detailed in appendix C; that occurred in each of the three minutes "time intervals". The observation covered one

hour (1:00 hour) duration; which is the usual lesson duration at NCE level (see appendix D). The number of the aspects of interaction emphasized (that is teacher talk and students talk) was calculated by totalling the number of frequency in which each aspect was observed. Appendix D represents the Eggleston Science Teaching Observation Schedule (ESTOS) format for teacher-student verbal interaction.

3.5.03 Students' Integrated Science Interest Questionnaire (SISIQ)

Another instrument used to generate data for this study is the Students' Integrated Science Interest Questionnaire (SISIQ). It is a 5 point Likert-scale questionnaire also developed by the researcher. The instrument is divided into two (2) sections, A and B. Section "A" deals with the demographic information such as name of college and gender among others. Section "B" consists of the instruction and the questionnaire items related to students' interest in Integrated Science. The instrument is made up of twenty (20) items or statements with each having four (5) options ranging from strongly agree (5), agree (4), undecided (3), disagree (2), to strongly agree (1). See appendix E.

3.5.04 Integrated Science Academic Performance Test (ISAPT)

Integrated Science Academic Performance Test (ISAPT) is the fourth instrument used for generating data for the study. The instrument was developed by the researcher himself and consists of thirty (30) items and each item has four (4) options (A - D) in the multiple choice format. The questions were drawn from the NCE II first semester moderated examination questions; derived from the aspects of the "Component of the Environment", "Science Education", "Man and Energy", "Workshop Practice, Laboratory Management and Safety", and "Scientific Method" of the NCE II first semester syllabus. See Table 3.3 and appendix F as well.

3.5.1 Validation of the Instruments

The validation of the instruments was done by five senior lecturers with minimum qualification of PhD. Four (4) of these lecturers are from science education department and the other one from psychology department, Ahmadu Bello University, Zaria. Also, two senior lecturers; one with PhD qualification from Integrated Science department of Federal College of Education, Zaria and the other with the minimum qualification of master's degree from English department of Federal College of Education, Katsina were involved in the validation of the instruments. Letters of validation are presented in appendix G.

The lecturers from the three institutions were asked to assess among other things the:

i. content validity of the instruments;

ii. language component of the instruments;

iii. appropriateness of the items;

vi. clarity of statements in the instruments and

v. make constructive criticisms and corrections that would help in improving the quality of the instruments.

Based on the validity results, modifications of some items in the instruments were made.

3.5.1.1 Validation of the Instrument (PSSFQ)

The instrument was validated by the set of lecturers mentioned in section 3.5.5 above. The experts made constructive criticisms and corrections on the basis of content and face validity of the instrument and also gave some useful suggestions. Based on the

validity results and the suggestions given, twenty (20) out of the thirty (30) items initially submitted for validation were selected for this instrument after some modifications. Items 1, 8, 9 and 26 were modified. For example, item 26 (now item 17) initially was “I can organize activities in Integrated Science through which I can be creative and productive; and as such Integrated Science is interesting to me”, but modified to “My capability of conducting practical activities in Integrated Science enables me to be creative and productive”. On the other hand, items 2, 6, 10, 11, 19, 20, 21, 22, 24 and 27 were totally removed from the initial instrument for not being appropriate and the remaining items were rearranged.

3.5.1.2 Validation of the Instrument (ESTOS)

This instrument was validated by two senior lecturers from science education department, Ahmadu Bello University Zaria. The experts made some corrections and gave some suggestions most especially on the titles of the observation schedule (appendix E) for observing teacher-students verbal interaction in the classroom and the aspects of the interaction categories to be observed (appendix D). The corrections made and suggestions given by the experts helped in improving the quality of the instrument.

3.5.1.3 Validation of the Instrument (SISIQ)

This instrument was also validated by the same lecturers who validated the Psycho-Social Factors Questionnaire (PSSFQ). The lecturers from the three institutions earlier mentioned made constructive criticisms and corrections on the basis of content and face validity of the instrument and gave some useful suggestions as well. Based on the validity results and the suggestions given, twenty (20) out of the twenty five (25) items submitted for validation were selected for this instrument after some modifications were made. Items 5, 17, 18, 21 and 22 were modified. For instance, item 17 (now item 13) initially was “My good love for Integrated Science is due to the fact that the course is

activity-based, is due to the fact that it prepares people to be creative and productive", but was modified to "My love for Integrated Science is due to the fact that it prepares people to be creative and productive". Items 3, 7, 9, 15, and 24 of the initial instrument in the other hand were removed for not being appropriate.

3.5.1.4 Validation of the Instrument (ISAPT)

The lecturers who validated the three other instruments also validated this instrument. As usual, the experts made constructive criticisms and corrections on the basis of content and face validity of the instrument. They also gave some useful suggestions and demanded for modification or change of some items in the instrument so as to ensure that all the items are in accordance with the Bloom's (1956) Taxonomy of Cognitive levels/objectives. Based on the results of the validation and the modifications or changes made as demanded for, the thirty (30**)** multiple choice items submitted for validation were maintained for the instrument. From the initial instrument, items 4, 5, 11, 16, 17, 19, 27 and 28 were changed. For example, item 11 then was "NISP stands for"

a). National Insurance Scheme Programme b). National Institute for Strategic Planning

c). Nigeria Integrated Science Project d). National Integrated Science Project

But latter, changed to "The magnifications of the lower power objective, medium power objective and high power objective lenses of a microscope are in the following respective order"

a). 4 X, 10 X and 40 X b). 40 X, 10 X and 4 X

c). 10 X, 4 X and 40 X d). 10 X, 40 X and 4 X

The corresponding marking scheme for the ISAPT (see appendix H) was also validated by the same lecturers who validated all the instruments.

The items specifications of the Integrated Science Academic Performance Test (ISAPT) based on Bloom's (1956) taxonomy of cognitive level/objectives (knowledge, comprehension, application, analysis, synthesis and evaluation) is presented in Table 3.3

Table 3.3: Table of Specifications for the Integrated Science Academic Performance Test (ISAPT) Based on Bloom's Taxonomy of Cognitive levels

S/N	General and Specific Topics	Weight %	Kn. 30%	Com. 13.33%	App. 13.33%	An. 20%	Syn. 10%	Ev. 13.33%	Total 100%
1.	Component of the Environment:								
	Weather	3.33	–	1	–	–	–	–	**1**
	Growth	3.33	–	–	–	–	1	–	**1**
	Water	6.67	–	1	1	–	–	–	**2**
	Air	3.33	–	–	–	–	–	1	**1**
2.	Science Education:								
	Theories of Learning	6.67	–	–	1	–	–	1	**2**
	History and Philosophy of Integrated Science	10.00	3	–	–	–	–	–	**3**
3.	Man and Energy:								
	Force/Work	10.00	1	–	2	–	–	–	**3**
	Energy	13.33	2	–	–	–	1	1	**4**
4.	Workshop Practice:								
	Circuit Connection	3.33	–	–	–	–	1	–	**1**
	Indicators-PH range	3.33	–	–	–	–	–	1	**1**
	Microscope	3.33	–	1	–	–	–	–	**1**
5.	Scientific Methods:								
	Measurement	13.33	3	–	–	1	–	–	**4**
	Observation	6.67	–	1	–	1	–	–	**2**
	Classification	13.33	–	–	–	4	–	–	**4**
	Total	**100**	**9**	**4**	**4**	**6**	**3**	**4**	**30**

Source: Adapted from Obeka (2012)

Key: Kn. = Knowledge, Com. = Comprehension, App. = Application, An. = Analysis, Syn. = Synthesis and Ev. = Evaluation.

The items specifications for the Integrated Science Academic Performance Test (ISAPT) based on content areas is presented in Table 3.4

Table 3.4: Items Specifications Based on Content Areas

S/N	Topics	Number of Items	Total
1.	Component of the Environment:		
	Weather	15	**1**
	Growth	16	**1**
	Water	20, 21	**2**
	Air	29	**1**
2.	Science Education:		
	Theories of Learning	10, 19	**2**
	History and Philosophy of Integrated Science	9, 25, 26	**3**
3.	Man and Energy:		
	Force/Work	1, 6, 7	**3**
	Energy	3, 4, 23, 24	**4**
4.	Workshop Practice:		
	Circuit Connection	17	**1**
	Indicators-PH range	5	**1**
	Microscope	11	**1**
5.	Scientific Methods:		
	Measurement	2, 14, 18, 22	**4**
	Observation	13, 28	**2**
	Classification	8, 12, 27, 30	**4**
	Total		**30**

Source: Adapted from Obeka (2012)

3.5.2 Pilot Testing

The four (4) instruments for data collection; Psycho-social Factors Questionnaire (PSSFQ), Eggleston Science Teaching Observation Schedule (ESTOS), Students' Integrated Science Interest Questionnaire (SISIQ), and Integrated Science Academic Performance Test (ISAPT) were pilot tested. The pilot testing was done using NCE II Integrated Science students of Federal College of Education, Katsina, which is not one of the sample Colleges but part of the population. The pilot test is to:

i. Find out the characteristics of ISAPT through item analysis,
ii. Determine the correct length of time required for the respondents to respond to the instruments,
iii. Determine the appropriateness of the wordings of the items of the ISAPT and the questionnaires, as well as the observation schedule (ESTOS).
iv. Find the reliability of the four instruments (PSSFQ, ESTOS, SISIQ and ISAPT).

3.5.2.1 Training of Observers (Research Assistants)

With regard to the Eggleston Science Teaching Observation Schedule (ESTOS), the researcher gave training to two teachers who are science education specialists and experienced teachers, for three weeks. These teachers are to serve as observers (research assistants) after the training, by assisting the researcher in collecting data for this study with respect to the teacher–students' classroom interaction. During the training period, the aspects of the interaction categories for teacher–students verbal interaction to be observed during a lesson period and the format of the Eggleston Science Teaching Observation Schedule (ESTOS) for teacher–students verbal interaction (see appendix D) to be used in noting and recording which of the aspects of the interaction categories might occur in each of the three (3) minutes "time interval"

were presented to the research assistants and discussed by the researcher. The aspects of the interaction categories are:

- Teacher aspect/Teacher talk: – accepts feelings, praises or encourages, accepts or uses ideas of students, asks questions, lectures, answer students' question, give directions, criticizes or justifies authority and corrective feedback.
- Student aspect/student talk: – Student talk–response, student talk–emitted, students' questions and silence or confusion.

For example, answering students' question(s) as part of the teacher aspect in the transaction; the teacher in response to these questions is expected to direct answers to questions regarding content or procedure asked by students. Likewise, asking teacher question(s) is part of the students' aspect in the classroom interaction. In this case, students ask teacher questions concerning content or procedure. Questions may also concern what happened in their area some time ago, that has traditional (superstition) explanation, which the teacher had tried to explain scientifically but still not clear to the students. The details of all the aspects of the interaction categories are shown in appendix C.

The training was done based on what Beaulieu (1979) and Burton (1983) gave as categorization of teacher–students interaction; that is, when teacher talk for 80 % and above and students talk for 20 % and below, during a lesson, the interaction is considered as low interaction. When teacher and students talk for 50 % each during a lesson, the interaction is regarded as medium interaction. If teacher talk for 20 % and students talk for 80 % during a lesson, then the interaction is considered as high interaction. The present study employed the categorization of teacher–students interaction in which if the teacher talk is above 50 % and students talk is below 50 %

during a lesson, the interaction is considered as low interaction. When both the teacher and the students talk for 50 % each during a lesson, the interaction is said to be at the medium level. But, if the teacher talk is below 50 % and students talk is above 50 % during a lesson period, the interaction in this case is regarded as high interaction.

The observers were trained on how to use the ESTOS and informed that all the categories are mutually exclusive, but totally inclusive of all verbal interactions occurring in the classroom. Then, the researcher organized a class using some of his colleagues as students under the observation of the research assistants receiving the training. The observers were asked to note, observe and record/code all the aspects of interaction categories that might occur during each of the three minutes "time intervals". The observation was done in one hour duration in accordance with the duration of the lesson; which is the usual lesson duration at the NCE level (see appendix D).

At the end of the training, in order to pilot test the instrument (ESTOS), the researcher and the two trained observers followed a teacher to the class during two different lessons in the College used for pilot testing; and took a record of the lessons by noting when one or more of the aspects of the interaction categories (that is teacher talk/student talk); detailed in appendix C occurred in each of the three minutes "time intervals". The frequency of use of the interaction categories was at the end estimated. The results obtained by the researcher and the two observers were correlated in order to get the reliability of the instrument (ESTOS).

3.5.3 Reliability of the Instruments

Reliability stands for the degree to which a test is consistent in measuring the qualities it is designed to measure. The reliability coefficient for a research instrument is usually

determined after the instrument has been pilot tested. Thus, after pilot testing all the four instruments for the present study, the reliability of each was determined. Different methods and statistics considered appropriate for reliability determination for each of the instruments were employed to achieve this.

3.5.3.1 Reliability of the Instrument (PSSFQ)

From the pilot test results, the Cronbach's alpha reliability coefficient value for this instrument was determined to be 0.80 using split half method and by the application of the Statistical Product for Service Solution (SPSS); previously known as the Statistical Package for Social Sciences. Thus with this coefficient, the instrument is found to be reliable for data collection on psycho-social factors in this study. This is in line with the view of the Institute for Digital Research and Education [IDRE] (2016) which stated that the coefficient of 0.70 or higher is considered acceptable in most social science research institutions.

3.5.3.2 Reliability of the Instrument (ESTOS)

The reliability coefficient for the Eggleston Science Teaching Observation Schedule (ESTOS) was re-determined from the pilot test result. That is, the results of the two different observations obtained by the researcher and the two observers were correlated. Using Pearson Product-Moment Correlation Coefficient (PPMCC) statistic; and by the application of SPSS, the coefficient value of 0.87 is obtained. Going by the IDRE (2016) view about the acceptable reliability coefficient, it can be said that the instrument is also reliable. Thus, it can be used to generate data on teacher-students verbal interaction for the present study.

3.5.3.3 Reliability of the Instrument (SISIQ)

Using split half method, the reliability coefficient value for this instrument was re-determined from the pilot test results. Using SPSS, the Cronbach's alpha reliability was employed to get the value of 0.81. This coefficient indicates that the instrument is reliable and can be used to collect data on students' interest for this study.

3.5.3.4 Reliability of the Instrument (ISAPT)

Based on the pilot test result, the reliability value of 0.74 was determined for this instrument using test-retest method. That is, the scores of the first test were correlated with the scores of the second test using Pearson Product-Moment Correlation Coefficient (PPMCC) statistic; by the application of SPSS.

On the basis of test-retest format of reliability determination for this instrument, an interval of two weeks was given between the first administration of the test and the second. This is in line with Tuckman (1975) and Sambo (2008) who recommended that a minimum interval of a week is advisable to be given before the administration of the second test so as to avoid influence of familiarity of the research instrument.

3.5.4 Item Analysis

Item analysis for Integrated Science Academic Performance Test (ISAPT) was carried out from the pilot test scores to determine the items' difficulty or facility index and discrimination index. According to Sambo (2008) the purpose of item analysis is to enable the test constructor to distinguish between good and poor items. A good item is one for which the difficulty index falls between 40 % and 60 % and for which the discrimination index exceeds 0.40. Two indixes are calculated under item analysis. They are difficulty or facility index and discrimination index.

3.5.4.1 Facility or difficulty index

Item facility index sometimes referred to as item easiness or item difficulty, is a measure of percentage of the number of students who got the item right out of the total number of students who attempted the item (Obeka, 2011). According to Ibrahim and Zakariyya (2015), difficulty index is the percentage of students who responded correctly to a particular test item. It is at times called easiness percentage. Sambo (2008) pointed out that items with difficulty index between 40 % and 60 % are accepted. Ibrahim and Zakariyya (2015) opined that indixes ranging from 30 % to 70 % are considered good. According to Ibrahim and Zakariyya (2015) item with difficulty index above 80 % is too easy while that below 20 % is too difficult. In this study, the items with difficulty index between 20 % and 80 % were accepted. Items with difficulty index below 20 % were either modified or changed for being too difficult, while those with difficulty index above 80 % were modified or changed for being too easy. In the Integrated Science Academic Performance Test (ISAPT) the difficulty index ranged from 0 % to 95.0 %. However, the difficulty index that falls between the range 20 % and 80 % is retained. For each test item, the difficulty index (Df) is calculated by

$$\mathrm{Df} = \frac{\mathrm{GU} + \mathrm{GL}}{\mathrm{N}} \mathrm{X}100$$

Where GU = number of students in the upper group who responded correctly to the test item;

GL = number of students in the lower group who responded correctly to the test item;

Df = Item difficulty index

N = number of respondents in each of the upper and lower groups.

The pilot test result in respect of the difficulty index of the ISAPT is presented in appendix I.

3.5.4.2 Discrimination Index

For each test item, the discrimination index (Ds) is calculated by

$$\mathrm{Ds} = \frac{\mathrm{GU} - \mathrm{GL}}{\mathrm{N}/2}\mathrm{X}100$$

Where GU = number of students in the upper group who responded correctly to a test item;

GL = number of students in the lower group who responded correctly to a test item;

Ds = Item discrimination index

N = number of respondents in each of the upper and lower groups.

According to Obeka (2011), the discrimination index ranging from 0.30 (30 %) to 0.70 (70 %) are acceptable. Ibrahim and Zakariyya (2015) pointed out that, a good test should have between 0.20 (20 %) to 0.50 (50 %) discrimination indexes. In this study, the Integrated Science Academic Performance Test (ISAPT) has discrimination index ranging from 15 % to 55 %. However, the discrimination index that falls between the ranges of 20 % to 50 % is retained. For more detail, see appendix I.

3.6 Administration of the Instruments

All the four instruments were administered to collect data for the study. Three out of them; Psycho-social Factors Questionnaire (PSSFQ), Students Integrated Science Interest Questionnaire (SISIQ) and Integrated Science Academic Performance Test (ISAPT) were administered together at the same time to the study subjects for answering. The students were given one and half hours (1:30 hrs.) within which to

respond to the items in the instruments. The fourth instrument, Eggleston Science Teaching Observation Schedule (ESTOS) was administered differently by the researcher with the help of two other observers (research assistants) so as to collect data regarding teacher–student's interaction in the classroom. In which case, the researcher together with the two observers followed five lecturers to the class; one after the other in each of the sample Colleges in order to observe and took a record of lessons by noting when one or more of the aspects of the interaction categories (that is teacher talk/student talk) detailed in appendix C occurred in each of the three minutes "time intervals". This observation covered one hour (1:00 hour) duration; which is the usual lesson duration at NCE level (see appendix D).

3.7 Data Collection Procedure

At the end of the administration of the instruments, all the attempted or answered instruments (PSSFQ, SISIQ and ISAPT) were collected and marked based on the marking scheme demand as for ISAPT. As regards to the fourth instrument, the ESTOS, the research assistants assisted the researcher in collecting data regarding teacher-students interaction. To achieve this, the researcher and the two research assistants followed five lecturers to the class in each of the sample Colleges and took a record of lessons by noting when one or more of the aspects of the interaction categories (that is teacher talk/student talk) occurred in each of the three minutes "time intervals". The frequency of use of the interaction categories was at the end estimated by using the relationship:

$$\frac{\text{Number of time intervals in which observation occur}}{\text{Total number of time interval observed}} \times \frac{100}{1}$$

The scores obtained from the four instruments were then subjected to analysis.

3.8 Procedure for Data Analysis

The data collected are subjected to analyses at two different levels; via descriptive and inferential levels. At the descriptive level, the data collected were analysed using descriptive statistics in form of mean and standard deviation for the purpose of answering the research questions, while at the inferential level, Multiple Regression Analyses were used to test the null hypotheses (H_O) at $P \leq 0.05$ level of significance (i.e. alpha (α) level). The inferential statistics level forms the basis for decision making on whether to reject or retain the stated null hypotheses after being tested.

The null hypotheses (H_O) are re-stated as follows and each is followed by the statistic used to test it:

H_{O1}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' academic performance in Integrated Science in Colleges of Education. Multiple Regression Analyses was used to test the hypothesis.

H_{O2}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science in Colleges of Education. The hypothesis was tested using Multiple Regression Analyses.

H_{O3}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science in Colleges of Education. This hypothesis was tested using Multiple Regression Analyses.

H_{O4}: There is no significant relationship between the levels of teacher-students interaction (low, medium and high) and students' academic performance in Integrated

Science in Colleges of Education. Multiple Regression Analyses was used to test the hypothesis.

H_{O5}: There is no significant relationship between the levels of teacher-students interaction and students' interest in Integrated Science in Colleges of Education. The hypothesis was tested using Multiple Regression Analyses.

H_{O6} There is no significant relationship between the levels of teacher-students interaction and academic performance of male and female students in Integrated Science in Colleges of Education. Multiple Regression Analyses was used to test the hypothesis.

H_{O7}: There is no significant relationship between Colleges of Education students' interest in Integrated Science and their academic performance in the subject. Simple Linear Regression Analysis was used in testing this hypothesis.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, the data analysis and discussion of results in relation to the research questions stated and hypothesis formulated were discussed. The research questions were answered with the use of correlation analysis to determine the extent of relationships of independent variables with the dependent variables. Regression analyses were used to test the null hypotheses of the study with the significance level fixed at 0.05.

4.2 Data Analysis and Results Presentation

The data collected for the purpose of this study were analyzed based on the research questions stated and hypotheses formulated.

Research Question 1: Which of the psycho-social factors positively predict students' academic performance in Integrated Science in Colleges of Education?

The data collected for the purpose of answering the research question one were analyzed using correlation analysis to determine the extent of relationships of psycho-social factors with students' academic performance in Integrated Science. The result of the analysis is presented in Table 4.1a.

Table 4.1a: Pearson Correlation Analysis of Psycho-social Factors (parental involvement, peer group influence and academic self-efficacy) and Students' Academic Performance in Integrated Science

Variable		N	$\overline{X}$	SD	r	Remark
Acad. Perf.	Parental Involvement	317	26.65	3.57	0.11	Weak Posit. Relationship
	Peer Group Influence	317	26.99	4.01	-0.13	Weak Neg. Relationship
	Academic Self-efficacy	317	23.98	3.12	0.09	Weak Posit. Relationship

Key: Acad. = Academic, Perf. = Performance, Posit. = Positive, and Neg. = Negative

Table 4.1a shows Pearson correlation analysis of the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' academic performance. The result shows that there is weak relationship between each of the observed variables: parental involvement, peer group influence and academic self-efficacy and predicted variable: students' academic performance. The correlation coefficient (r) is interpreted based on the criterion for evaluating the magnitude of a correlation as given by Akuezuilo and Agu (2002); who stated that, the coefficient (r) ranging from 0.00 – 0.39 indicates Weak relationship, 0.40 – 0.59 indicates moderate relationship and 0.60 – 1.00 indicates strong relationship. Thus, the coefficients obtained on parental involvement and academic self-efficacy are r = 0.11and 0.09 respectively; which show weak but positive correlation with academic performance. The coefficient got on peer group influence is r = –0.13. This indicates weak but negative correlation with students' academic performance. This signifies that students' academic performance was positively related to parental involvement and academic self-efficacy and negatively related with peer group influence.

To test whether the relationships obtained between the dependent and independent variables are significant, null hypothesis one (H_{O1}) is used; which states as follows:

$H_{O1:}$ There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' academic performance in Integrated Science in Colleges of Education.

This hypothesis was tested using multiple regression analysis at $P \leq 0.05$ level of significance. The test model revealed a coefficient of determination of the variation in students' academic performance (R^2) of 0.046; which implies that the selected psycho-social factors could only account for 4.6 percent of the variation in students' academic performance. The result of the regression is presented in Table 4.1b.

Table 4.1b: Multiple Regression Analysis between Psycho-social Factors and Academic Performance

		Unstandardized Coefficients		Standardized Coefficients		
Acad. Perform.	Model	B	Std. Err.	Beta	p-value	Remark
	1 (Constant)	24.42	4.67		0.001	
	Parental Involv.	2.00	0.92	0.13	0.029	*Sig.
Acad. Perform.	Peer Group Infl.	-2.78	0.89	-0.17	0.002	*Sig.
	Academic Self-Eff.	1.31	1.03	0.07	0.204	Not Sig.

*Sig. at $P \leq 0.05$

Key: Acad. = Academic, Perform. = Performance, Infl. = Influence, Involv. = Involvement, and Self-Eff. = Efficacy

Table 4.1b indicates the result of the multiple regression analysis of psycho-social factors and students' academic performance. The result of the analysis shows that

parental involvement with P–value of 0.029 and peer group influence with P–value of 0.002; which are less than the 0.05 level of significance; significantly predict students' academic performance in Integrated Science. Thus, the null hypothesis which states that there is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' academic performance in Integrated Science in Colleges of Education is therefore rejected. However**,** academic self-efficacy with P–value of 0.204 which is greater than 0.05 level of significance; did not significantly predict students' academic performance in Integrated Science. Hence, the hypothesis is retained.

Research Question 2: Which of the psycho-social factors positively predict students' interest in Integrated Science in Colleges of Education?

The data collected for the purpose of answering research question two were analyzed using correlation analysis to determine the extent of relationships of psycho-social factors and students' interest in Integrated Science. The result of the analysis is shown in Table 4.2a.

Table 4.2a: Spearman Rank Correlation Analysis of Psycho-social Factors and Students' Interest in Integrated Science

Variable		N	$\overline{X}$	SD	r	Remark
Interest	Parental Involvement	317	26.65	3.57	0.07	Weak Posit. Relationship
	Peer Group Influence	317	26.99	4.01	0.02	Weak Posit. Relationship
	Academic Self-efficacy	317	23.98	3.12	0.23	Weak Posit. Relationship

Key: Posit. = Positive

Table 4.2a shows Spearman Rank Correlation analysis of psycho-social factors and students' interest in Integrated Science. The result from the Table indicates that there is weak relationship between each of the psycho-social factors observed: parental involvement, peer group influence and academic self-efficacy and students' interest. The coefficients obtained on parental involvement, peer group influence and academic self-efficacy are r = 0.07, 0.02 and 0.23 respectively. It implied that all the observed variables have weak but positive relationship with students' interest in Integrated Science.

To test whether the relationship between the psycho-social factors and students' interest is significant, the null hypothesis two is used.

H_{O2}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science in Colleges of Education.

This hypothesis was tested using multiple regression analysis at $P \leq 0.05$ level of significance. The R^2 value revealed by the test model is 0.054, and this suggests that the selected psycho-social factors accounted for 5.4 percent of the variation in students' interest. The result of the analysis is presented in Table 4.2b

Table 4.2b: Multiple Regression Analysis of Psycho-social Factors and Students' Interest in Integrated Science

		Unstandardized Coefficients		Standardized Coefficients		
Interest	Model	B	Std. Error	Beta	p-value	Remark
	1 (Constant)	2.98	0.22		0.001	
	Parental Involvement	-0.00	0.04	-0.00	0.923	Not Sig.
Interest	Peer Group Influence	-0.00	0.04	-0.01	0.840	Not Sig.
	Academic Self-efficacy	0.18	0.05	0.23	0.001	*Sig.

*Sig. at $P \leq 0.05$

Table 4.2b shows the regression analysis of psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science. The result from the table indicates that parental involvement and peer group influence with the P–values of 0.923 and 0.840 respectively, which are greater than 0.05 level of significance, did not significantly predict students' interest in Integrated Science. Thus, the null hypothesis which states that there is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science in Colleges of Education is retained. However, academic self-efficacy with P–value of 0.001 which is less than 0.05 level of significance, significantly predicts students' interest in Integrated Science., Hence, the null hypothesis is rejected

Research Question 3: Which of the psycho-social factors serve as predictor(s) of academic performance of male and female students in Integrated Science in Colleges of Education?

The data collected so as to answer the research question three were analyzed using correlation analysis of the dependent variable (gender performance) and independent variables (psycho-social factors – parental involvement, peer group influence and academic self-efficacy) to determine the extent of the relationships of psycho-social factors and gender performance. The result of the analysis is shown in Table 4.3a

Table 4.3a: Pearson Correlation Analysis of Psycho-social Factors and Academic Performance of Male and Female Students in Integrated Science

Variable		N	$\overline{X}$	SD	r	Remarks
Males' Performance	Parental Involvement	259	26.58	3.54	0.02	Weak Positive Relationship
	Peer Group Influence	259	27.12	3.96	-0.14	Weak Negative Relationship
	Academic Self-efficacy	259	24.01	3.06	0.19	Weak Positive Relationship
Females' Performance	Parental Involvement	58	26.95	3.74	0.00	Weak Positive Relationship
	Peer Group Influence	58	26.41	4.21	-0.24	Weak Negative Relationship
	Academic Self-efficacy	58	23.83	3.40	0.16	Weak Positive Relationship

Table 4.3a shows Pearson correlation analysis of psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science. The result from the table reveals that there is weak but positive relationship between two of the three psycho-social factors observed (i.e. parental involvement and academic self-efficacy) and academic performance of both male and female students. The result also indicates that there is an inverse but weak relationship between the performance of male and female students and peer group influence; the other psycho-social factor observed. The coefficients obtained on parental involvement, peer group influence and academic self-efficacy for male students are r = 0.02, -0.14 and 0.19 respectively. On the other hand, the coefficients obtained on the same psycho-social factors for female students are r = 0.001, -0.24 and 0.16 respectively.

To test for significance of the relationship between the observed psycho-social factors and the academic performance of male and female students, the null hypothesis three (H_{O3}) is used.

H_{O3}: There is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science in Colleges of Education.

This hypothesis was tested using multiple regression analysis at $P \leq 0.05$ level of significance. The R^2 of 0.039 was revealed by the test model; which implies that 3.9 percent of the variation in males' academic performance is accounted for by the selected psycho-social factors. For female students, the test model revealed R^2 value of 0.104; which suggests that the selected psycho-social factors could only account for 10.4

percent of the variation in female students' academic performance. The result of the analysis is shown in Table 4.3b.

Table 4.3b: Results of the Multiple Regression Analysis of Psycho-social Factors and Academic Performance of Male and Female Students in Integrated Science

		Unstandardized Coefficients		Standardized Coefficients		
Gender Performance	Model	B	Std. Error	Beta	P-value	Remark
	(Constant)	24.05	5.02		0.001	
	Parental Involvement	1.69	1.03	0.11	0.100	Not Sig.
Males' Performance	Peer Group Influence	-2.60	1.04	-0.16	0.012	*Sig.
	Academic Self-efficacy	1.60	1.17	0.09	0.170	Not Sig
	(Constant)	21.52	13.73		0.123	
	Parental Involvement	3.70	2.23	0.21	0.103	Not Sig.
Females' Performance	Peer Group Influence	-3.21	1.83	-0.22	0.084	Not Sig.
	Academic Self-efficacy	0.46	2.28	0.02	0.838	Not Sig.

*Sig. at $P \leq 0.05$

The results from Table 4.3b illustrate the multiple regression analyses between Psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science. The result from the Table indicates that parental involvement and academic self-efficacy with P-values of 0.100 and 0.170 respectively, which are greater than 0.05 level of significance, did not significantly predict male students' academic performance in Integrated Science. Thus the hypothesis which states that there is no significant relationship between the psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and academic performance of male and female students in Integrated Science in Colleges of Education is retained. However, peer group influence with P–value of 0.012, which is less than 0.05 level of significance, significantly predicts male students' academic performance in Integrated Science. Hence, the hypothesis is rejected. Meanwhile, with reference to female students, all the observed psycho-social factors (parental involvement, peer group influence and academic self-efficacy) with their P-values of 0.103, 0.084 and 0.838 respectively, which are greater than 0.05 level of significance; did not significantly predict their academic performance. Hence, the hypothesis is retained.

Research Question 4: What levels of teacher-students interaction contribute to the prediction of students' academic performance in Integrated Science in Colleges of Education?

The data collected for the purpose of answering research question four were analyzed using correlation analysis to determine the extent of the relationships of teacher-students interaction (low, medium and high) with students' academic performance. The result of the analysis is presented in Table 4.4a.

Table 4.4a: Pearson Correlation Analysis of the Levels of Teacher-students Interaction (low, medium and high) and Students' Academic Performance

Variable		N	$\overline{X}$	SD	r	Remark
Acad. Perf.	Low Teacher-students Interaction	18	37.50	5.49	-0.21	Weak Negative Relationship
	Medium Teacher-students Interaction	13	51.46	1.45	0.23	Weak Positive Relationship
	High Teacher-students Interaction	14	62.14	4.68	0.72	Strong Positive Relationship

Key: Acad. = Academic, Perf. = Performance,

Table 4.4a shows the correlation analysis between the levels of teacher-students interaction (low, medium and high) and students' academic performance in Integrated Science. The result from the table indicates that the coefficient got on low level of teacher-students interaction is r = -0.21, and this signifies weak but negative relationship with students' academic performance. The coefficient obtained on medium level of teacher-students interaction is r = 0.23, and this indicates a weak but positive relationship with students' academic performance. Also, the coefficient obtained on high level of teacher-students interaction is 0.72, and this is an indication of a strong but positive relationship with students' academic performance**.** Hence, the result signifies that students' academic performance is positively related to medium and high levels of teacher-students interaction, and negatively related to the low level of teacher-students interaction.

To test for significance of the relationships, the null hypothesis four (H_{O4}) was used.

H_{O4}: There is no significant relationship between the levels of teacher-students interaction (low, medium and high) and students' academic performance in Integrated Science in Colleges of Education.

Multiple regression analysis was used to test the hypothesis at $P \leq 0.05$ level of significance. The test model revealed a coefficient of determination of the variation in students' academic performance (R^2) of 0.576; which implies that the levels of teacher-students interaction accounted for 57.6 percent of the variation in students' academic performance. The result of the regression analysis is presented in Table 4.4b.

Table 4.4b: Multiple Regression Analysis for the Levels of Teacher-students Interaction and Students' Academic Performance in Integrated Science

		Unstandardized Coefficients		Standardized Coefficients		
Acad. Perform.	Model	B	Std. Err.	Beta	P-value	Remark
	1 (Constant)	-8.94	43.55		0.842	
	Low Teacher-students Interaction	-0.25	0.25	-0.23	0.323	Not Sig.
Acad. Perform.	Medium Teacher-students Interaction	-0.11	0.85	-0.03	0.891	Not Sig.
	High Teacher-students Interaction	0.85	0.29	0.69	0.016	*Sig.

*Sig. at $P \leq 0.05$

Key: Acad. =Academic, Perform. = Performance

Table 4.4b indicates that low and medium levels of teacher-students interaction with P–values of 0.323 and 0.891 respectively, which are greater than 0.05 level of significance; did not significantly predict students' academic performance in Integrated

Science. Thus the hypothesis which states that there is no significant relationship between the levels of teacher-students interaction (low, medium and high) and students' academic performance in Integrated Science in Colleges of Education is retained. However, based on the fact that high level of teacher-students interaction with P–value of 0.016, which is less than 0.05 level of significance; significantly predicts students' academic performance in Integrated Science. Thus, the hypothesis is rejected.

Research Question 5: How do the levels of teacher-students interaction positively predict students' interest in Integrated Science in Colleges of Education?

The data collected for the purpose of answering research question five were analyzed using correlation analysis to determine the extent of the relationships between the levels of teacher-students interaction (low, medium and high) and students' interest in Integrated Science. The result of the analysis is presented in Table 4.5a.

Table 4.5a: Spearman Rank Correlation Analysis of the Levels of Teacher-students Interaction (low, medium and high) and Students' Interest

Variable		N	$\overline{X}$	SD	r	Remark
	Low Teacher-students Interaction	18	37.50	5.49	-0.22	Weak Negative Relationship
' Interest	Medium Teacher-students Interaction	13	51.46	1.45	-0.46	Moderate Negative Relationship
	High Teacher-students Interaction	14	62.14	4.68	0.10	Weak Positive Relationship

Table 4.5a shows the correlation analysis between the levels of teacher-students interaction (low, medium and high) and students' interest in Integrated Science. The

result from the table indicates that there is relationship between all the levels of teacher-students interaction and students' interest. The coefficients obtained on the low and medium levels of teacher-students interaction are r = –0.22 and –0.46 respectively; and these indicate weak but negative relationship and moderate but negative relationship respectively**.** Meanwhile, the coefficient got on high level of teacher-students interaction is r = 0.10; and this indicates weak but positive relationship. Thus**,** the result reveals that low and medium levels of teacher-students interaction are negatively related with students' interest, while high level of teacher-students interaction is positively related with students' interest in Integrated Science.

To test whether the relationships are significant, the null hypothesis five (H_{O5}) was used.

H_{O5}: There is no significant relationship between the levels of teacher-students interaction and students' interest in Integrated Science in Colleges of Education.

Multiple regression analysis was used to test the hypothesis at 0.05 level of significance. The R^2 value of 0.286 is revealed by the test model; and this implies that 28.6 percent of the variation in students' interest in Integrated Science is accounted for by the levels of teacher-students interaction. The result of the analysis is presented in Table 4.5b.

Table 4.5b: Multiple Regression Analysis of the Levels of Teacher-students Interaction (low, medium and high) and Students' Interest in Integrated Science

		Unstandardized Coefficients		Standardized Coefficients		
Interest	Model	B	Std. Err.	Beta	P-value	Remark
	1 (Constant)	246.49	96.38		0.031	
	Low Teacher-students Interaction	-0.26	0.55	-0.13	0.645	Not Sig.
Interest	Medium Teacher-students Interaction	-3.47	1.87	-0.56	0.096	Not Sig.
	High Teacher-students Interaction	-0.26	0.64	-0.12	0.692	Not Sig.

*Sig. at $P \leq 0.05$

Table 4.5b shows the multiple regression analysis between the levels of teacher-students interaction and students' interest in Integrated Science. The result from the table reveals that the P–values for all the three levels of teacher-students interaction: low, medium and high are 0.645, 0.096 and 0.692 respectively; which are greater than 0.05 level of significance. Thus, it signifies that none of the levels of teacher-students interaction significantly predicts students' interest in Integrated Science. Hence, the null hypothesis which states that there is no significant relationship between the levels of teacher-students interaction and students' interest in Integrated Science in Colleges of Education is retained.

Research Question 6: Which of the levels of teacher-students interaction serve as predictor(s) to academic performance of male and female students in Integrated Science in Colleges of Education?

For the purpose of answering this research question, the data collected were also analyzed using correlation analysis so as to determine the extent of the relationships of the levels of teacher-students interaction and gender performance in Integrated Science.

The result of the correlation is presented in Table 4.6a

Table 4.6a: Pearson Correlation Analysis of the Levels of Teacher-students Interaction (low, medium and high) and Academic Performance of Male and Female Students in Integrated Science

Variable		N	$\overline{X}$	SD	r	Remarks
Males' Performance	Low Teacher-students Interaction	18	37.50	5.49	-0.21	Weak Negative Relationship
	Medium Teacher-students Interaction	13	51.4	1.45	0.23	Weak Positive Relationship
	High Teacher-students Interaction	14	62.14	4.68	0.72	Strong Positive Relationship
Females' Performance	Low Teacher-students Interaction	18	37.50	5.49	0.03	Weak Positive Relationship
	Medium Teacher-students Interaction	13	51.46	1.45	-0.02	Weak Negative Relationship
	High Teacher-students Interaction	14	62.14	4.68	-0.39	Weak Negative Relationship

Table 4.6a illustrates the Pearson correlation analysis between the levels of teacher-students interaction and academic performance of male and female students in Integrated Science. The result from the table shows that there is relationship between academic performance of male and female students and the levels of teacher-students interaction: low, medium and high. The coefficients obtained on low, medium and high levels of teacher-students interaction for male students are r = -0.21, 0.23 and 0.72 respectively; and these indicate weak but negative relationship, weak but positive relationship and a strong but positive relationship respectively with male students' academic performance. For female students, the coefficients got on low, medium and high levels of teacher-students interaction are r = 0.03, -0.02 and -0.39 respectively. It implies that low level of teacher-student interaction has weak but positive relationship with female students' academic performance, while medium and high levels of teacher-students interaction show weak but negative relationship with the academic performance of female students. The overall result reveals that, low level of teacher-students interaction is negatively related with males' performance and positively related with female students' performance. Medium level of teacher-students interaction is related positively with males' performance and negatively related with female students' performance. However, high level of teacher-students interaction is positively related with male's performance and negatively related with female students' performance.

To test for significance of the relationships between the levels of teacher-students interaction gender performance, null hypothesis six (H_{O6}) was used.

H_{O6}: The hypothesis states that there is no significant relationship between the levels of teacher-students interaction and academic performance of male and female students in Integrated Science in Colleges of Education.

In view of this, multiple regression analysis was run to test the hypothesis at 0.05 level of significance. The coefficient of determination of the variation in male students' academic performance (R^2) is 0.576; which suggests that the levels of teacher-students interaction could only account for 57.6 percent of the variation in male students' academic performance. For female students, the R^2 value is 0.291; which implies that the levels of teacher-students interaction could only account for 29.1 percent of the variation in female students' academic performance. The result of the regression is shown in Table 4.6b.

Table 4.6b: Multiple Regression Analysis of the Levels of Teacher-students Interaction and Academic Performance of Male and Female Students in Integrated Science

		Unstandardized Coefficients		Standardized Coefficients		
Gender Performance	Model	B	Std. Error	Beta	P-value	Remark
	(Constant)	-8.94	43.55		0.842	
	Low Teacher-students Interaction	-0.25	0.25	-0.23	0.323	Not Sig.
Males' Performance	Medium Teacher-students Interaction	-0.11	0.85	-0.03	0.891	Not Sig.
	High Teacher-students Interaction	0.85	0.29	0.69	0.016	*Sig.
	(Constant)	43.72	107.98		0.695	
	Low Teacher-students Interaction	0.07	0.61	0.03	0.906	Not Sig.
Females' Performance	Medium Teacher-students Interaction	1.25	2.09	0.18	0.564	Not Sig.
	High Teacher-students Interaction	-1.34	0.72	-0.56	0.093	Not Sig.

*Sig. at $P \leq 0.05$

Table 4.6b shows multiple regression analysis between the levels of teacher-students interaction and academic performance of male and female students in Integrated Science. The result from the Table indicates that low and medium levels of teacher-students interaction with their P-values of 0.323 and 0.891 respectively, which are greater than 0.05 level of significance, did not significantly predict male students' academic performance in Integrated Science. Thus the hypothesis which states that there is no significant relationship between the levels of teacher-students interaction (low, medium and high) and academic performance of male and female students in Integrated Science in Colleges of Education is retained. However, high level of teacher-students interaction indicates with P–value of 0.016, which is less than 0.05 level of significance; significantly predicts male students' academic performance in Integrated Science. Hence, the hypothesis is rejected. Meanwhile, with reference to female students, all the levels of teacher-students interaction (low, medium and high) with their P-values of 0,906, 0.564 and 0.093 respectively, which are greater than 0.05 level of significance; did not significantly predict their academic performance. Hence, the hypothesis is retained.

Research Question 7: How does students' interest in Integrated Science positively predict their academic performance in the subject?

The data collected for the purpose of answering the research question seven were analyzed using correlation analysis to determine the extent of the relationship between students' interest and their academic performance in Integrated Science. The result of the analysis is presented in Table 4.7a

Table 4.7a: Spearman Rank Correlation Analysis of Students' Interest and their Academic Performance in Integrated Science.

Variable	N	$\overline{X}$	SD	r	Remark
Students' Interest	317	77.03	9.39		
				0.11	Weak Positive Relationship
Academic Performance	317	28.15	8.00		

Table 4.7a indicates Spearman correlation between students' interest and their academic performance in Integrated Science. The result of the analysis shows that there is weak but positive relationship between students' interest and their academic performance in Integrated Science. This is indicated by the coefficient obtained on interest which is r = 0.11.

To test whether the relationship was significant, null hypothesis seven (H_{O7}) is used.

H_{O7}: The hypothesis states that there is no significant relationship between Colleges of Education students' interest in Integrated Science and their academic performance in the subject.

This hypothesis was tested using Simple linear regression analysis at 0.05 level of significance. The R^2 value of 0.013 is revealed by the test model; and this implies that students' interest in Integrated Science could only account for 1.3 percent of the variation in their academic performance in the subject. The result of the analysis is presented in Table 4.7b.

Table 4.7b: Linear Regression Analysis of Students' Interest and their Academic Performance in Integrated Science

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	P-value	Remark
1 (Constant)	20.67	3.70		0.001	
Students' Interest	0.09	0.05	0.11	0.043	*Sig.

Dependent Variable: Students' Academic Performance

*Sig. at P $\leq$ 0.05

Table 4.7b illustrates the result of simple linear regression analysis of students' interest and their academic performance in Integrated Science. The evidence from the result as shown in the table indicates that students' interest in Integrated Science significantly predicts their academic performance in the subject. This is confirmed by the P–value of 0.043; which is less than 0.05 level of significance. Hence, the null hypothesis which states that there is no significant relationship between Colleges of Education students' interest in Integrated Science and their academic performance in the subject is rejected.

4.3 Summary of Major Findings

Based on the results of the analyses of the data collected for this research work, the major findings are the followings:

1). There was a significant positive relationship between parental involvement and students' academic performance in Integrated Science. There was also a significant but inverse relationship between peer group influence and students' academic performance in Integrated Science. Thus, parental involvement and peer group influence with all their P-values less than 0.05 level of significance; significantly predict students'

academic performance in Integrated Science. But, peer group influence with P-value of 0.002 had a stronger predictive power than parental involvement with P-value of 0.029. However, there was no significant relationship between academic self-efficacy and students' academic performance in Integrated Science. Hence, academic self-efficacy was not a predictor to students' academic performance in Integrated Science.

2). Parental involvement and peer group influence were not significant predictors to students' interest in Integrated Science. Thus, there was no significant relationship between students' interest in Integrated Science and the two psycho-social factors. However, there was a significant relationship between academic self-efficacy and students' interest in Integrated Science. Meaning that, academic self-efficacy was a significant predictor to students' interest in Integrated Science.

3). There was no significant relationship between male students' academic performance in Integrated Science and the psycho-social factors of Parental involvement and academic self-efficacy. Thus, Parental involvement and academic self-efficacy were not significant predictors of the performance of male students in Integrated Science. However, there was a significant but inverse relationship between peer group influence and academic performance of male students in Integrated Science. Meanwhile, there was no significant relationship between female students' academic performance in Integrated Science and all the three psycho-social factors observed (i.e. Parental involvement, peer group influence and academic self-efficacy).

4). Low and medium levels of teacher-students interaction did not significantly predict students' academic performance in Integrated Science. Hence, the relationship between these two levels of teacher-students interaction and students' academic performance in Integrated Science was not significant. However, there was a significant relationship

between the high level of teacher-students interaction and students' academic performance in Integrated Science. Therefore, high level of teacher-students interaction was a significant predictor of students' academic performance in Integrated Science.

5). There was no significant relationship between the levels of teacher-students interaction (low, medium and high) and students' interest in Integrated Science. Thus, low, medium and high levels of teacher-students interaction were not significant predictors to students' interest in Integrated Science.

6). There was no significant relationship between male students' academic performance in Integrated Science and the two levels of teacher-students interaction (low and medium) Thus, these levels of teacher-students interaction were not significant predictors of the performance of male students in Integrated Science. However, there was a significant but positive relationship between high level of teacher-students interaction and academic performance of male students in Integrated Science. Hence, high level of teacher-students interaction was a significant predictor of male students' academic performance in Integrated Science. Meanwhile, there was no significant relationship between female students' academic performance in Integrated Science and all the levels of teacher-students interaction (i. e. low, medium and medium). Thus, all the three levels of teacher-students interaction were not significant predictors of the performance of female students in Integrated Science.

7). Students' interest in Integrated Science was a significant predictor of their academic performance in the subject. Thus, there was a significant relationship between students' academic performance in Integrated Science and their interest in the subject.

4.4 Discussion of the Results

This study investigated psycho-social factors (parental involvement, peer group influence, and academic self-efficacy) and teacher-students interaction (low, medium and high) as predictors of students' interest and their academic performance in Integrated Science in Colleges of Education. The discussion of the result for the present study is presented in relation to the research questions and hypotheses stated for the research. The data collected from the questionnaires, observation schedule and the test administered were analyzed using regression analyses. Multiple and linear regression analyses were used to test whether there were significant contributions of the independent variables to the prediction of the dependent variables. The analyses addressed the research questions stated and the hypotheses formulated.

The results shown in Table 4.1a and Table 4.1b were presented to answer the research question one and to show the result of testing null hypothesis one respectively. Result from Table 4.1a revealed that there were positive relationships between students' academic performance and parental involvement and academic self-efficacy. This means that academic performance increases with increase in parental involvement and academic self-efficacy. In contrast, peer group influence showed an inverse relationship with students' academic performance. This may not be unconnected with the fact that the youth of today are carried away by events in social media (e.g. face book) and pay less attention to academic works. Whereas parents who want their children to excel, will pay much attention and make them develop good study habit.

Table 4.1b showed the result of testing null hypothesis 1. The hypothesis focussed on the relationship between psycho-social factors (parental involvement, peer group influence, and academic self-efficacy) and students' academic performance in Integrated Science. The result of the analysis from Table 4.1b revealed that there was

significant positive relationship between parental involvement and students' academic performance. Meaning that, parental involvement had significant contribution to the prediction of students' academic performance. This could be explained by the fact that parents, through their specific roles either have negative or positive influences on students' academic performance; depending on how they play their roles in the education of their children. Thus, the result is an indication that parents have really played their roles as expected of them. The finding of the study is in line with the earlier findings by Higgins (2011), Milad and Sayid (2011), Nel (2013), Daniela and Daniela (2013) and Twum–Ampofo and Oei–Owusu (2015) among others who in their separate studies reported significant positive correlations between parental involvement and students' academic performance. This means that parents who are fully involved in the education of their children; such that they pay school fees in time and ask after their children's results, e.tc; are likely to have students/children with better results.

In relation to peer group influence, the second psycho-social factor observed, the result from Table 4.1b showed that there was significant inverse relationship between peer group influence and students' academic performance in Integrated Science. Implying that, as peer group influence increases students' academic performance declines. This is not so surprising because, students nowadays showed poor study habit due to increase in time watching television and so on instead of spending more time on their studies and tutorials. However, this depends on the type of peers (good or bad) students interact with. Students who come across or interact with bad peers; such as those who engage in bad habits like drinking, stealing, sneaking and sexual harassment among others are likely to have lower academic performance. The finding confirmed the earlier findings by Bellemare, Lepage, and Shearer (2009) who found that peer groups could decrease the productivity of workers. Tope (2011) and Akhtar (2011) in their separate studies

reported that peer group influence had negative relationship with students' academic performance.

However, the finding is contrary to the findings of Sajjad, et al (2013) and Jain and Kapoor (2013) who found significant positive impact of peer group influence on academic performance. Korir and Kipkemboi (2014) also reported that peer group influence made significant positive contribution to the students' academic performance. Again, Twum-Ampofo and Oei–Owusu (2015) found significant positive correlation between peer group influence and students' academic performance. This might be with peers that have good study habits and come from homes where parents involve themselves fully in the education of their children.

With reference to academic self-efficacy, Table 4.1b explained that there was no significant relationship between academic self-efficacy and students' academic performance. This could be explained that, probably the students might have possessed low sense of academic self-efficacy; for it has been established that academic self-efficacy differs in their impact on students' academic performance; depending on whether the individuals or students in question possessed low or high sense of self-efficacy. Students with a strong or high sense of academic self-efficacy have the capacity to devote their time and effort towards academic accomplishment and quality of functioning; and vice versa. The finding agrees with Aguayo, et al (2011) who also reported that there was no significant relationship between self-efficacy and academic performance for immigrant students. Meanwhile, the finding disagrees with other findings such as Adeyemo and Adetola (2007) who found that academic self-efficacy significantly predicted students' academic performance. Khan (2013) noted a significant positive correlation between academic self-efficacy and students' performance. Also,

Shkullaku (2013), Yazachew (2013) and Gaulao (2014) among others reported a significant relationship between self-efficacy and academic performance.

The analysis of data for the purpose of answering research question 2 as presented in Table 4.2a showed that there were positive relationships between all the observed psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and students' interest in Integrated Science. However, when significance of the relationships was tested as proposed in null hypothesis 2, the result in Table 4.2b demonstrated that there was no significant relationship between parental involvement and students' interest in Integrated Science. This could be as a result of the fact that Integrated Science being an activity-oriented course, perhaps most of the students are not used to operating equipment and independent decisions, reflective thinking, and self-regulatory learning. Or, probably most parents were unable to assist their children or answer science-related questions at home. It was established that students' interest development in science and hard work in science class are related positively to parental involvement at home. This is because, as mentioned somewhere in the literature, the environment at home serves as the first and primary socialization agent and has a great influence on a child's interest in school and career aspirations for the future.

The result of the study somehow corroborates Oyenuga and Lopez (2012) who asserted that many parents may discourage or encourage their children towards a particular subject or career. However, the evidence from the result in Table 4.2b is contrary to the earlier findings by Tucker–Drop (2014) who found significant positive relationship between parental involvement and students' interest. Shumow, Lyutykh and Schmidt (2011) also noted that parental involvement was significantly related positively to students' interest in Science. The result is also in line with Sothy and Whitney (2015)

who reported a significant correlation between parental involvement and students' interest in Science, Technology, Engineering and Mathematics (STEM) education.

The result in Table 4.2b also indicates that there was no significant relationship between peer group influence and students' interest in Integrated Science. This could be because, most students at the College of Education level are matured and self-regulated learners who would not give in to peer pressure. The finding confirms the earlier findings by researchers such as Furrer, et al (n. d) who found that, students who interact or relate more with peers who spend much of their time participating in social activities in place of academic works or activities are more likely to become disinterest in schooling. It implied that the relationship between peer group influence and the interest of such students in schooling was not significant. However, the finding disagrees with McCashin (2009) and Ciani , et al (2010) who in their independent studies pointed out that other people (peers) could significantly promote students' interest by pointing them in the right direction, helping them to overcome obstacles as they pursue where initial interest leads. In this case, it implied that the relationship between peer group influence and students' interest was significant. Pasupathi and Hoyt (2009) and Renninger (2009) also reported significant contribution of peers to developing students' interest particularly in their years between 13 and 19 and early 20s.

On the issue of academic self-efficacy, the result from Table 4.2b revealed that the relationship between academic self-efficacy and students' interest in Integrated Science was significant and positive. This could be an indication that the students might have possessed high sense of self-efficacy which guides an individual's actions and efforts. The finding is in support of other research works such as So (2009) who noted that students' interest is positively correlated to their academic self-efficacy regardless of grade levels. Tella, Tella and Adeniyi (2011) found a significant positive correlation

between students' academic self-efficacy and their interest in schooling. Also, Sha, et al (2015) reported that there was a statistically significant correlation between students' academic self-efficacy and their interest in science. Nevertheless, none of the earlier studies in the literature reviewed related to the relationship between academic self-efficacy and students' interest was found to have contradicted the present finding. Thus, the result in Table 4.2b demonstrated that of all the psycho-social factors observed, only academic self-efficacy contributed significantly to the prediction of students' interest in Integrated Science.

The null hypothesis 3 focused on the relationship between psycho-social factors (parental involvement, peer group influence, and academic self-efficacy) and gender performance in Integrated Science. Based on gender, the result presented in Table 4.3a for answering research question 3 showed that there were positive relationships between male and female students' performance and parental involvement and academic self-efficacy as well. Meanwhile, the result also revealed that an inverse relationship exists between peer group influence and the performance of both male and female students.

The result of the analysis for testing null hypothesis 3 as presented in Table 4.3b indicated that gender wise, there was no statistically significant relationship between parental involvement and the performance of male and female students. In relation to male students' performance, the finding is in line with Akhtar and Aziz (2011) who found that there was no significant relationship between parental involvement and academic performance male students. However, with reference to females' performance, the finding is contrary to Akhtar and Aziz (2011) who also found significant positive relationship between parental involvement and female student performance.

On the issue of peer group influence, the result presented in Table 4.3b demonstrated that peer group influence had a significant inverse relationship with the academic performance of male students. It implied that as peer group influence increased the performance of male students decreased. The result also revealed that the relationship between peer group influence and the performance of female students was not significant. Given that adolescent males spend twice as much time outside with peers compared to parents; and that adolescent females spend twice as much time at home with parents compared to peers, could be reason enough for peer group influence to have a significant or otherwise relationship with students' academic performance. The finding supports in one hand and contradicts in the other hand Akhtar and Aziz (2011) who found significant inverse correlation between peer group influence and female students' performance. The researchers also found that there was no significant correlation between peer group influence and male students' performance.

For academic self-efficacy, the result from Table 4.3b signified that academic self-efficacy had no significant relationship with students' academic performance based on gender. Given that self-efficacy influences individual's productivity, it could be explained that probability the students (both male and female) might have possessed low sense of academic self-efficacy; thus resulting in getting the result as it is. The finding disagrees with earlier research works such as Abd-Elmotaleb and Saha (2013) and Shkullaku (2013) who separately reported significant relationships between self-efficacy and academic performance of the two sexes (male and female). Saunders, et al (2004) found that academic self-efficacy was a strong predictor of girls' academic performance and a weak predictor of males' performance. Meaning that, the relationship between academic self-efficacy and girl's academic performance was

highly significant; and that for male's performance, its relationship with academic self-efficacy was not significant. Thus, the finding supports in one hand and contradicts in the other hand Saunders, et al (2004).

The null hypothesis 4 focused on the relationship between teacher-students interaction (low, medium and high) and students' academic performance. The result of the analysis for answering research question 4 as presented in Table 4.4a indicated that the relationship between the low level of teacher-students interaction and students' academic performance was an inverse one; which implied that as teacher talk or classroom participation increased students' academic performance decreased. Meanwhile, the result from Table 4.4a also revealed that the relationships between the medium and high levels of teacher-students interaction and students' academic performance were positive. Meaning that, as students' talk or classroom participation increased or become higher than that of the teacher, their academic performance also increased. This means the more students' participation in the lesson the better will be their performance.

The outcome of the analysis for testing null hypothesis 4 as presented in Table 4.4b explained the position of each of the levels of teacher-students interaction on students' academic performance. The result showed that there were no significant relationships between the low and medium levels of teacher-students interaction and students' academic performance. The finding supports Ndirika (2009) who found that there was no significant difference in the performance of students taught with low and medium levels of teacher-students verbal interaction. It means that students' academic performance had no significant relationship with either low or medium level of teacher-students interaction.

Meanwhile, the evidence from the result in Table 4.4b revealed that there was a significant positive relationship between high level of teacher-students interaction and students' academic performance. Implying that, high level of teacher-students interaction contributed significantly to the prediction of students' academic performance. This could be as a result of increase in students' interest in the classroom where student-centred approach is adapted by the teachers; thus enabling the students to perform high. The finding of the study corroborates Ndirika (2009) who reported that students who were exposed to high level of teacher-students' verbal interaction performed significantly higher than those exposed to low and medium levels. This indicated a significant correlation between students' academic performance and high level of teacher-students interaction. Thus, the overall result signified that, of all the levels of teacher-students interaction, high level was the only significant predictor of students' academic performance. However, the whole finding supports in one way and contradicts in the other way Fatokun and Omenesa (2015) who in their study found that students taught using teacher-students interaction tend to perform significantly better than those taught using demonstration method.

The analysis of data for answering research question 5 as presented in Table 4.5a showed that the relationships between the low and medium levels of teacher-students interaction and students' interest in Integrated Science were inverse ones. The result from the Table also demonstrated that positive relationship exists between high level of teacher-students interaction and students' interest. However, when the significance of the relationship between the levels of teacher-students interaction and students' interest was tested as suggested in the null hypothesis 5, the result of the analysis presented in Table 4.5b indicated that all the three levels of teacher-students interaction (low,

medium and high) showed no significant relationships with students' interest. It implied that none of the levels had a significant contribution to the prediction of students' interest in Integrated Science. The result of the present study cannot not be compared to any of the previous studies consulted (literature reviewed) because, none of them examined teacher-students interaction based on its levels as correlates of students' interest. However, some looked at the teacher-students interaction in block and its relationship with the students' interest. Others considered teacher-students interaction as being positive and/or negative and investigated their impact on students' interest. For example, McClnerney, et al (2005) found that support from teachers had the strongest impact on students' interest. Spilt, Koomen and Thijs (2011) reported that teacher-student interaction was a major factor affecting students' academic motivation. Onah and Ugwu (2010) noted that interest of students lie within the teacher and students' relationship in a given subject. Hughes and Chen (2011) reported that supportive and positive relationship between teachers and students promote a sense of school belonging and encourage students to participate cooperatively in classroom activities. Larson (2011) found that the existence of positive interactions in the classroom could affect either in a positive or negative way students' willingness to work.

The null hypothesis 6 focused on the relationship between teacher-students interaction (low, medium and high) and students' academic performance based on gender. The results of the analyses for answering research question 6 and for testing the corresponding null hypothesis are presented in Table 4.6a and Table 4.6b respectively. The result from Table 4.6a demonstrated that the relationship between low level of teacher-students interaction and the performance of male students was an inverse one. Meanwhile, the result indicated a positive relationship between the performance of

female students and low level of teacher-students interaction. However, in the case of medium level of teacher-students interaction, the result in Table 4.6a showed entirely a reverse case. That is, positive relationship with the performance of male students and inverse relationship with female students' performance. For high level of teacher-students interaction, the result revealed positive relationship with male students' performance and inverse relationship with the performance of female students.

The result of the analysis for testing the significance of the relationship as proposed in the null hypothesis 6 presented in Table 4.6b showed that there were no significant relationships between low and medium levels of teacher-students interaction and the performance of both male and female students. This could be an indication that, in a situation where teacher-students interaction was low, teachers dominated the classroom talk such that all the students (both sexes) had equal opportunities of participation in the classroom; to the extent that no sex dominated the interactive session of the classroom at the expense of other; which could have resulted to performing high by the dominating sex. Besides, it could also be explained by the fact that teachers might have encouraged and motivated the students regardless of sex, as they guided them for the classroom interaction especially the one in which teachers and students had equal level of participation. The finding is in agreement with Tambaya (2007) who found no significant difference in the academic achievement of male and female students exposed to medium level of teacher-students verbal interaction. The result is also in support of Ndirika (2009) who also noted that there was no significant difference in the mean scores of male and female students exposed to low and medium levels of teacher-students verbal interaction. It signified that there was no significant relationship between male and female students' performance and either low or medium levels of

teacher-students verbal interaction. Thus, low and medium levels of teacher-students interaction could be regarded as gender friendly.

However, with reference to high level of teacher-students interaction, the result presented in Table 4.6b indicated a significant positive relationship with male students' performance, and that there was no significant relationship with performance of female students. This could be explained by the fact that since in this case the students dominated the classroom talk, it could be possible that male students were more interactive than their female counterparts; which could have resulted to making the relationship significant. Besides, this could not be unconnected to the fact that most females naturally shy away from classroom verbal interaction; for they are naturally calm compared to their male counterparts. This result confirmed Ndirika (2009) who found a significant difference in the performance of male and female students taught with high level of teacher-students interaction; with males performing better than females. It implied that there was a significant relationship between high level of teacher-students interaction and the performance of male students.

The concern of null hypothesis 7 is the relationship between students' interest and their academic performance in Integrated Science. The outcomes of the analyses for answering research question 7 and for testing the significance of the relationship as demanded in the corresponding null hypothesis 7 are shown in Table 4.7a and Table 4.7b respectively. The result presented in Table 4.7a showed a positive relationship between students' interest and their academic performance in Integrated Science. It implied that as students' interest in the subject increased their academic performance also increased.

The result of the analysis as presented in Table 4.7b revealed that there was a significant positive relationship between students' interest and their academic performance in Integrated Science. This could be explained by the fact that parents had at home fully involved themselves in the education of their children; thus triggering their interest in science and hard work in science class. Moreover, it could also be as a result of the fact that teachers formed good relationships and personal interaction with students which could have helped in arousing students' interest as well as in having a successful teaching and learning process; which could have resulted to higher performance.

The result of the study is in conformity with Tella, Tella and Adeniyi (2011) who found a significant positive correlation between students' interest in schooling and their academic performance. Peter, Odoh and Ben(2014) noted a significant relationship between students' interest and their academic performance in Chemistry. Essein, Akpan and Obot (2015) found that students' interest in Social Studies significantly relates to their academic performance. Similarly, Olusola, et al (2015) pointed out that students' interest will significantly influence their academic performance in Agricultural Science. Meanwhile, the present finding contradicts among others, Onah and Ugwu (2010) who reported that interest of students in Physics had no significant effect on their academic performance in the subject. Tucker-Drob (2014) found that Science interest and Science performance were not related at all for students from poor country. The researcher also reported that in the context of poor family, school, and national socioeconomic condition, students' interest in Science is unrelated to Science academic performance.

Generally, all the psycho-social factors observed had low relationships with students' general performance, and their performance based on gender, as well as their interest in the subject. This may not be unconnected with the issue of the level of educational

awareness, social, cultural and economic constraints that can affect or limit education and training. Also, all the levels of teacher-students interaction showed low relationships with students' general performance and the performance of female students. However, high level of teacher-students interaction had high relationship with male students' performance. Low and high levels of teacher-students interaction showed lo relationships with students' interest. Meanwhile, medium level showed moderate relationship with interest.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study investigated psycho-social factors and teacher-students interaction as predictors to interest and academic performance in Integrated Science among Colleges of Education students in North-West, Nigeria. The chapter is presented in the following sub-headings:

5.2 Summary of the Study

5.3 Summary of Findings

5.4 Conclusions

5.5 Recommendations

5.6 Contribution to Knowledge

5.7 Limitations of the Study

5.8 Suggestions for Further Studies

5.2 Summary of the Study

The study investigated psycho-social factors and teacher-students interaction as predictors of students' interest and academic performance in Integrated Science in College of education, North-West Zone, Nigeria. The research work is divided into five different chapters:

Chapter one contains the background of the study, theoretical framework, and statement of the problems. The chapter also contains seven objectives, seven research questions and seven corresponding null hypotheses. Significance of the study, basic assumptions and scope of the study were also highlighted in the chapter. Literature related to the study were reviewed under twelve different secondary headings such as psycho-social

factors and students' performance in science, psycho-social teacher-students interaction and students' performance in science, and teacher-students interaction and students' interest in science, among others.

The research design employed for the study is a survey research design. The population of the study comprised of ten co-educational Colleges of Education in zone with a total number of one thousand seven hundred and ninety two (1,792) NCE II Integrated Science students. Three colleges were randomly selected from the population as the sample for the study with their total students of three hundred and seventeen (317). For different instruments were used to collect data for the study. The instruments were validated and then pilot tested and their reliability coefficients were determined. Two research assistants were trained on how to use the Eggleston Science Teaching Observation Schedule (ESTOS) – one of the research instruments. The data collected were analyzed by means of descriptive and inferential statistics.

The data collected were analyzed using correlation and multiple regression analyses to answer the research questions and test the hypotheses respectively. The results obtained are presented in Tables 4.1a – 4.7a and 4.1b – 4.7b for research questions and hypotheses testing respectively. Findings and detailed discussion of the results obtained are also highlighted. In the last chapter, the entire research work was summarized. Conclusion, recommendations, contribution to knowledge, limitation(s) of the study, and suggestions for further study are also highlighted.

5.3 Summary of Findings

The data collected for the purpose of this study were analyzed using Correlation and Regression Analyses. The confidence limit of 0.05 levels was adopted for retaining or

rejecting the hypotheses formulated. The results obtained from testing hypotheses 1 to7 are presented in chapter four. Based on the results obtained, the findings are as follows:

1). There was a significant positive relationship between parental involvement and students' academic performance in Integrated Science. There was also a significant but inverse relationship between peer group influence and students' academic performance. However, there was no significant relationship between academic self-efficacy and students' academic performance.

2). There was no significant relationship between students' interest in Integrated Science and the psycho-social factors of parental involvement and peer group influence. However, there was a significant relationship between students' interest in Integrated Science and academic self-efficacy.

3). There was no significant relationship between the academic performance of male students in Integrated Science and the psycho-social factors of parental involvement and academic self-efficacy. But, there was a significant relationship between peer group influence and the academic performance of male students in Integrated Science. However, there was no significant relationship between all the three psycho-social factors (parental involvement, peer group influence and academic self-efficacy) and the academic performance of female students in Integrated Science.

4). There was no significant relationship between low and medium levels of teacher-students interaction and the students' academic performance in Integrated Science. However, there was a significant relationship between high level of teacher-students interaction and students' academic performance in Integrated Science.

5). There was no significant relationship between all the levels of teacher-students interaction (i. e. low, medium and high) and students' interest in Integrated Science.

6). The relationship between low and medium levels of teacher-students interaction and the academic performance of male students in Integrated Science was not significant. But, there was a significant relationship between high level of teacher-students interaction and the academic performance of male students in Integrated Science. However, there was no significant relationship between all the levels of teacher-students interaction (i. e. low, medium and high) and the academic performance of female students in Integrated Science.

7). There was a significant relationship between students' interest in Integrated Science and their academic performance in the subject.

5.4 Conclusions

The present research work investigated the relationship of psycho-social factors and teacher-students interaction with students' interest and academic performance in Integrated Science in Colleges of Education, North-West, Nigeria. Based on the findings of the study, the following conclusions were drawn:

1. Both Parental involvement and peer group have influence on students' academic performance in Integrated Science; but the influence of peer group is more than that of parental involvement. Male students' academic performance is influenced by peer group influence. Academic self-efficacy influenced students' interest in Integrated Science.

2. High level of teacher-students interaction influenced students' academic performance in Integrated Science. Gender wise, male students' academic performance was also influenced by high level of teacher-students interaction.

3. Students' academic performance in Integrated Science is influenced by their interest in the subject.

4. Students' interest in Integrated Science as well as their academic performance in the subject depend not only on the type of teacher-students interaction that takes place within a classroom, but also on the psycho-social factors that operate both within and outside a classroom setting. For instance, if teachers would adopt high level of teacher-students interaction (student-centred approach) in their teaching, and also if parental involvement or support of children (students) in their education would be in a proper way, students' interest and academic performance would then be enhanced.

5.5 Contribution to Knowledge

Science education is dynamic which changes base on frontier of new knowledge. Thus, the findings of the present study will serve as a contribution to knowledge in the following dimensions:

1**.** The study established that psycho-social factors of parental involvement and peer group influence can predict students' academic performance in Integrated Science.

2. It was established that academic self-efficacy is significantly related to students' interest in Integrated Science. Thus, it can predict their interest in the subject.

3. It was also established that high level of teacher-students Interaction relate higher with students' academic performance, followed by low and then medium which was found least related. Thus, high level of teacher-students Interaction can predict students' academic performance in Integrated Science.

4. The instruments developed by the researcher can be used by other researchers in subsequent studies related to psycho-social factors, students' interest and academic performance in Integrated Science and other subject areas as well.

5.6 Recommendations

Based on the findings of this research work, the following recommendations were proffered:

1. In the present study, parental involvement in the education of their children showed a significant relationship with their academic performance. It is therefore recommended that parents should continue to give all the necessary support to the education of their children for them to performance academically well.

2. Students should be enlightened on the type peers (friends) they should associate themselves with; especially those that will help them to enhance their interest and their academic performance.

3. Counselling units in Colleges of Education should create an avenue for counselling teachers, parents and students themselves on the need and how to build self-efficacy in students so as to enhance their interest in school subjects and to be self-efficacious in their academic activities.

4. High level of teacher-students interaction should be employed by Integrated Science teachers in their teaching for the enhancement of students' academic performance.

5. A socially and psychologically conducive classroom should be encouraged by Integrated Science teachers so as to motivate their students to develop interest in the subject; thereby enhancing their academic performance as well.

6. Students should be aware that parents and peers play significant roles in influencing their academic performance.

7. School administrators and professional bodies like STAN and MAN among others should try to incorporate in their seminars, workshops and conferences; psycho-social factors and teacher-students' interaction as correlate of students' interest and academic performance. Such bodies will come to know about the outcomes of this research through paper presentations during seminars, workshops and conferences being organized

8. Curriculum planners/designers should make some modifications in Colleges of Education Curriculum by incorporate strategies for practicing high level of teacher-student interaction.

5.7 Limitations of the Study

1. One limitation of this research work is that, there was a kind of overlapping of time (lesson duration) during the administration of the Eggleston Science Teaching Observation Schedule (ESTOS) for teacher-students interaction. That is, some lecturers could not come for their lessons at the right time, and those who were able to come tend to exceed their periods and consume some time out of the next lesson duration. Hence, the observation of the teacher-students interaction that took place in the classrooms during the lesson periods of such lecturers; which was scheduled for one hour duration per lesson was done in less than an hour.

2. In the area under which the study was conducted, only three Colleges of Education with their total number of 317 NCE II Integrated Science students were used as the sample for the study, hence the findings cannot be generalized for all Colleges of Education in Nigeria.

5.8 Suggestions for Further Studies

No research work could be considered as the last weapon to fight a problem in question. Every research has its own limitations to solve some problems and at the same time leave behind some research gaps for further studies. The present study has also left some gaps to be filled when further similar or different studies are to be carried out. Hence, the following suggestions are made.

1. This study was restricted to NCE II Integrated Science students of Colleges of Education in North-West, Nigeria. Students of other disciplines such as Biology, Physics and Chemistry among others in Colleges of Education and other tertiary institutions from the same or different geographical zone of the country can be used for further study.

2. As there are as many psycho-social factors as possible, the study examined only three of such factors as they play a vital role in the education of individuals. Other psycho-social factors not investigated in this study can be investigated using the same or different discipline, level, and or location.

3. The study can be replicated in different geographical zone(s) most especially in South-East and or South-West zone(s) of the country; where it is believed that there are variations in the levels of educational awareness, social, cultural and economic constraints that can affect education and training in Southern and Northern parts of the country to see what the result will be.

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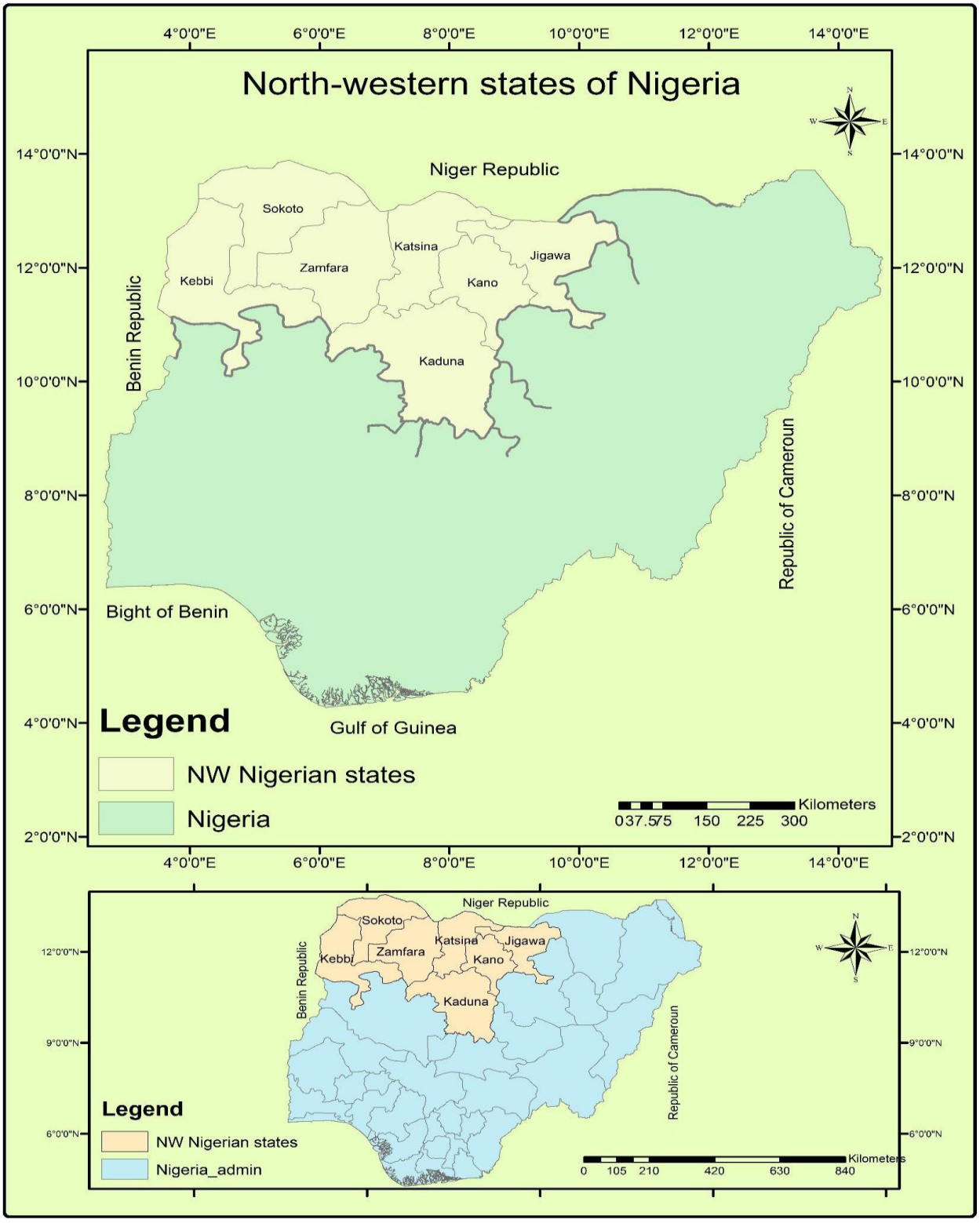
APPENDIX A

NORTH–WESTERN STATES OF NIGERIA



APPENDIX B

DEPARTMENT OF SCIENCE EDUCATION, AHMADU BELLO UNIVERSITY, ZARIA

Date: ----------

PSYCHO-SOCIAL FACTORS QUESTIONNAIRE (PSSFQ)

Dear Respondent,

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below is the list of items to be used to generate data regarding psycho-social factors (parental involvement, peer group influence, and academic self-efficacy) that may influence students' interest and academic performance in Integrated Science in Colleges of Education in North-West, Nigeria. You are required to freely express your feelings about the extent to which you agree or disagree with the questionnaire items/statements. In this regard, the researcher seeks your cooperation to kindly attend to the questions/statements by ticking [√] the alternative that best describes your feelings or opinions about each statement.

Please be informed that all information provided would be used only for the purpose of the research study and would be treated with outmost confidentiality in accordance with the research ethics.

Thanks for your cooperation.

Signed: ----------, the researcher.

TIME: 30 MINUTES

SECTION A: BIO DATA

Name of College: ----------

Course Combination: ----------

Gender (Sex): Male [ ] Female [ ]

SECTION B: QUESTIONNAIRE ITEMS

INSTRUCTION

Please tick [√] the appropriate column of your choice under the abbreviated responses against each statement, to indicate the degree to which you agree or disagree with the statement.

Take note of the following keys to guide your responses:

SA ----------Strongly Agree

A ----------Agree

U ----------Undecided

D ----------Disagree

SD ----------Strongly Disagree

S/N	Parental Involvement Factor	SA	A	U	D	SD
1	Parents ask to see their children's results in Integrated Science at the end of every semester					
2	Parents value the education and performance of their children as such they provide all the necessary assistance for their education					
3	My parents never provided for my educational needs such as text books, and other necessary materials resulting for my negative interest in Integrated Science					
4	Most parents engage their children in different activities at home, making it difficult for them to do their homework or read their books leading to low performance in Integrated Science					
5	My parents encourage me to be listen to radio and television for scientific programmes so as to develop more interest in Integrated Science					
6	My parents monitor me whenever I study at home and they do correct my mistakes and this positively influence my results in Integrated Science					
7	Parents teach their children what they don't know in Integrated Science and this helps them to perform well in the subject					

	Peer Group Influence Factor	**SA**	**A**	**U**	**D**	**SD**
8	Most of my friends in school perform well in examinations					
9	My friends encourage me to work hard in school					
10	I spend most of my time in school with friends listening to music or discussing about football matches					
11	Most of my friends do not attend school regularly					
12	My friends affect my academic work positively					
13	I spend most of my time in school with friends attending group discussion and tutorials to prepare for examination					
14	My friends are not happy with students who try to do well in school					
	Academic Self-Efficacy Factor					
15	I feel confident in my ability to learn the materials in Integrated Science					
16	I am capable of conducting Integrated Science practical activities and this helps to boost my interest and performance in the subject					
17	My capability of conducting practical activities in Integrated Science enables me to be creative and productive					
18	It is difficult for me to carry out most of the activities contained in Integrated Science curriculum					
19	I have the confidence that I will continue to study Integrated Science up to the doctorate (PhD) level					
20	I have the confidence that I will pass my examinations in Integrated Science thereby moving to next level successfully					

APPENDIX C

ASPECTS OF INTERACTION CATEGORIES FOR OBSERVING TEACHER-STUDENTS VERBAL INTERACTION; FORMED BY HOUGH AND OBER (1966), EGGLESTON, GALTON AND JONES (1975) AND USED BY OLAJIDE (1987), TAMBAYA (2007) AND NDIRIKA (2009):

1. Accept feelings: accepts and clarifies the feeling tone of students in a nonthreatening manner. Feelings may be positive or negative. For example, I can see you are not in the mood for work today, o.k. let someone else try. Predicting and recalling feelings are included.

2. Praises or encourages: praises or encourages students' action or behaviour. Jokes that releases tension, not at the expense of another individuals, nodding head or saying "uh huh" or "go on, tell us more about it", "Yeah, I expect you to be able to do that, since you are from that area", try again are included.

3. Accepts or uses ideas of students: clarifying, building on, developing and accepting ideas of students or their suggestions, statements such as "That's interesting", and "See what you mean", among others are included.

4. Asks questions: asking a question about content or procedure with the intent that the students should answer. Such questions may be on what they believe about certain scientific concepts traditionally.

5. Lectures: giving facts or opinions about content or procedure; expressing his ideas; asking rhetorical questions. In expressing his own ideas he may say what he believes about traditionally, and then tries to give the impression that is just the Western ideas, "Well, according to the text book ----".

6. Answer students' question: direct answers to questions regarding content or procedure asked by students.

7. Gives directions: directions, commands or orders to which a student is expected to comply. He may threaten students, he may tell them to work in (a) group or (b) singly. He may direct students to meet each other for help.

8. Criticizes or justifies authority: statement intended to change students' behaviour from a non-acceptable to an acceptable one; bawling (shout loudly) out someone, stating why the teacher is doing what he is doing so as to achieve or maintain control; rejecting or criticizing a student's opinion or judgement.

9. Corrective feedback: telling a student that his answer is wrong when the correct answer can be established by other means other than opinion. That is empirical, validation definition, custom or culture.

10. Student talk-response: talk by student in response to request or narrow teacher questions e.g. “Yes Sir”, you are right Ma etc. The teacher initiates the contact or solicits students’ statements etc. Teacher may say “do you understand?” Students may say “Yes” student answers in a conforming way, due probably to fear. He wants to please the teacher.

11. Student talk-emitted: talk by student in response to broad teacher questions which require judgement or opinion. Students’ declarative statements emitted but not called for by teacher questions. Student may respond because he feels he is expected to know. His answer may be bits of superstitious beliefs, or use of traditional games. He makes statements that suggest students to do the work in group or singly. He may try to justify opinion by saying that what the teacher is saying is the white man’s idea and is different from the beliefs in their village.

12. Students’ questions: questions concerning content or procedure that are directed to the teacher. Questions may concern what happened in their area some time ago, which the teacher had tried to explain scientifically but still not clear to the student(s).

13. Silence or confusion: pauses, short period or silence, and periods of confusion in which communication cannot be understood by the observer.

APPENDIX D

EGGLESTON SCIENCE TEACHING OBSERVATION SCHEDULE (ESTOS) FOR TEACHER-STUDENTS VERBAL INTERACTION

Observation Time–Interval (minutes) S/No. Time–Interval	Aspects of Interaction Observed Teacher Talk	Students Talk
1. 0 – 3		
2. 3 – 6		
3. 6 – 9		
4. 9 – 12		
5. 12 – 15		
6. 15 – 18		
7. 18 – 21		
8. 21 – 24		
9. 24 – 27		
10. 27 – 30		
11. 30 – 33		
12. 33 – 36		
13. 36 – 39		
14. 39 – 42		
15. 42 – 45		
16. 45 – 48		
17. 48 – 51		
18. 51 – 54		
19. 54 – 57		
20. 57 – 60		
Total		

Name of College ---------- Date ----------

APPENDIX E

DEPARTMENT OF SCIENCE EDUCATION, AHMADU BELLO UNIVERSITY, ZARIA

Date: ----------

STUDENTS' INTEGRATED SCIENCE INTEREST QUESTIONNAIRE (SISIQ)

Dear Respondent,

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below is the list of items to be used to obtain data on students' interest in Integrated Science in Colleges of Education, North-West, Nigeria. You are requested to freely express your feelings about the extent to which you agree or disagree with the questionnaire items/statements. In line with this, the researcher seeks your cooperation to kindly attend to the questions/statements by ticking [√] the alternative that best describes your feelings or opinions about each statement.

You are assured that all information provided would be used only for the purpose of the research study and would be treated with outmost confidentiality.

Thanks for your cooperation.

Signed: ----------, the researcher.

TIME: 25 MINUTES

SECTION A: BIO DATA

Name of College: ----------

Course Combination: ----------

Gender (Sex): Male [ ] Female [ ]

SECTION B: QUESTIONNAIRE ITEMS

INSTRUCTION

Please tick [√] the appropriate column of your choice under the abbreviated responses against each statement. This indicates the degree to which you agree or disagree with the statement.

Please take note of the following keys to guide your responses:

SA ----------Strongly Agree
A ----------Agree
U ----------Undecided
D ----------Disagree
SD ----------Strongly Disagree

S/N	ITEM/STATEMENT	SA	A	U	D	SD
1	I don't like attending Integrated Science class because I find it more difficult than any other subject.					
2	I always feel very sad when my Integrated Science teacher is not around.					
3	I like Integrated Science because it enables me to acquire science process skills and scientific attitudes which are necessary in life.					
4	Conducting practical activities in Integrated Science makes me to like the subject.					
5	I like listening to science quiz and programmes on radio and television.					
6	I prefer Integrated Science to any other subject because of the way it is being taught (i.e. using activity-based approach).					
7	My best wish is to continue to study Integrated Science up to PhD (doctorate) level.					
8	My interest in Integrated Science depends on how the teachers interact with and relate to me and to the students in general					
9	I am interested in Integrated Science because it prepares me to live, behave, and act scientifically in the society.					
10	My interest in Integrated Science encourages me to attend class regularly.					
11	Integrated Science is interesting because it can be taught and learnt effectively using locally available resources/materials.					

12	Integrated Science is interesting because it gives room for interacting with materials, mates, and teachers through its activities.	**SA**	**A**	**U**	**D**	**SD**
13	My love for Integrated Science is due to the fact that it prepares people to be creative and productive.					
14	I like Integrated Science because it inculcates in me the spirit of leadership and respect for other people's views through team/group work.					
15	I always feel happy when it is time for Integrated Science.					
16	Whenever I hear the word "Integrated Science", I have a feeling of dislike.					
17	I like Integrated Science because it provides me with the basic foundation for the study of the core science subjects (Biology, physics and Chemistry).					
18	My love for Integrated Science is due to the fact that it enables me to become scientific literacy.					
19	My hatred to Integrated Science is due to the fact that I don't like practical activities at all.					
20	I don't like to be recognized as an Integrated Science student because the society does not value it as it does to other core science subjects (Biology, physics and Chemistry).					

APPENDIX F

DEPARTMENT OF SCIENCE EDUCATION, AHMADU BELLO UNIVERSITY, ZARIA

Date: ----------

INTEGRATED SCIENCE ACADEMIC PERFORMANCE TEST (ISAPT)

Dear Respondent,

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below is the list of thirty (30) multiple choice questions which you are required to attend to. Each question has four (4) options lettered A – D. From the options provided, you are expected to choose only one which you feel is the best and correct answer to the question.

INSTRUCTION

Answer all the questions on the question paper by circling the correct option for each question.

TIME: 35 MINUTES

SECTION A: BIO DATA

Name of College: ----------

Course Combination: ----------

Gender (Sex): Male [ ] Female [ ]

SECTION B: TEST ITEMS

QUESTIONS:

1. The unit of work is;

a). the metre b). the kilogram c). the joule d). the Celsius

2. The unit in which temperature is measured is;

a). degree centigrade b). joule c). Newton d). calorie

3. Which of the following is not regarded as a source of energy?

a). oil b). sand c). electricity d). sun

4. Which of the following types of energy does a moving object is said to possess?

a). kinetic energy b). potential energy c). heat energy d). sound energy

5. When water has a PH of 9, it can be concluded that such water is

a). acidic b). alkaline c). neutral d). pure and safe

6. The amount of work which is needed to lift an object weighing10 N (Neuton) to a distance of 5 m (meter) is

a). 50 joules (Neuton- meter) b). 2 joules c). 0.5 joules d). none of the above

7. What is the weight of a body which can be lifted to a height of 3 m in if the work done is a). 27 N b). 93 N c). 87 N d) 30 N

8). ---------- can be used to classify objects

a). Colour and shape b). size and behaviour c). A and B d). none of the above

9. USSR launched the first satellite into space in the year

a). 1957 b). 1975 c).1857 d).1875

10. Which of the following Stimulus Response Theories is proposed by B. F. Skinner?

a). Skinner's conditioning b). Classical conditioning c). Intellectual conditioning

d). operant conditioning

11. The magnifications of the lower power objective, medium power objective and high power objective lenses of a microscope are in the following respective order

a). 4 X, 10 X and 40 X b). 40 X, 10 X and 4 X

c). 10 X, 4 X and 40 X d). 10 X, 40 X and 4 X

12. Based on Bloom's taxonomy, educational objectives can be classified into --------- major domains

a). four (7) b). three (3) c). five (5) d). six (6)

13. The instrument used for observing very small objects that cannot be seen with naked eyes is known as

a). telescope b). hand lens c). camera d). microscope

14. Which of the following instruments is used for measuring temperature?

a). sun dial b). thermometer c). barometer d). stop watch

15. In the weather station, weather instruments are kept in

a). Stevenson screen b). tool box c). weather box d). white box

16. In relation to growth, which of the following types of changes can you relate to the increase in size/volume?

a). temporary change b). permanent change c). physical change d). none of the above

17. When three (3) cells each of 1.5 volt are connected in series, the total voltage (V) is

a). 3 V b). 3.5 V c). 4.5 V d). 1.5 V

18. The S.I unit of pressure is;

a). moles b). mercury millimetre (mmHg) c). Kelvin d). joule

19. Which of the following pairs of levels of domain objectives forms part of the cognitive domain as classified by Ben-Eligahujamin Bloom in his taxonomy of educational objectives?

a). knowledge/receiving b). application/physical abilities c). evaluation/responding

d), analysis/synthesis

20. All the following are not universal solvent except

a). kerosene b). petroleum c). palm oil d). water

21. Sugar and salts can dissolve completely in

a). water b). kerosene c). ground nut oil d). palm oil

22. Point out the pair of instruments that can be used to measure the area of a rectangular table

a). meter rule and vernier calliper b). ruler and micrometer screw gauge

c). tape and vernier calliper d). meter rule and tape

23. Potential energy is described as

a). the force of an object in motion b). the energy of an object at rest

c). the energy of an object in motion d). none of the above

24. The law of conservation of energy states that:

a). energy cannot be created but it can be destroyed

b). energy can be created but it cannot be destroyed

c). energy cannot be created or destroyed, but it can be changed from one form to another

d). energy can be created or destroyed, but it cannot be changed from one form to another

25. The satellite launched into space by the USSR in 1957 is known as

a). SPUTNIK 1 b). SPUTNIK II c). SPUTNIK III d). Kumbo Apolo Eleven (11)

26. The first (1^{st}) international conference in Integrated Science took place in

a). United States of America (USA) b). United Kingdom (UK) c). Japan d). Vulgeria

27. Identify the lowest group among the following taxonomic groups

a). kingdom b). species c). order d). family

28. Effective observation cannot take place without proper coordination of

a). one sense only b). two senses only c). three senses only d). all the senses involved

29. The percentages of Nitrogen, Oxygen and noble gases in the atmosphere are in the following proportion

a). 78 %, 21 % and 1 % b). 68 %, 31% and 1% c). 21 %, 78% and 1%

d). 1 %, 21% and 78%

30. The condition of being unable to correctly distinguish between different colours is associated with

a). colour blindness b). colouration c). colour sensitivity d). photo blindness

APPENDIX G

LETTERS OF VALIDATION OF THE RESEARCH INSTRUMENTS

LRTTER 1

Department of Science Education,
Faculty of Education, Ahmadu Bello University, Zaria
9th March, 2016

Science Education Lecturer,
Department of Science Education,
Faculty of Education, Ahmadu Bello University, Zaria

Dear Sir/Ma,

VALIDATION OF RESEARCH INSTRUMENTS

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below are four research instruments to be used to collect data for PhD Thesis titled "Psycho-Social-Factors and Teacher-Students-Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria". The instruments are titled:

1. Psycho-social Factors Questionnaire (PSSFQ); 30 items of 5 point Likert scale;
2. Teacher-Students Interaction Questionnaire (TSIQ); 27 items of 5 point Likert scale;
3. Students' Integrated Science Interest Questionnaire (SISIQ); 25 items of 5 point Likert scale as well;
4. Integrated Science Academic Performance Test (ISAPT) consists of 30 multiple choice objective items. The drafts of the instruments are attached herewith along with the corresponding marking scheme for the ISAPT.

As an experienced Science Education Lecturer, your inputs would certainly improve the quality of the instruments. Hence, you are requested to critically examine and assess all the items of the instruments with reference to:

1. Content and face validity of the instruments;
2. Language component of the instruments;
3. Appropriateness of the items in terms of reading difficulty level for the group that they are meant for
4. Clarity of the statements in the instruments.

Name of the validator: ----------

Rank of the validator: ----------

Validator's Signature: ----------

Date of Validation: ----------

Your valuable suggestions will be quite appreciated. Thanks.

Yours faithfully,

Ibrahim Justice Duwan, ABDULLAHI

LETTER 2

Department of Science Education,
Faculty of Education, Ahmadu Bello University, Zaria
9th March, 2016

Educational Psychology Lecturer,
Department of Psychology and Counselling,
Faculty of Education, Ahmadu Bello University, Zaria

Dear Sir/Ma,

VALIDATION OF RESEARCH INSTRUMENTS

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below are four research instruments to be used to generate data for PhD Thesis titled "Psycho-Social-Factors and Teacher-Students-Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria". The instruments are titled:

1. Psycho-social Factors Questionnaire (PSSFQ); 30 items of 5 point Likert scale;
2. Teacher-Students Interaction Questionnaire (TSIQ); 27 items of 5 point Likert scale;
3. Students' Integrated Science Interest Questionnaire (SISIQ); 25 items of 5 point Likert scale;
4. Integrated Science Academic Performance Test (ISAPT) consists of 30 multiple choice objective items. The drafts of the instruments are attached herewith along with the corresponding marking scheme for the ISAPT.

As an experienced Psychology Lecturer, your inputs would certainly improve the quality of the instruments. Hence, you are requested to critically examine and assess all the items of the instruments with reference to:

1. Content and face validity of the instruments;
2. Language component of the instruments;

3. Appropriateness of the items in terms of reading difficulty level for the group that they are meant for
4. Clarity of the statements in the instruments.

Name of the validator: ----------

Rank of the validator: ----------

Validator's Signature: ----------

Date of Validation: ----------

Your valuable suggestions will be quite appreciated. Thanks.

Yours faithfully,

Ibrahim Justice Duwan, ABDULLAHI

LETTER 3

Department of Science Education,
Faculty of Education, Ahmadu Bello University, Zaria
9th March, 2016

Integrated Science Lecturer,
Department of Integrated Science,
Federal College of Education, Zaria

Dear Sir/Ma,

VALIDATION OF RESEARCH INSTRUMENTS

Below are four research instruments to be used to generate data for PhD Thesis titled "Psycho-Social-Factors and Teacher-Students-Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria". The instruments are titled:

1. Psycho-social Factors Questionnaire (PSSFQ); 30 items of 5 point Likert scale;
2. Teacher-Students Interaction Questionnaire (TSIQ); 27 items of 5 point Likert scale;
3. Students' Integrated Science Interest Questionnaire (SISIQ); 25 items of 5 point Likert scale;
4. Integrated Science Academic Performance Test (ISAPT) consists of 30 multiple choice objective items. The drafts of the instruments are attached herewith along with the corresponding marking scheme for the ISAPT.

As an experienced Integrated Science Lecturer, your inputs would certainly improve the quality of the instruments. Hence, you are requested to critically examine and assess all the items of the instruments with reference to:

1. Content and face validity of the instruments;
2. Language component of the instruments;
3. Appropriateness of the items in terms of reading difficulty level for the group that they are meant for
4. Clarity of the statements in the instruments.

Name of the validator: ----------

Rank of the validator: ----------

Validator's Signature: ----------

Date of Validation: ----------

Your valuable suggestions will be quite appreciated. Thanks.

Yours faithfully,

Ibrahim Justice Duwan, ABDULLAHI

LETTER 4

Department of Science Education,
Faculty of Education, Ahmadu Bello University, Zaria
9th March, 2016

English Language Lecturer,
Department of English,
Federal College of Education, Katsina
Dear Sir/Ma,

VALIDATION OF RESEARCH INSTRUMENTS

I am a PhD Science Education student undergoing a research on "Psycho-social Factors and Teacher-students Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria".

Below are four research instruments intended to be used to generate data for PhD Thesis titled "Psycho-Social-Factors and Teacher-Students-Interaction as Predictors to Interest and Academic Performance in Integrated Science among Colleges of Education Students, North-West, Nigeria". The instruments are titled:

1. Psycho-social Factors Questionnaire (PSSFQ); 30 items of 5 point Likert scale;
2. Teacher-Students Interaction Questionnaire (TSIQ); 27 items of 5 point Likert scale;
3. Students' Integrated Science Interest Questionnaire (SISIQ); 25 items of 5 point Likert scale as well;
5. Integrated Science Academic Performance Test (ISAPT) consists of 30 multiple choice objective items. The drafts of the instruments are attached herewith along with the corresponding marking scheme for the ISAPT.

As an experienced English Language Lecturer, your inputs would certainly improve the quality of the instruments. Hence, you are requested to critically examine and assess all the items of the instruments with reference to:

1. Content and face validity of the instruments;
2. Language component of the instruments;

3. Appropriateness of the items in terms of reading difficulty level for the group that they are meant for, and
4. Clarity of the statements in the instruments.

Name of the validator: ----------

Rank of the validator: ----------

Validator's Signature: ----------

Date of Validation: ----------

Your valuable suggestions would be quite appreciated. Thanks.

Yours faithfully,

Ibrahim Justice Duwan, ABDULLAHI

APPENDIX H

INTEGRATED SCIENCE ACADEMIC PERFORMANCE TEST (ISAPT)

MARKING SCHEME

1) − C	11) − A	21) − A
2) − A	12) − B	22) − D
3) − B	13) − D	23) − B
4) − A	14) − B	24) − C
5) − B	15) − A	25) − A
6) − A	16) − A	26) − D
7) − D	17) − C	27) − B
8) − C	18) − B	28) − D
9) − A	19) − D	29) − A
10) − D	20) − D	30) − A

NB: - Each question carries two (2) marks. That is 2 x 30 = 60 marks.

APPENDIX I

ITEM ANALYSIS FOR THE MULTIPLE CHOICE ITEMS (ISAPT): TABLE OF DIFFICULTY (FACILITY) AND DISCRIMINATION INDIXES

Item	CR	RU	RL	Df $= \frac{GU + GL}{N} X100$	Df %	Ds $= \frac{GU - GL}{N/2} X100$	Ds %
1	C	18	13	0.775	77.5	0.25	25
2	A	18	14	0.800	80.0	0.20	20
3	B	7	10	0.425	42.5	0.15	15
4	A	19	13	0.800	80.0	0.30	30
5	B	15	10	0.625	62.5	0.25	25
6	A	10	6	0.400	40.0	0.20	20
7	D	16	7	0.575	57.5	0.45	45
8	D	6	12	0.450	45.0	0.30	30
9	A	19	12	0.775	77.5	0.35	35
10	D	9	11	0.500	50.0	0.20	20
11	A	9	9	0.450	45.0	0.00	00
12	B	15	18	0.825	82.5	0.25	25
13	D	19	19	0.950	95.0	0.00	0
14	B	20	15	0.875	87.5	0.25	25
15	A	2	7	0.225	22.5	- 0.25	- 25
16	A	19	8	0.675	67.5	0.55	55
17	C	9	5	0.350	35.0	0.20	20
18	B	13	7	0.500	50.0	0.30	30
19	D	12	4	0.400	40.0	0.40	40

Item	CR	RU	RL	Df $= \frac{GU + GL}{N} X100$	Df %	Ds $= \frac{GU - GL}{N/2} X100$	Ds %
20	D	10	15	0.625	65.5	- 0.25	-25
21	A	20	14	0.850	85.0	0.30	30
22	D	12	5	0.425	42.5	0.35	35
23	B	6	10	0.400	40.0	- 0.20	-20
24	C	17	11	0.700	70.0	0.30	30
25	A	20	12	0.800	80.0	0.40	40
26	D	0	0	0.000	0	0.00	0
27	B	17	10	0.675	67.5	0.35	35
28	D	7	4	0.275	27.5	0.15	15
29	A	5	5	0.250	25.0	0.00	0
30	A	10	10	0.500	50.0	0.00	0

Key:

CR = Correct Response (option)

GU = number of students in the upper group who responded correctly to the test item;

GL = number of students in the lower group who responded correctly to the test item;

DF = Item difficulty index

Df % = Percentage difficulty

Ds = Item discrimination index

Ds % = Percentage discrimination

N = number of respondents in each of the upper and lower groups.