

**STUDENTS' SOFT SKILLS AS CORRELATES OF THEIR
ACADEMIC ACHIEVEMENT IN BASIC SCIENCE**

BY

**ANDOR, SEBASTINE EBUNMEREH
PG/M.Ed/14/67916**

**DEPARTMENT OF SCIENCE EDUCATION
FACULTY OF EDUCATION
UNIVERSITY OF NIGERIA, NSUKKA**

SEPTEMBER, 2016

TITLE PAGE

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**A THESIS SUBMITTED TO THE DEPARTMENT OF SCIENCE
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MEASUREMENT AND EVALUATION.**

SUPERVISOR: PROF. B. G. NWORGU

SEPTEMBER, 2016

APPROVAL PAGE

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University of Nigeria, Nsukka

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Andor, Sebastine Ebummeh, a postgraduate student in the department of science education with registration number Pg/Med/14/67916 has satisfactorily completed the requirements for the award of master of education (M.ED) in measurement and evaluation. The work embodied in this project report is original and has not been submitted in parts or in full for any other diploma or degree of this or any other university.

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DEDICATION

This project is dedicated to my parents; Mr. & Mrs. Austin O. Andor

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ABSTRACT

This study examined students' soft skills as correlates of their academic achievement in basic science. The correlational survey research design was employed in the study. The population of the study comprised the 5,721 JSS3 students in public or government owned secondary schools in the five (5) local government areas in Ogoja education zone of Cross River State. A sample of 357 JSS3 students (168 males and 189 females) was drawn for this study using multistage sampling procedure. The study employed two researcher-developed instruments; Students' Soft Skills Assessment Scale (SSSAS) and Students' Academic Achievement Proforma (SAAP) in data collection. Data collected were analyzed using regression analysis (correlation) and t-test statistic. The results based on the research questions showed that: problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) best-predicted students' academic achievement in basic science, followed by teamwork soft skills .44 (44%), then communication soft skills .32 (32%), followed by time management soft skills .29 (29%) and lastly intra-interpersonal soft skills .28 (28%). 63% of variation in students' academic achievement in basic science (criterion variable) is accounted for by all the dimensions of their soft skills (predictor variables) jointly; and that gender moderated 5% of the variation in students' academic achievement in basic science in favour of the female than their male counterparts. The findings from the null hypotheses revealed that: the regression/beta coefficients (β) associated with each of the predictor variables; students' problem solving soft skills ($\beta = .37$), teamwork soft skills ($\beta = .24$), communication soft skills ($\beta = .19$), intra and interpersonal soft skills ($\beta = .10$), and time management soft skills ($\beta = .09$) in predicting their academic achievement in Basic Science are significant; gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills; and lastly, findings indicated that the regression model for predicting students' academic achievement in Basic Science by their soft skills was significant. All the hypotheses were tested at 0.05 level of significance. Based on the findings and conclusions, it was recommended that: students, teachers, parents, education administrators and government should develop, teach and assess, encourage and support programmes that will duly consider students' development and improvement on relevant soft skills. Home-related, school-related and cognitive-related variables should be taken into cognizance by the different stakeholders in order to create favourable learning and achievement; every teaching and learning situation should be made gender insensitive for adequate learning among students irrespective of gender; and finally, education administrators and government should encourage and support programmes that will duly consider teaching and assessment of students' possession of soft skills in order to promote achievement in school and life generally.

CHAPTER ONE

INTRODUCTION

Background to the Problem

The role of science in the development of modern societies is indispensable especially now that the influence of modern technologies has permeated every sphere of man's life. Emphasis is now laid on science and technology globally since the growth of any nation depends largely on its level of advancement in science and technology. Science as a concept deals with knowledge about the structure and behaviour of the natural and physical world based on facts that are verifiable through a systematic process of investigation. According to Afuwape (2012), science helps people to understand the world they live in, in order to interpret the laws and principles that govern it. It blends logic and imagination to explain and predict events through systematic inquiry into natural phenomena. This helps us in understanding and relating better to nature and the universe as a whole on knowledge of facts or evidence.

In Nigeria, the bedrock of the acquisition of useful scientific knowledge and skills or the entry point to the study of science or technology-related courses is through the understanding of basic science (Bukunola & Idowu, 2012). Basic science offers the basic training in scientific skills required for human survival, sustainable development and societal transformation. It is useful to the study of other sciences at the senior secondary school level.

According to Oludipe (2014), basic science (formally known as integrated science) is a core subject in Nigeria junior secondary school curriculum. Basic science is an introductory course to the study of the sciences in the senior secondary school (Omiko, 2016). Basic science involves the study of elementary biology, anatomy, earth/solar system, ecology, genetics, chemistry and physics as a single science subject in the Junior Secondary school (Nwafor, 2012).

In other words, basic science is a subject that prepares the students for the study of core science subjects like physics, chemistry and biology at the senior secondary school level.

However, in view of the fundamental importance of basic science to science learning, its rationale as enshrined in the Nigerian school curriculum according to NPE (2004:28) is to:

- provide students at the junior secondary school level with a sound basis for continuing science education either in single science subjects or further integrated science;
- enhance the scientific literacy of the citizenry;
- enable students to understand their environment in its totality rather than in fragments;
- enable students to have a general view of the world of science;
- serve as a unifying factor for the various science subjects through integrated approach of learning science.

Since basic science provides students at the junior secondary school level with a sound basis for continuing science education either in single science subjects or further integrated science, it then implies that for a student to be able to study any single science subjects at the senior secondary school level and beyond successfully, such a student must have been well-grounded in Basic Science at the junior secondary school level. To achieve this, parents, teachers, and the government have made different efforts. Most parents have provided the basic needs for their children's education (Omiko, 2016). Also, in a bid to promote the teaching and learning of basic science, teachers have adopted innovative methods of teaching like discovery, problem-solving, open-ended field trips and laboratory methods among others (Omiko, 2016). On the part of the government, as noted in the National Policy on Education, special provisions are made for educational expenditure in science and technology learning in Nigerian schools

(FRN, 2004). Such expenditures are provision of school infrastructures, instructional materials, laboratories and laboratory equipment (Omiko, 2016). These efforts are all aimed at enhancing the teaching and learning process generally, and the academic achievement of students in particular.

Academic achievement of students entails their learning outcomes or the scores they obtain in a test or examination. This shows the extent to which a learner (student) has accomplished specific learning objectives. According to Adeyemi (2008), academic achievement is the scholastic standing of a student at a given moment. Maphoso and Mahlo (2014) viewed academic achievement as the result of successful completion of school task(s) or programme, as well as the extent to which stakeholders in education enterprise have realized educational goals. In the opinion of Adeyemo (2001), the fundamental role of the school is to work towards the achievement of academic excellence by students. Adeyemo also observed that students' academic achievement attracts high expectations by all the stakeholders in the education sector. Academic achievement in the context of this work entails results or scores of students in both internal and external examinations.

Despite concerted efforts by government, teachers, parents and other relevant stakeholders in the education industry to enhance the teaching and learning of basic science, academic achievement of students in the subject remain consistently poor (Nasiru, 2013). Previous studies have shown that academic achievement of students in both internal and external examinations in science subjects, specifically basic science has been declining. In this respect, literature (Njoku, 1994; Ali & Anekwe, 1997) revealed that there is an inconsistent trend in students' achievement in the sciences at various levels of Nigerian education system. In the same light, poor achievement in sciences at different levels of Nigerian education was evidenced in some empirical studies (Betiku, 2001; Omole, 2003; & Ferdinand, 2007).

In the same vein, Adeyemi (2008) noted that grades that candidates had in the examinations in both primary and junior secondary schools external examinations (Common entrance and Junior Secondary School Certificates Examination, JSSCE) indicates that majority of the students achieve below average in Basic Science. Bukunola and Idowu (2012) also reported that students' academic achievement in Basic Science have been very poor. It is noteworthy that poor academic achievement of students in Basic Science may in turn affect their academic achievement in science subjects such as Physics, Chemistry and Biology at the senior secondary. Also their aspirations about choosing a career in the sciences may be affected since Basic Science lays the foundation for the learning of science at senior secondary and beyond. This has become a source of worry to all stakeholders in the education sector.

According to Onuka and Durowoju (2015), factors such as low socio-economic status of parents, poor foundational knowledge and inadequate teachers are responsible for the poor academic achievement of students. Other factors according to Olorundare (2014) include poor funding, lack of basic infrastructure, lack of teaching/learning materials, lack of motivation and poor attitudes by both teachers and students. Olorundare also mentioned that learners' poor study habits or lack of adequate preparation for examination, examination phobia or anxiety, and emotional instability account for the decline in students' academic achievement in examinations across Nigeria. Omole, (2003) was of the opinion that poor academic achievement in basic science is due to teachers' use of ineffective methods and strategies in science teaching. Thus, necessary efforts at improving students' academic achievement in basic science have focused on positive improvement of these factors mentioned by researchers, yet students' achievement in the subject remains poor (Olorundare, 2014). Also, Omebe and Omiko (2015) observed that in spite of efforts made by stakeholders in education, the results of the students in the Junior Secondary School Certificate Examination (JSSCE) in basic science have not been encouraging.

Apart from improving on the aforementioned factors which have yielded little or no result with respect to improvement in students' achievement, the students' hard and soft skills have been thought of as strong determinants of their academic achievement in any given subject if adequately utilized. In this regard, Onuka and Durowoju (2015) stated that students' cognitive abilities also called the 'hard skills' and the affective skills also known as the 'soft skills' could act as basic determinants of their academic achievement. The hard skills are cognitive based and deal with a person's mental abilities, capabilities, knowledge and technical know-how that enable the individual to execute cognitive related task(s). The hard skills are said to produce minimal result if the soft skills are not effectively utilized to complement them. Essentially, soft skills are products of the affective domain (Durowoju & Onuka, 2014). Soft skills are personality attributes, personal qualities and personal behaviour of individuals (Shaheen, Zhang, Shen, & Sati, 2012). According to these authors, soft skills include certain abilities such as communication, problem-solving, self-motivation, decision-making, and time management skills. Similarly, Aworanti (2012) viewed soft skills as abilities and traits that pertain to personality, attitude, and behavior exhibited in decision making, problem solving and self-management rather than formal or technical knowledge. Soft skills according to Onuka and Oyegoke (2015) are a cluster of personality traits, social graces, communication skills, language, personal habits, friendliness and optimism that characterizes relationship with other people.

Soft skills also include leadership potentials, time management skills, interpersonal skills, behavioural competencies, people's skills or personal attributes that enable them to relate well in the society, perform excellently on-the-job, and career prospects (Kechangias, 2011). Ifangko (2013) stated that soft skills such as, communication, time management and intra and interpersonal skills as well as good character and morals complement academic excellence, successful employee and future undertakings as they are closely related to the marketability of

the students in the world of works. In this respect, most employers will like to deal with people who have good communication and time management skills and those who are of good character, honest, kind, reliable or trustworthy, loving, empathetic and sociable. Iiangko believes that with adequate utilization of soft skills, the hard skills will be complemented since education is geared towards producing complete (all-round) individuals who are found worthy both in character and learning. That is to say, possession or acquisition of soft skills is expected to mould positive changes in students' character building, and learning or academic achievement. In this study, students' soft skills are defined as affective competencies that complement their mental abilities to promote favourable living and achievement in life generally.

According to these researchers (Kechagias, 2011; Aworanti, 2012; & Iiangko, 2013), soft skills are of different dimensions. These dimensions include communication, intra and interpersonal relationship, teamwork, problem solving, time management, decision making, leadership and self-management soft skills as well as good morals or character. Among these dimensions, the present study will focus on communication, intra and interpersonal, teamwork, problem solving and time management soft skills as they relate more to school activities and are mostly required for academic tasks than others. Though other dimensions may be required for schooling, they relate more to people's morals and general functional living. However, the researcher's interest also informed the choice of the variables. Besides, all the soft skills variables cannot be exhausted in this work.

Among the variables of interest, communication soft skills are fundamental to teaching and learning. Communication soft skills are individual's skills to verbally articulate opinions, listen actively, to be assertive, receive and convey messages meaningfully to others using verbal and non-verbal means (Taylor, 2000). Schultz (2008) stated that communication soft skills or competencies are the abilities to communicate in socially acceptable way, which involves the

speaker's interaction with others, the audience perception about the speaker in terms of vocal presentation, message control, command of language, physical appearance and so on. According to Pratt and Richards (2014), clearly written communication and verbal communication, and active listening are soft skills that may enhance academic performance. In a related opinion, Osborn and Pearson (2000), noted that competencies in oral and written communication are the prerequisite for students' academic, personal, and professional success. In the same vein, Azizi, and Nordin (2006) observed that a student who lacks communication skills will not only experience problems communicating with others but also during the learning process as discussion forms the very basis of today's teaching and learning process. In essence, communication soft skills help in communicating successfully with others; asserting one's own opinion, expressing ideas and concepts clearly and paying attention in group interaction or discourse whether in school or at home.

However, daily communication processes or social interactions with oneself, between individuals or group of individuals depends largely on intra and interpersonal soft skills or competencies possessed and utilized by them. Intra and interpersonal soft skills are affective attributes that enable an individual to interact with self and with other people (Weiner, 2000). According to Wood (2005), people need to have effective intra and interpersonal soft skills to enable them understand themselves, and others' behaviours, cope with circumstances, and control any situation(s) they find themselves in. This is why Editor and Bash (2013) noted that intra and interpersonal Skills are skills used by a person to properly interact with themselves and others. This implies that intra and interpersonal soft skills help people to clarify ideas, reflect on issues, concentrate on task at hand, and ensure good rapport, and a smooth interdependent relationship with others. It is important to note that the possession and utilization of these skills vary amongst students due to differences that exist among them, which

consequently create variations in their academic achievements, and their sense of cooperation or teamwork.

The term teamwork can be defined as the activity of working together well as a group. Team work involves people working collaboratively in small groups (teams) for a common goal (Ivanova-stenzel & Kubler, 2005). Afolakemi and Joshua (2013) defined team work as work done by several associates with each doing a part but all subordinating personal prominence to the efficiency of whole. By implication, tasks are accomplished at a faster pace when performed by a team rather than an individual. Moreover, an individual will definitely take more time to perform, if he or she is single-handedly responsible for everything. Team work requires that students be involved in small groups in which they work actively together to maximize learning and gain from each other on specific tasks. According to Zhang (2012), that is why institutions and schools are shifting their pedagogical approaches from passive to active learning in and outside the classroom which encourages learning in groups or teams and enhancement of problem solving skills.

Problem solving soft skills involves taking series of actions in the process of seeking to bridge the gap between a problem status and the anticipated goal. Problem solving soft skills comprises all action steps taken by a person or learner to reach anticipated goal when faced with a task (Adesoji, 2008). According to Adeyemi (2008), problem solving soft skills are skills employed when engaging in a task for which the solution is not known in advance. That is why, Ifamuyiwa and Ajilogba (2012) pointed out that, problem solving soft skills helps in finding solutions to identified problems by carrying out sets of action. Such skills include; the willingness to engage in a task, one's potential as a constructive and reflective individual, critical and analytic thinking, creativity, self confidence, motivation, curiosity and perseverance

(Programme for International Students Assessment- PISA, 2012). These skills were pointed out as those that can enhance learning and necessary for accomplishment of task(s).

Another variable is time management soft skills. Time management soft skills are individuals' abilities to use time efficiently in order to accomplish well defined tasks (Dalli, 2014). According to Zulauf, Blodg and Gortner (2015), time management soft skills include setting goals and priorities, as well as using time well. Time management is the art of arranging organizing, scheduling and budgeting one's time for the purpose of generating more effective work and achievement (Lakein, 2003). It can be deduced from Misra (2000) view that an in-school adolescent who spends his time on irrelevant things instead of concentrating on studies may end up having poor academic performance. Thus, individuals with poor time management soft skills could ineffectively utilize their time and as a result, many tasks will be left undone thereby resulting to a feeling of failure, frustration and unhappiness which may in turn affect individual's achievement negatively.

Based on the foregoing, communication, intra and interpersonal, teamwork, problem solving and time management soft skills are perceived or thought by researchers as possible determinants of achievement in life generally, and school in particular. However, the claim that students who possess ample amount of these soft skills are likely to complement their learning and consequently improve their academic achievement is still in doubt since students who are lacking in the dimensions of soft skills mentioned above are still likely to excel in their academic pursuit, and the other way round. Moreover, the dimension of students' soft skills that contribute more to their academic achievement is yet to be made explicit by researchers. More so, since students differ in many ways especially in the area of gender, studies are yet to establish how gender in relation to soft skills account for variations in students' academic achievement or the variation in academic achievement that is predicted by soft skills due to gender. Hence, there is a

need to carry out a study to ascertain the amount of variation in students' academic achievement that can be predicted by the various dimensions of their soft skills and the moderating influence of gender in the prediction.

According to Yang (2010), gender can be viewed as social attributes and opportunities associated with being a male and a female and the relationships between women and men, girls and boys. This implies that gender differences are defined by the society based on its norms and values. As observed by Mlambo (2011), gender differences do exist in students' academic performance depending on the subject matter. Zembar and Blume (2011) also indicated that on average, girls do better in art subjects than boys, while boys do better in sciences as compared to girls. Similarly, a standardized achievement test shows that females are better at spelling and perform better on tests of literacy, writing, and general knowledge (National Research Council (NRC), 2011). According to NRC, an international aptitude test administered to fourth graders which is equivalent to primary four in Nigeria in 35 countries, for example, showed that females outscored males on reading literacy in every country. Hence, researchers (Abubakar & Oguguo, 2011; Abdu-Raheem, 2012; & Igbo, & Ihejiene, 2014) considered gender as a reasonable determinant or predictor of students' academic achievement in any subject. Therefore, one can reasonably attempt to ascertain the moderating influence of gender in the correlation between the dimensions of students' soft skills and their academic achievement.

Correlation in this context concerns establishing relationships between two or more variables (Leedy & Ormrod 2010). Correlational studies generally measure the relationship between two or more variables (predictor (independent variable(s)) and criterion (dependent variable(s))) to determine the amount of variation in the criterion variable(s) that can be attributed to the predictor variable (Kappe, Boekholt, Rooyen & Flier, 2009). Correlational studies make use of correlation statistical methods such as Pearson product moment correlation,

Spearman rank order correlation coefficient, Kendall's coefficient of concordance, and regression analysis. Accordingly, Nworgu (2015) noted that correlational-based statistical techniques specifically the regression analysis are employed for making predictions. According to Nworgu, regression analysis is a tool for predicting one variable from one or more variables based a regression equation and the coefficient of determination (r^2). The coefficient of determination is the amount of variation in the criterion variable (dependent variable) that can be attributed to the predictor variable(s). Therefore, correlation is useful to this study since it sought to ascertain the extent to which students' soft skills correlate with their academic achievement in basic science.

Statement of the Problem

There is an increasing rate of poor academic achievement of students in science related subjects. Precisely, the continuous poor academic achievement of students in basic science at the junior secondary school has become an issue of great concern to stakeholders in the educational industry in recent years. This is because it has negative effects on the study of science subjects at the senior secondary and future career aspirations in sciences. Thus, science educators and researchers had anchored most of their researches on factors accountable for the poor academic achievement of students in science subjects. Consequently, efforts at promoting the academic achievement of students in basic science have been focused on teaching methods, effective utilization of appropriate instructional materials, and other teacher-related factors revealed in literature as key determinants. Such efforts have produced little or no improvement on students' achievement in the subject. On this note, more efforts towards improving the academic achievement of students have demanded that affective dimensions of the students should be explored to ascertain whether significant improvement can be made on students' achievement in the subject.

However, students' soft skills have been mentioned by some researchers as good predictors or determinants of their academic achievement, but it is not yet clear about the contribution of the dimensions of students' soft skills to their academic achievement in basic science. Moreover, the separate and joint contribution of the dimensions of soft skills has not been made explicit by any research work. In addition, the dimension of students' soft skills that contribute more to their academic achievement is not yet clear in literature.

Nonetheless, gender has been considered by many studies as a significant factor that account for students' academic achievement in any given subject, but the moderating influence of gender on students' soft skills and their academic achievement has not been clearly established by researchers. Hence, this research work was interested in ascertaining the amount of variation in students' academic achievement in Basic Science that is predicted by their soft skills (communication soft skills, intra and interpersonal soft skills, teamwork soft skills, problem solving soft skills and time management soft skills) and the amount of variation in students' academic achievement that is attributed to the moderating influence of gender on the predictor variables.

Purpose of the Study

The general purpose of this study was to ascertain the extent to which students' soft skills predict their academic achievement in Basic Science and the moderating influence of gender in the prediction. Specifically, the study ascertained the:

1. amount of variation in students' academic achievement in Basic Science that can be attributed to each of the dimensions of their soft skills;
2. amount of variation in students' academic achievement in Basic Science that can be accounted for by all the dimensions of their soft skills jointly.

3. amount of variation in the prediction of students' academic achievement in basic science by their soft skills that is moderated by gender;
4. regression model that can be used in predicting students' academic achievement in basic science based on their soft skills;

Significance of the Study

The significance of the study is viewed from both theoretical and practical perspectives. Theoretically, this study will provide necessary evidence to explain and support existing theories in this area. Specifically, the findings of this study will support and explain Goleman's theory of emotional intelligence which believes that emotional intelligence provides the basis for emotional competencies that in turn promote social and personal skills in individuals for better performance, and this will enhance better understanding of the theory.

From the practical perspective, it is expected that the result of this study will be of great benefits to students, teachers, parents, education administrators, government and researchers alike. In this sense, the findings will enable the students to be adequately informed about the soft skills inherent in them, thus learn how to utilize soft skills that are capable of enhancing their academic achievement.

The findings of this study will be of great value to the teachers. Teachers' knowledge of the influence of students' soft skills on their academic achievement will enable them to restructure their teaching pedagogies and adopt favourable leadership styles to meet the learning needs of the students. This will in turn help in enhancing effective teaching and learning.

Also, findings of this study will serve as a source of information to parents. Parents will become fully aware of the influence of soft skills on their children's academic achievement, thereby creating a favourable home environment that will enable them develop, exhibit and improve on soft skills necessary for their academic success.

More so, the findings of this study will help educational administrators in the educational system to formulate and implement different kinds of educational programmes that will duly consider students' development and improvement in soft skills. In addition, having the knowledge of students' soft skills and how they relate to their academic achievement will help educational administrators in designing the curriculum that will integrate relevant soft skills into the content to compliment the hard skills which the curriculum basically considers, thereby enhancing students' learning and academic achievement in basic science.

Notwithstanding, the result of this study can inform the government on the significance of soft skills to students' academic achievement, thereby funding and supporting an educational system that is capable of producing school leavers and graduates that are found worthy in character and learning.

The regression model that will be obtained from this study can serve as a model for predicting student academic achievement in basic science based on the knowledge of their soft skills, and also in relation to gender differences.

Finally, the findings of this research work will be of great benefit to future researchers and scholars in education enterprise, especially in the area of academic achievement and students' soft skills. This is because relevant materials and information will be made available to them.

Scope of the Study

This study focused on the relationship between students' soft skills and their academic achievement in Basic Science. The study was limited to JSS3 students in Ogoja Education Zone of Cross River State. The dimensions of students' soft skills investigated in the study included; communication soft skills, intra and interpersonal soft skills, teamwork soft skills, problem solving soft skills and time management soft skills. Also, the moderating influence of gender on these dimensions of students' soft skills and their academic achievement in Basic Science was

ascertained. The average score for three consecutive end-of-the-term examination results for 2014/2015 academic session were used as a measure of the Basic Science academic achievement level of the students in this study.

Research Questions

The following research questions guided the study:

1. Which of the dimensions of students' soft skills best-predict their academic achievement in Basic Science?
2. How much of the students' academic achievement in Basic Science can be accounted for by all the dimensions of their soft skills jointly?
3. How much variation in the prediction of students' academic achievement in Basic Science by their soft skills is moderated by gender?
4. What regression model can be used in predicting students' academic achievement in Basic Science based on their soft skills?

Hypotheses

The following null hypotheses were formulated to guide the study and were tested at 0.05 level of significance.

H₀₁: The regression model for predicting Students' academic achievement in Basic Science by their soft skills is not significant.

H₀₂: The regression coefficients associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science are not significant.

H₀₃: Gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills.

CHAPTER TWO

LITERATURE REVIEW

The review of literature for this study was organized under the following sub-headings.

- Conceptual Framework
- Theoretical Framework
- Theory of Emotional Intelligence
- Teaching and Learning of Basic Science in Nigerian Secondary Schools
- Soft Skills: Nature and Dimensions
- Moderator Variables and Predictive Studies
- Empirical Studies
- Summary of Literature Review

Conceptual Framework

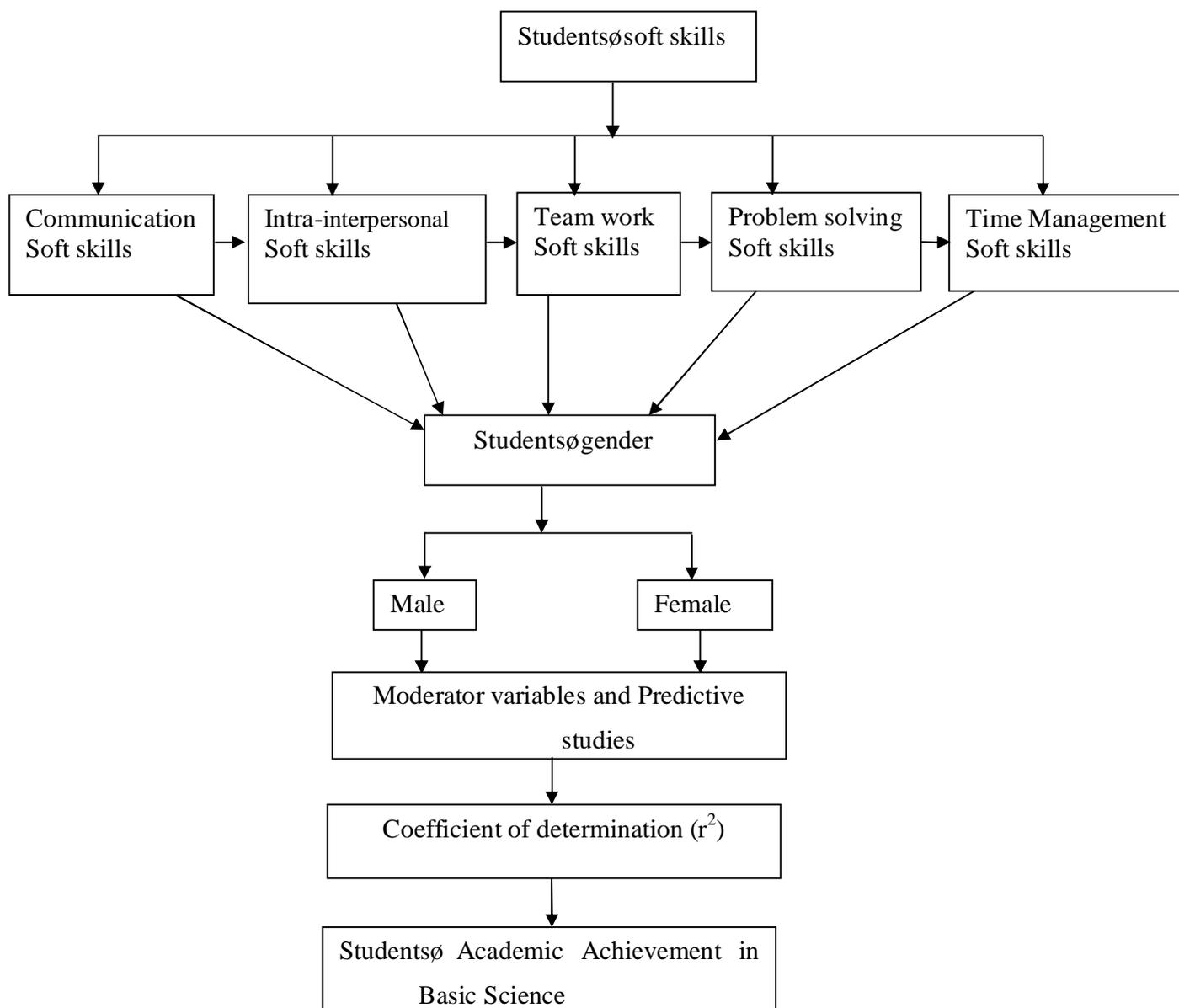


Fig 1: A schematic diagram showing relationships among the variables studied.

The above schema illustrates explicitly the relationships between studentsøsoft skills, and the moderating influence of gender in predicting their academic achievement in basic science using the coefficient of determination (r^2). Studentsøsoft skills (communication soft skills, intra and interpersonal soft skills, team work soft skills, problem solving soft skills and time

management soft skills) were the independent variables, and gender (male and female) was the moderating variable, (all are predictor variables) influencing the prediction of students' academic achievement which was the dependent variable (criterion variable). However, students' academic achievement in basic science had no classification. Hence, this served as a conceptual framework on how this study was carried out.

Theoretical Framework

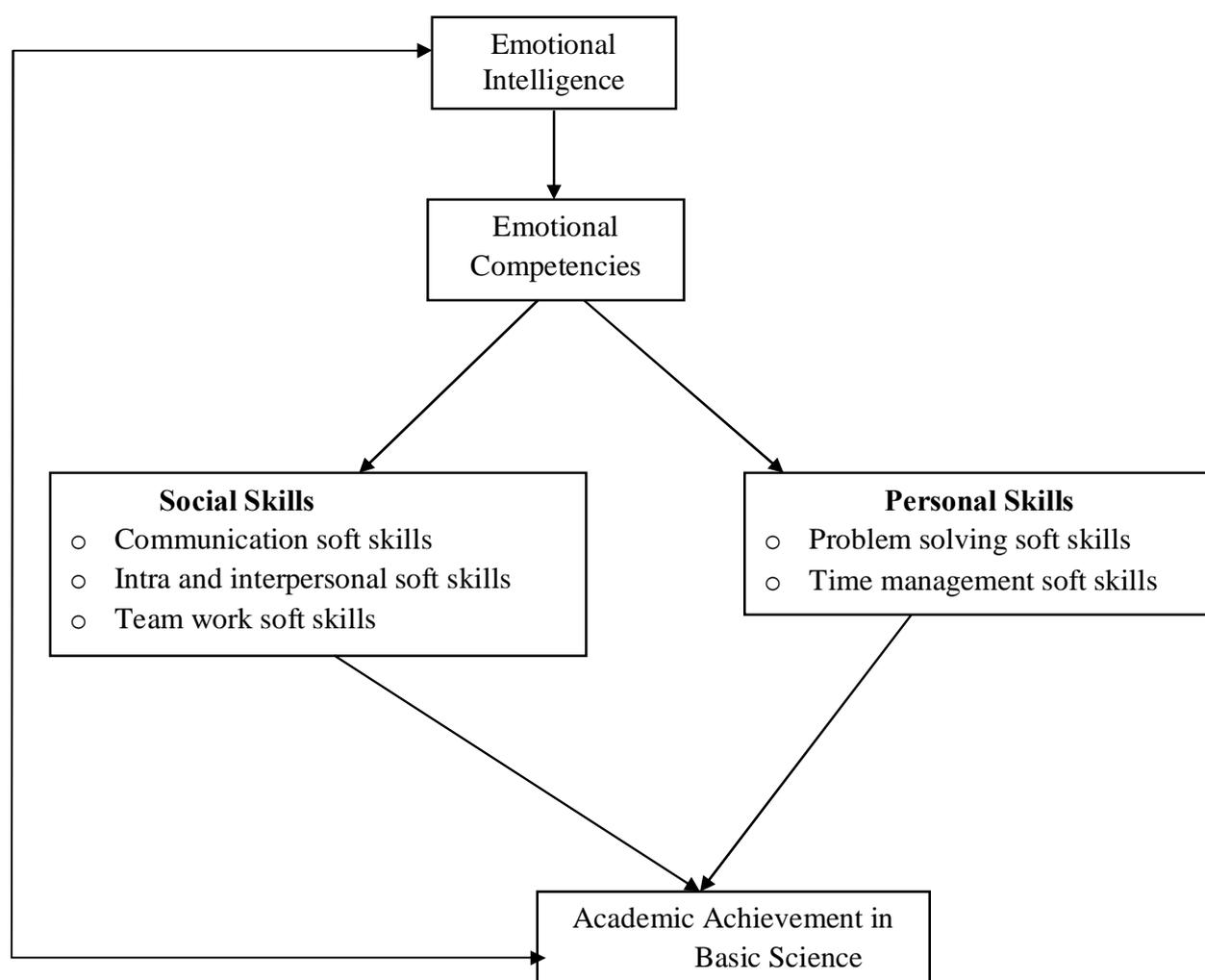


Fig 2: A schematic diagram showing relationships among the basic tenets of emotional intelligence theory and the dimensions of students' soft skills studied.

The above schema shows that emotional intelligence leads to emotional competencies that in turn promote social skills (communication soft skills, intra and interpersonal soft skills and team

work soft skills) and personal skills (problem solving soft skills and time management soft skills). These skills then, jointly contribute to students' academic achievement in basic science which in turn affect emotional intelligence.

Theory of Emotional Intelligence (1996) by Daniel Goleman

Goleman (1996) theorized that emotional intelligence provides the basis for emotional competencies that promote social and personal skills in individuals for better performance. Goleman defined emotional intelligence as the ability to understand the sense of self and others, to motivate self, and regulate emotions in both self and personal relationships with others. According to Goleman, emotional intelligence is considered as an important construct responsible for success in every aspect of a person's life. Goleman explained that those who have high emotional competencies can recognize emotions and influence other people's feelings, as compared to those who have less emotional skills. Thus, those with high emotional skills can normalize their emotions and are able to perform better in all ramifications. Goleman buttressed that IQ (intelligent quotient) contributes only 20% in the success in life and the rest by other factors. Goleman believed that emotional intelligence has a stronger influence on IQ, and can be enhanced if taught in a certain way. This theory was relevant to this work since the basic tenets were based on the fact that emotional intelligence promotes social and personal skills in individuals for better performance. The social skills in the context of this work was related to communication soft skills, intra and interpersonal soft skills and team work soft skills, while the personal skills was related to problem solving soft skills and time management soft skills. These skills are then thought to separately or jointly contribute to students' academic achievement.

Teaching and Learning of Basic Science in Nigerian Schools

The type of science where emphasis is placed on the fundamental unity of science is referred to as basic science. This is an approach to the teaching of science in which scientific concepts and principles are presented to pupils/students as a unified whole to express the fundamental unity of scientific thoughts in order to avoid premature or undue stress on the distinctions between the various fields of science. In Nigeria, the process of presenting science learning activities in school is integrated in nature. According to Aworanti (1991) it is this integration in Science-teaching that gave rise to Integrated Science, now known as Basic Science. It is predicated on the fact that it exposes students to experiences in the field of science and stresses the fundamental unity of science thereby laying adequate foundation for subsequent specialization in different aspects of the subject matter. This is in pursuance of the global demand by the National Standard and goals for reforming science education for more academic rigour in teaching and learning of complex subject matter (National Research Council-NRC, 2011). Thus, the Federal Government of Nigeria embarked on educational reform which necessitated the appraisal of the science curriculum at the Universal Basic Education (UBE) resulting in the unification of Integrated and Technology sciences into Basic Science (Nigeria Educational Research and Development Council, NERDC, 2007). Base on the reform, basic one to six offers the subject as Basic Science and Technology, while, Basic seven to nine, offers it as Basic Science. This new project stressed that science education shall cultivate inquiry, knowing and rational thinking for the conduct of a good life and democracy (NPE, 2004).

Many research studies that had been carried out on the effective teaching and learning of basic science have found, among other things, that lack of qualified basic science teachers; inappropriate methods of teaching; lack of instructional materials; lack of practical works, etc. are the logics behind students' poor academic achievement in Basic Science. In corroboration,

Afuwape and Olatoye (2004) found that lack of qualified teachers, lack of equipment and facilities for teaching, lack of practical works, insufficient allotment of time for integrated science on the school time-table and poor methods of teaching are the major factors militating against the successive implementation of the core curriculum in integrated science. These factors can influence students' development of necessary soft skills for learning, which in turn affect their achievement. However, it is believed that if basic science concepts are not taught from known to unknown and from simple to complex, with students' failure to utilize the necessary soft skills, it is likely that they may find it difficult to understand the concepts taught (Aworanti, 1991). This may lead to the development of negative attitude towards the subject by the students, thereby resulting in many of them not showing interest in offering core science subjects at the senior secondary school level and science-oriented courses at the tertiary institutions. Thus students are expected to build on the Junior Secondary Basic Science for further science education either in single science subject or further integrated science.

According to Aworanti (2012), despite the efforts of science educator in presenting the relevance of the basic science to technological development of the nation, the recurrent students' poor achievement recorded in their end of basic education examination has become a worrisome phenomenon to all stakeholders. According to the author, to ameliorate the issue of poor achievement, quite a number of researchers have reported the impact of some approaches which can serve as remedy to the persistent students' failure, taking into cognizance the fact that a credit pass in Basic Science is a prerequisite requirement for students to study science-related courses at the senior secondary school and higher institution. Thus, if teachers really want to lead students to understand and acquire scientific conception, they need to make use of strategies that can expose students' prior knowledge to facilitate learning of basic science. In the context of this

study, the teaching and learning of basic science was defined as the presentation and acquisition of the basic knowledge of the sciences.

Soft Skills: Nature and Dimensions

The term soft skills have been defined in multiple perspectives by various scholars. Soft skills according to Aworanti (2012) are all the skills other than cognitive or technical (non-technical) skills that are required for a successful performance and career. Aworanti also viewed soft skills as behavioural competencies, interpersonal skills, or people skills which include proficiencies such as communication skills. These skills include a person's skills set, and ability to perform a certain type of task or activity. Aworanti noted that soft skills are often described using terms associated with personality traits, such as: optimism, common sense, responsibility, and a sense of humour. Other terms include integrity, empathy, teamwork, leadership, communication, good manners and sociability.

Soft skills have also been conceptualized as personality attributes that enhance an individual's interaction, on-the-job performance and career prospect unlike hard skills which are about a person's skill set and ability to perform a certain type of task or activity. Soft skills relate to a person's ability to interact effectively with colleagues, mates or peers and others (Obioma, Apeji, Omole, Aworanti, Opara & Adewuni, 2013). "Soft skills are cluster of personality skills or competencies that enable people to relate well in the society, perform excellently on a task and career aspirations". In the words of Kechangias (2011), basic skills such as literacy and numeracy are not sufficient for successful accomplishment of any given task, as such, a number of intra-interpersonal skills (socio-emotional competence), such as communication skills and ability to work in multidisciplinary teams are required,. According to Kechangias, these skills are what people refer to as soft skills in order to differentiate them from technical or hard skills. These soft skills complement hard skills which are technical requirements of task

accomplishment. Therefore, teachers should not only teach and assess students' hard skills (cognitive and psychomotor domains) but are also expected to teach and assess soft skills which are affective based (Durawoju & Onuka, 2014) to develop every individual to become a total man (someone who possesses both hard and soft skills). Put differently, due consideration has been given to the teaching and assessment of both character (soft skills) and learning (hard skills) to ensure a holistic assessment. As noted in most of the literatures concerning this subject matter, some of the soft skills that can be assessed include; commitment, honesty, integrity, honour, motivating, communication, language, common sense, enthusiasm, reliability, adaptability, teamwork, problem-solving, self-management, initiative and a host of others.

Nonetheless, according to the partnership for 21st century skills (P21, 2009) framework definition, soft skills consist of life and career skills, learning and innovation skills, information, media and technology skills, critical thinking, problem solving, communication and collaboration. These skills are viewed as non-cognitive factors necessary for academic or life success, and are often tied to the social-emotional learning. Thus, most educators have grown increasingly aware of the important role soft skills play in ensuring students are adequately prepared for academic success and successful living. Hence, soft skills are necessary for youths to succeed in education, job training, independent living, community participation, and ultimately, performance in workplace (National collaborative on workforce and disability-NCWD, 2011).

Soft skills as noted have been viewed as the ground for all other skills considering their interesting contribution for the configuration of meta-competencies. This is because the mental capacity necessary for learning can only function effectively when it is supported by important socio-emotional dimensions such as soft skills. These which include communication, intra- and interpersonal, teamwork, problem solving and time management skills that have been the focus

of most of the literature reviewed. In this work, the concept and nature of soft skills was defined as emotional or affective competencies (communication soft skills, intra-interpersonal soft skills, teamwork soft skill, problem solving soft skills and time management soft skills) that complement their mental abilities to ensure an optimum or favourable academic achievement.

- **Communication Soft Skills**

Communication can be defined as the process of transmitting information and common understanding from one person to another or amongst people in a group. According to Taylor (2000), communication is a two-way process of giving, receiving or exchanging of information, opinions or ideas so that the message is completely understood by everybody involved. The effectiveness of this two-way process of exchanging ideas or opinions is said to be characterized by efficient utilization of communication skills or competencies such as ability to; read with understanding, convey ideas in writing, and speak so that others can understand, listen actively, and observe critically for non verbal cues. With these competencies, the sender is able to express ideas and reflections clearly, make contacts with other people quickly and provide feedback. In the same vein, the sender is able to look for, find and transfer different information, coordinate all inner and outer thoughts effectively. Accordingly, Lunenburg (2010), opined that communication skills are those tools used by people to remove the barriers to effective communication that prevents messages or ideas from getting through. Hence, Taylor (2000) posited that communication is a learned skill. That, while most people are born with the physical ability to talk, not all can communicate well unless they make special efforts to develop and refine this skill further. This does not mean that one must be a brilliant orator or writer but one's ability to express ideas whether verbal or written, in a coherent, persuading and understandable manner.

Whereas, Society (2009) established that communication is traditionally viewed as verbal (exchanging ideas orally) or non-verbal (exchanging ideas through writing or body language) and involves two common elements such as the sender of a message, and the receiver of the message. Competencies in oral communication (speaking and listening) are the prerequisite to students' academic, personal, and professional success in life (Osborn & Pearson, 2000). It is in this context that communication is reviewed in this study. Thus, in a school or any teaching and learning situation, the sender is a person who has a need or responsibility to convey an idea or concept to others. Indeed, teachers deliver most classroom instruction orally to students and this is also applicable among students themselves. As observed by Osborn and Pearson, students with ineffective listening skills fail to absorb much of the materials to which they are exposed and their problems are intensified when they respond incorrectly or inappropriately because of poor speaking skills. They further expressed that students who cannot clearly articulate what they know may be wrongly judged as not able to understand the lesson taught or poorly informed. In addition, some speech styles of students can trigger stereotyped expectations of poor ability. More so, students who are unable to effectively ask for help from the teacher or more knowledgeable others will not receive it, and typically uncommunicative students progress more slowly despite their level of aptitude. This is because if we fail to communicate, we fail to tell others our existence and our being. However, Pratt and Richards (2014) reported that clearly written and verbal communication, and active listening are skills that enhances academic performance.

According to Lunenburg (2010), in daily interactions, people are confronted with issues and matters that require them to assume certain roles and perform certain tasks. That many a time, teachers and students assume certain roles as facilitators who are involved in interactions concerning certain academic and non-academic activities. Effective communication skills play a

significant role here, in the sense that they are essential for students to gain entry to and be successful in learning and also develop effective written, oral and interpersonal communication skills which will develop students' emotional intelligence and empathy through shared understanding. These skills contribute significantly towards positioning the students for success. Lunenburg further pointed out some communication skills necessary for success to include students' ability to communicate with others, assert their opinions and express their ideas and concept clearly. Thus, effective communication is dependent on communication soft skills such as active listening (paying keen attention to the speaker), efficient speech (clearly understandable oral or verbal expressions), efficient writing ability (meaningful written expressions), good questioning ability (properly seeking information from others) and ability to appropriately use non-verbal cues (eye contact and body language). In this study, communication soft skills was conceptualized as competencies that enable students to exchange ideas or opinions effectively which can enhance their learning achievement.

- Intra and Interpersonal Soft Skills

The concepts of intrapersonal and interpersonal skills have been used by many researchers to explain a number of skills used by individuals to interrelate with themselves and with others. The National Research Council (US) committee on the Assessment of 21st century skills (2009), viewed intrapersonal skills as a cluster of talents or abilities that resides within an individual which enables the individual to relate with self and others. These skills support free-will or discretionary behaviour aimed at accomplishing the goals an individual sets for self accomplishment (Editor & Bash, 2013). Editor and Bash highlighted some examples of intrapersonal soft skills to include self-discipline, delay of gratification, the ability to deal with and overcome distractions, and the ability to adjust one's strategy or approach as needed. In the same light, Irma (2010) explained that intrapersonal skills concerns how one monitors, direct,

maintains and modifies behaviours to approach a desirable goals. The author further opined that the skills concern the capacity of individuals to guide themselves in any way possible toward important goals. Irma also considered intrapersonal skills as self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals. It is important to mention that in this review, most researchers on this subject of discourse acknowledged that intrapersonal skills are utilized within an individual to guide self towards some sets of goals.

Nonetheless, intrapersonal skills result from three developmental levels as indicated by (Weiner,2000). According to Weiner, these three levels include: basic skill level, complex skill level and coherence level. The basic skill level involves development of simple self-awareness, skills of basic independence, and a genuine curiosity about oneself and the world. The self-awareness enables an individual to express a variety of feelings and moods and develop consciousness about the existence of the self. On one hand, the complex skill level involves acquiring skills of self reflection, selfóunderstanding and self-esteem, including the ability to step outside of the self and reflect on oneø thinking, behaviour and moods. Moreover, the coherence level involves expanded development of the skills of introspection, including meta-cognition, self-analysis, mindfulness, personal beliefs, values and philosophies of life. All these were identified as factors that make or mar learning acquisition. Thus, many researchers believe that at the heart of our inner world are the strengths that people are relying on to understand themselves and others, imagine, plan, and solve problems. Qualities such as motivation, determination, ethics, integrity, altruism, empathy and as well as development of sense of humour lie in this inner world. Without these inner resources which are considered in this work as intrapersonal soft skills, it is very difficult to live a productive life in the fullest sense, since a

growing sense of identity that results from the inner world forms the basis for other positive, social relationships, thus the interdependent of intra and interpersonal skills(Weiner, 2000).

On the other hand, much of what is most important about social relationships are interpersonal skills that characterizes how individuals deal with others. Awareness of one's own and others' interpersonal skills can help people enormously in dealing with the task they are responsible for. Accordingly, Markovic and Axmann (2007) reported that, developing good interpersonal skills socially and otherwise begins with looking outwards: being very generous with praise and having a genuine desire to listen and encourage others at every opportunity. Suffice to say that many people are only interested in hearing their own voices, dominating or putting their colleagues or mates down and this have caused such social relationships to fail. Thus, individual(s) with doubts about dealing with others can improve the situation by trying to listen more than speak, make constructive criticisms, and not destructive ones, be assertive as well as being persuasive than divisive. On this note, initiating a conversation is one interpersonal skill, and maintaining it is another (Weiner, 2000). Noting further, it was state that an effective conversation that characterize interpersonal skills is one that "flows" and "goes forward," and capable of able to keeping a conversation from being stuck or breakdown on the way. In this regard, making a general statement can give an insight to those involved on the next issue of discourse and can also serve to illustrate principles shared, or personal experiences acquired.

According to Editor and Bash (2013) interpersonal Skills are skills used by a person to properly interact with others. They are dictated by one's communication and listening abilities, attitude, manners and behaviour. Importantly, interpersonal skills enable individuals' ability to get along with others while getting an assigned task done. In other words, it entails an individual's ability to build a relationship with others; hence they are prerequisite for social

belongingness and task accomplishment in group settings. These skills according to Editor and Bash, concerns how people express their confidence, ability to listen, and understand, solve problems, make decisions, manage self and develop their emotional intelligence which implies knowing oneself in social interactions and being willing to share ideas and feelings with others. They also deal with the ability to identify, assess, and control the emotions of oneself and others, awareness of oneself and emotional understanding, self-management, control of personal emotions, social awareness and understanding about the surrounding social atmosphere and communicating clearly to inspire and influence others.

Moreover, interpersonal skills determine the ability to recognize and connect with others using nonverbal cues, the ability to be humorous, and playful to deal with social challenges and also, the ability to resolve conflicts positively, and with confidence. Imperatively, the ability to persuade and resolve conflicts is crucial if social groups must move forward, therefore people need necessary interpersonal skills to develop mutually beneficial relationships so as to influence and persuade other people. Put differently, these skills help individual(s) to guide others, resolve conflict and negotiations, advocate for others, and influence people's thoughts or actions, and the ability to relate adequately with self and other people. In this study, intra-interpersonal soft skills was defined as skills that enable students to interact with self and with others, which are capable of influencing learning achievement.

- Teamwork Soft Skills

A team is a small group of people with common goals, priority and which work towards achieving a uniform goal. Teamwork is the term used to explain a variety of activities involving joint intellectual effort by students, or students and teachers together (Ivanova-stenzel, Kübler, Ivanova-stenzel, & Kübler, 2005). It involves the use of organized small groups in where pupils or students work together to maximize and gain from each other. Hence, pupils/students are

expected to help, discuss and argue with each other, assess each other's current knowledge, and fill gaps in each other's understanding. Put simply, teamwork is a process by which people interact together on a task in order to accomplish it.

Teamwork enhances students' creativity, mastery of subject matter, cultural competence and lifelong learning. Thus, teamwork requires a small number of students to work together on a common task, supporting and encouraging one another to improve their learning through interdependence and cooperation with one another (Maharani, 2014). However, the formation of a team depends on the task that has been set, the expectations of the team members, and the learning outcomes. For students, the formation of a team can be daunting due to little previous experience, or perhaps few positive experiences in a teamwork setting. The processes used to form the team can set the foundations for effective team experiences in the future, and how students are allocated to teams must be carefully considered and the actual task assigned to a team should depend on the size of the team (Apesteguia, 2012). In other words, the size of the team is related to the context of the task, the number of students in the class, and available time and resources. It has been noted that as a general rule teams made up of three to six people usually perform well and deliberation on the time it takes to check team progress, mediate and assess is a vital consideration when determining team size. Moreover, a well-organized and supported teamwork will increase students' confidence to engage in teamwork activities throughout their learning and working careers and consequently increase their learning outcome. Students can learn in teamwork whilst immersed in a task, but negotiate tasks better when explicit and transparent teamwork procedures and processes are made available and explained.

Notwithstanding, some researchers (Ivanova-stenzel, 2009; Bukunola & Idowu, 2012) believed that most teamwork groups usually comprise five students or more, and allow everyone to participate in a clearly designed task. Students within these teams or small groups are

encouraged to share ideas and materials and divide the work when appropriate to complete the task. Small group competitive learning provides students with opportunity to explore and discuss topics with peers in a Bonds-on, interactive environment (Kübler, 2008). They further maintained that students benefit academically and socially in teamwork task. The theoretical foundations of teamwork grew out of the work of social psychologist called Morton, who observed that social interdependence and interaction among students on specific tasks increases their mastery of critical concepts (Bear, Woolley, Bear, & Woolley, 2011). In other words, students who interact with others explain and discuss each other's point of view, and this can lead to greater understanding and learning.

Nonetheless, struggles to resolve potential conflicts during teamwork activities results in the development of higher level understanding(Ivanova-stenzel, 2009). Teamwork activities enhance elaborative thinking and more frequent giving and receiving of explanations, which has the potential to increase depth of understanding, the quality of reasoning, and the accuracy of long term retention (Bukunola & Idowu, 2012). It is pertinent to state that, in teamwork, team members must promote each other's learning and success face-to-face; hold each other personally and individually accountable to do a fair share of the work, use the interpersonal and small group skills needed for collaborative efforts to be successful and process as a group effectively working together. In this work, teamwork soft skills is defined as students'skills that enable them to work conscientiously and cooperatively with others which are capable of influencing their academic achievement.

- **Problem Solving Soft Skills**

Problems are situations with no obvious solution, and solving problems requires thinking and learning in action. Invariably, problem solving begins with recognizing that a problem situation exists and establishing an understanding of the nature of the situation. It requires the

solver to identify the specific problem(s) to be solved, plan and carry out a solution, monitor and evaluate progress throughout the activity. That is why Adesoji (2008) strongly believed that problem solving involves initiating, usually on the basis of hunches or feelings, interactions with the environment to clarify the nature of a problem and potential solutions, so that the problem-solver can learn more about the nature of the problem and the effectiveness of their strategies, modify their behaviour and launch a further round of experimental interactions with the environment.

According to Adeyemi (2008) problem-solving involves a systematic application of acquired knowledge to overcome any obstacle perceived by an individual as a problem. More elaborately, PISA (2012) defined problem-solving competence as an individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. On this note, Salami and Aremu, (2002) revealed that problem solving ability is predictive of study behaviour of secondary school students. In the same vein, Adeyemi (2008) noted that girls had higher achievement mean than boys in problem solving strategy group. In contrast to this, (*PISA 2012 Results: Creative Problem Solving*, 2012) observed that boys scored seven points higher than girls in problem solving, on average across Organization of Economic Cooperation and Development (OECD) countries. The variation observed among boys was also larger than the variation observed among girls.

PISA also acknowledged that in a school situation, students' willingness to engage with novel situations is an integral part of problem-solving competence and this depends on their perseverance (whether they give up easily) and openness to problem solving (like to solving complex problems) and so on. According to Osuolale (2014), many researchers strongly support the view that good teachers and well equipped schools can enhance students' overall problem-solving skills such as critical thinking, analytical thinking, creativity, common sense, motivation

and curiosity in addition to their competence in regular curricular subjects. Osuolale pointed out essentials of problem solving activities and skills to include; problem definition and formulation, generation of alternatives, decision making, and solution implementation as well as solution verification. Notwithstanding, while problem-solving skills are increasingly needed in learning, the ability to adapt to new circumstances, learn throughout life, and turn knowledge into action has always been important for full participation in society (PISA, 2012).

However, problem solving as a student-centered instructional strategy enables students to solve problems and reflect on their experiences (Salami and Aremu, 2002). According to the author, problem solving stems from the constructivist principles of learning. These principles posited that learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts. The strength of constructivism lies in its emphasis on learning as a process of personal understanding and the development of meaning in ways which are active and interpretative. In this domain, learning is viewed as the construction of meaning rather than as the memorization of facts. In problem solving, emphasis is laid on thinking skills, which is integrating knowledge, skills and behaviours (Adesoji, 2008). As stated, it also includes integration of concepts and skills to get over the unusual complete situations.

Though problem-solving is the ultimate goal of learning, it is more about facilitating students' learning through solving real-life and authentic problems and also, integrating knowledge across discipline. It is process-oriented and; requires self-directed, problem-driven learning; and takes a holistic approach to teaching/training and learning through reflection (Osuolale, 2014). By implication, it is characterized by; learning driven by challenging, open-ended learning, ill-defined and ill-structured problem, and student-centered instruction which can be considered as a potential method for enhancing intrinsic motivation among student. Thus, problem solving as a student-centered instruction attempts to engender active learning by using

methods such as cooperative learning, open-ended assignments, critical thinking exercises, simulations and problem solving activities (Osuolale, 2014). This approach leads to students being more challenged and being given more choice and control over instructional activities, which can enhance intrinsic motivation for proper task accomplishment (Adeyemi, 2008).

Furthermore, problem-solving skills enables students to be actively involved in the teaching learning process, whereby students think out solutions to problems and the teacher only guide by giving hints or suggestion as the need arises. The students thus develop the ability to discover the required knowledge by themselves through trial and error. With this, students understand the nature of the problem and apply the knowledge to solution of other problems. This method presents a constructivist learning situation that provides students with the opportunity to explore, speculate and brainstorm in an emotionally supportive atmosphere where they must be willing to engage in activities, participate in discussions, and write about experiences in order to pursue topics in depth (Ifamuyiwa & Ajilogba, 2012). In this light, it provides opportunity for students to determine, challenge or add to existing beliefs and understanding, and also describes the stages or the sequences of steps used in problem-solving that allows students to fully explore their residual knowledge and skills cum available information to solve the problem at hand. In the context of this work, problem solving soft skills represented skills applied by students in solving different tasks whether as class work, assignment, weekly test, or examination which can affect their academic achievement.

- Time Management Soft Skills

Time may be described as a measure of the duration and order of events in the past, the present and the future. Although every individual has 24 hours of time to work each day, it is the effective use of time that distinguishes achievers from non-achievers in all spheres of life. According to Olowookere, Alao, Odukoya, Adekeye, and Agbude (2015), time is the scarcest

resource available and many times people's highest priorities are not reflected in their actual daily activities. That is why most times, students face a number of pressures that are distinct from the stresses pupils face, thus the need for proper planning and time management to avoid distress becomes imperative. The above authors mentioned that there is a significant and positive relation between time planning and academic achievement of students. They also indicated that the problems of students in Nigerian schools include time management, study habits, note taking, internet skill, the elimination of distraction and assigning a high priority to study.

Time-management practices have also been found to predict school achievement. However, the development of such time management skills has not been effectively incorporated into academic counselling and teaching in Nigerian schools. According to Dalli (2014), teachers have neglected the teaching of necessary study skills like time management in their effort to encourage study habits among students. Students' time management skills and personal development have been the research interests of educational researchers (Olowookere, Alao, Odukoya, Adekeye, and Agbude, 2015) in time past. They explained that although time management has been theoretically linked with academic performance, there is a dearth of literature on the impact of time management practices on character development and the link between such characters and academic performance. They further noted that past researchers have found time management as one of the predictors of students' academic performance and achievement. Similarly, Dalli (2014) reported a correlation between time management, stress reduction and academic success. Also, they associated students' poor time management with academic underachievement. They asserted that a positive significant relationship exist between students' grade point averages and time management skills or long-range planning. They further maintained that academic competence, test competence, time management and test anxiety are significantly related to students' academic performance.

However, the students who are perceived to have good time management are those that have the desire to achieve, result in higher level of academic performance. Nzewi, Chiekezie, and Ikon (2014) opined that, success can only be achieved in school when teachers shows good example of time management, but the practice in most of the secondary schools is that school activities seems not to respect the school time table. In this sense, it is a law abiding student is the one who the school authority expect to arrive on time for lessons, and wait for the teacher, while law abiding teacher is expected to respect all the time allocated on the timetable. This is because efficient use of time on the part of the students and school administrator could be directly associated with increased academic performance. In this light, many researchers (Dalli, 2014; Olowookere, Alao, Odukoya, Adekeye, & Agbude, 2015) believe that extra time study has a strong influence on academic attainment. These researchers also believe that time management is a way of monitoring and regulating oneself with regards to the performance of multiple tasks within a certain time period. Therefore, to improve academic performance, both the student and staff self attitude and participation is required as a principle of time management practice. These by implication shows the significant role time management plays in enhancing school performance, stress management and work output generally. In the context of this study, time management soft skills are skills possessed by students that enable them utilize or prioritize time for the numerous activities they face on daily basis which can exert effect on their academic achievement.

Moderator Variable and Predictive Studies

Researchers may be interested in questions related to moderation, or the changes that occur in a relationship as a function of some moderating influence. Specifically, within a correlational analysis framework, a moderator is a third variable that affects the correlation between two variables. According to Chin (2006), a moderator variable is a qualitative (e.g., sex

or gender, race, class) or quantitative (e.g., level of rewards) variable that affects the direction and/or strength of the relation between a predictor (independent) and criterion (dependent) variables to produce either a main or an interactive effect on the outcome (criterion variable). The author emphasized that in a more familiar analysis of variance (ANOVA) terms, a basic moderator effect can be represented as an interaction between an independent variable and a factor that specifies the appropriate conditions for its operation (dependent variable). In other words, a moderator is a variable that specifies conditions under which a given predictor is related to an outcome. This also implies that the relationship between a predictor and criterion variables changes as a function of the moderator variable's effect. It explains "when" a dependent variable and independent variable are related showing an interaction effect of the relationship between the two variables.

However, this effect could be positive, where increasing the moderator would increase the effect of the predictor (independent variable) on the outcome (dependent variable) or negative, where increasing the moderator would decrease the effect of the predictor on the outcome and more so antagonistic, where increasing the moderator would reverse the effect of the predictor on the outcome (Wuensch, 2014). Wuensch further noted that, to test moderation, one will precisely consider the interaction effect between predictor variable and moderator variable and whether or not such an effect is significant in predicting the criterion variable. That, this is in turn done by including an interaction effect in the model and ascertaining if indeed such an interaction is significant and helps explain the variation in the criterion variable better as predicted by the predictor variable.

According to Fairchild and MacKinnon (2009) the moderation effects are tested with multiple regression analysis, where all predictor variables and their interaction (total effect of X on Y) term are centered prior to model estimation to improve interpretation of regression

coefficients. The regression coefficient for the interaction term provides an estimate of the moderation effect. In addition, when the moderating influence is measured in a continuous manner, this influence is generally modeled by creating a new variable that is the product of the variable that is being moderated and the variable that is moderating (Little, Card, Bovaird, Preacher & Crandall, 2007). The authors further explain that, the interaction term of the moderator variable on predictor and criterion variables is then entered into the regression equation after the linear main effects on the outcome of the moderating and moderated variables are estimated. More so, if the effect of is significant, then the effect of predictor variable on criterion variable is dependent upon the levels of the moderator variable. This is fundamental to predictive studies.

Predictive studies measure the relationship between two variables, the predictor (independent variable) and criterion (dependent variable) to determine the amount of variation in the criterion variable that can be attributed to the predictor variable. These studies make use of correlation statistical procedures such as Pearson product moment correlation, Spearman rank order correlation coefficient, Kendall's coefficient of concordance, and regression analysis among others to determine the extent to which two or more variables are related. Moreover, these statistical techniques help to establish the extent of relationship, association, or co-variation between two or more variables usually expressed as a correlation coefficient. Accordingly, Nworgu (2015) noted that correlational-base statistical techniques are employed for making predictions, specifically the regression analysis. The author viewed regression analysis as a tool for predicting one variable from one or more variables based a regression equation and their coefficient of determination (r^2). The coefficient of determination is an indicator of the amount of variation in the criterion variable (dependent variable) that is attributed to the predictor variable(s).

In education, predictive studies help to accurately predict student behaviours notably in the areas of learning outcomes, admission, and retention (Kappe, Boekholt, Rooyen & Flier, 2009). For instance, by analyzing students' achievement, this can help to inform the school or institution as to which area students are most likely to enroll and perform optimally. They present some ideas about future improvements by collecting information from more varied sources to predict future achievement. Thus, Edokpayi and Suleiman (2011) in their study revealed that the academic achievement of students in integrated science in the junior secondary school certificate examination (JSSCE) was a poor predictor of later achievement in chemistry at the senior secondary school certificate examination (SSCE). Similarly, Ugwu (2011) revealed that, students' achievement scores in Pre-NCE Chemistry, physics and Biology, relate positively or are predictors of their achievement in NCE Integrated science. In the same way Agah, Akobi and Okorie (2016) on computer anxiety, operation skills and attitude as correlates of students' preparedness for computer based assessment. The result showed that computer anxiety, operation skill and attitude are good predictors of students' preparedness for computer-based-assessment with an R^2 (coefficient of determination) of .89 indicating that the variables jointly contributed 80% to students' preparedness for computer-based-assessment. Also, on joint contribution of variables, Mamah, (2015) studied parental socioeconomic status and home education environment as correlates of students' academic achievement in physics, and the result showed that .67 (67%) of variation in students' academic achievement was jointly predicted by the predictor variables- parents' income, parents' education, parents' occupation and home education environment.

It was earlier observed by Ajayi and Muraina (2011) that researches over the years, have indicated that academic achievement has numerous determinant factors ranging from socio-economic status, age, gender, attitude, interest, to teaching methods and so on. Hence, researches

have continued to focus on studying the separate and joint effects of these factors as predictors of students' academic achievement in different school subjects. Accordingly, Ogundokun and Adeyemo (2010) found that emotional intelligence, age and academic motivation were potent predictors associated to academic achievement using Pearson product moment correlation coefficient and regression analysis to establish the strength the relationships. In the same vein Abubakar and Oguguo (2011) carried out a study on age and gender as predictors of academic achievement of college mathematics and science students, using multiple regression analysis, the result revealed a linear relationship between the predictor variables and the criterion variable. Also, the predictor variables jointly accounted for 1.3% of the variance, with gender as the better predictor of academic achievement of the students but not gender with soft skills as predictor as in this study.

In another study by Oludipe (2014) on gender and science anxiety as predictors of Nigerian junior secondary students' academic achievement in basic science, the researcher used descriptive statistics and univariate Analysis of Variance (ANOVA) in analyzing the data collected from a sample of 120 students. The result revealed that there was no significant effect of gender on students' mean score in basic science. However, this study failed in establishing the amount of academic achievement that was due to being a male or female. Nonetheless, the method of data analysis has no predictive power as indicated on the topic of the study. Therefore, this present work hopes to provide adequate empirical data to this effect. Similarly, Omenka and Kurumeh (2012) carried out study on gender and location as correlates of achievement in number and numeration using ethno mathematics approach in junior secondary schools in Benue state. Using a sample of 175 JSS 2 students in intact classes, data collected were analyzed using mean and standard deviation and analysis of covariance (ANCOVA). The findings revealed that gender did not significantly affect achievement in number and numeration using ethno

mathematics approach. However, the study was carried out using quasi experimental design whereas this study used a correlational design and its statistics which is most appropriate.

Empirical Studies

Several studies that have summarized or reviewed previous researches on this topic were not conclusive about the students' soft skills as correlates of their academic achievement.

Studies Related to Communication Soft Skills

Azizi, (2009) carried out a study on the relationship between self-concept and communication skills towards academic achievement among secondary school students in Johor Bahru. The study was guided by nine null hypotheses. Descriptive survey research design was adopted for the study. The population of the study comprised 10,694 form four students from 39 government aided schools in the Johor Bharu District. A sample of 370 students from 10 different schools was randomly drawn for the study. The instruments used for data were; Tennessee Self Concept Scale (TCS) and Interpersonal Communication Skills Inventory (ICSI). Data collected were analyzed using correlation analysis. The results indicated that the majority of the students possessed the moderate level of self-concept and communication skills. Self-concept and communication skills correlated quite significantly with students' academic achievement. The study was related to this work in three ways. Firstly, both studies considered communication skills as a variable. Secondly, the study adopted descriptive survey research design which this work also adopted. Thirdly, the method of data analysis in these two studies was similar. It is pertinent to point out that, Azizi study failed to ascertain the amount of variation in students' achievement that can be attributed to communication skills which this study hopes to establish. Moreover, the variables of the studies, areas of study and the population of the two studies are not the same; hence the two works are different. Therefore this study was necessary.

In a study carried out Baba (2010) on communication skills improvement needs of lecturers of business courses in polytechnics in North Central States of Nigeria, four (4) research questions and two null hypotheses guided the study. A descriptive survey research design was adopted for the study. The population of the study comprised 341 lecturers of business courses in the ten (10) polytechnics in the North Central States, Nigeria. No sampling technique was used and no sample was drawn since the population was small and manageable. The instrument employed in data collection was a five-point bipolar scale constructed and validated by the researcher. The data collected were analyzed using mean and standard deviation to answer the research questions, while the null hypotheses were tested at 0.05 level of significance using Analysis of Variance (One-way ANOVA). The result of the study showed that lecturers of business courses in the area need to improve on their communication skills which are necessary for both teaching and learning.

The above study was useful to this work because it provided insights on communication soft skills in this current study. But, study did not show clearly the extent of improvement on communication skills needed by the lecturers and how such skills influence teaching and learning in their courses. The study should have adopted the census survey design since the entire population was used for the study rather than the descriptive survey research design employed. In the same vein there was no need for inferential statistics in the analysis of data since no sample was drawn from the population. Apparently, the research design, population and area of study of this work, were different from those employed in the above study. The method of data analysis was also different; hence this study was imperative since the two works were very different.

In a similar study carried out by Duru (2012) to determine the relationship between communication skills and administrative performance of principals in secondary schools in

Okigwe Education Zone in Imo State of Nigeria, five research questions and three null hypotheses guided the research. The researcher employed the descriptive survey research design. The population of the study comprised all the 29 principals and 343 teachers of the state secondary schools in the area. No sampling was done since the population size was small and manageable. The researcher used a 32-item communication patterns and administrative performance of principals questionnaire (CPAPPQ) as instrument for data collection. This instrument was constructed and validated by the researcher. Data collected were analyzed using mean and standard deviation to answer the five (5) research questions, while Z-test statistic was used to test the three (3) null hypotheses at 5% level of significance. The result of the study showed that communication skills influence the administrative performance of secondary school principals to a greater extent. Therefore, there is a significant relationship between communication skills and administrative performance of principals in secondary schools.

However, there were some similarities between Duru's study and this one. Firstly, communication skills in the above study was related to communication soft skills in this present study. Secondly, administrative performance of principals was also similar to students' achievement in this present research work; hence the study was of great help to this work. But the study was criticized in terms of methods and procedures employed. In essence, the study should have adopted the census survey design since the entire population was used studied rather than the descriptive survey research design employed. In addition, there was no need for inferential statistics in the analysis of data since no sample was drawn from the population. Notwithstanding, the study is different from this one. The differences exist in the peculiarity of communication soft skills, the area of this study which was Ogoja Education Zone in Cross River State, the research design, area of the study, population of the study and the sampling technique.

Nonetheless, the methods of data analysis which the researcher employed in this study were not the same with those employed by Duru. Therefore this study was necessary.

Furthermore, Ofeoshi (2013) carried out a study aimed at investigating the influence of communication skills on administrative performance of staff of Federal Ministry of Education, Abuja, Nigeria. The study was guided by five (5) research questions and five (5) null hypotheses. The researcher used Ex-post facts research design. The population of the study consisted of the 18,380 administrative and non-administrative staff of the Federal Ministry of Education, Abuja, from grade level four (4) to seventeen (17). A stratified random sampling technique was used to draw a sample of nine hundred (900) staff from the above population, from whom data were collected. In the analysis, the researcher used mean and standard deviation to answer the research questions, while the t-test statistic was used to test the null hypotheses at 5% level of significance. The result of the study basically revealed that effective communication skills influence administrative performance of staff. Hence, there is a significant relationship between communication skills and administrative performance of staff.

The study was of immense relevance to this research since it considered communication skills and administrative performance of staff which are similar to communication soft skills and students' achievement respectively. Although the study provided an insight on communication soft skills, it did not show explicitly the extent to which communication skills influence administrative performance of staff. Moreover, the study did not consider the relationship between communication skills and students' academic achievement as in the case of this study. Notwithstanding, the research design, the population and area of the study were different from those used in this study. Also, the method of data analysis was different, hence this study was pertinent in these regard.

Again, in another study by Onwe (2013) aimed at investigating the influence of communication skills on the performance of secondary school students in Ebonyi State, five (5) research questions and three(3) null hypotheses guided the study. The researcher adopted the ex-post facto research design for the study. The population of the study comprised all secondary school students in Onueke and Afikpo Education Zones of Ebonyi State. A sample of 423 students (3% of the population) was randomly selected from the 141 state-owned secondary schools in the area. A researcherø developed questionnaire with 29 items was used as the instrument for data collection. The data collected by the researcher were analyzed using mean and standard deviation in order to answer the research questions, while the t-test statistic was used to test the null hypotheses. The findings indicated that studentsø communication skills have significant influence on their performance.

Obviously, the findings of the study gave a clue to what communication soft skills are. But lacked the dept this study hoped to provide. However, the research design, the population and area of the study were totally different from those this study used. As well, the method of data analysis was also different. Therefore, this present work was indispensable.

Studies Related to Intra and Interpersonal Soft Skills

Ogbonna (2015) carried out a study aimed at examining the influence of classroom interaction patterns on studentsø interest and achievement in Government in Nsukka Local Government Area of Enugu State, Nigeria. The study was guided by six (6) research questions and four (4) hypotheses. The ex-post facto research design was adopted for the study. The population of the study comprised all Government teachers and senior secondary two (SSII) students in the area. The sample of the study was made up of four (4) teachers and one hundred and sixty (160) SSII Government students drawn from the population using multi-stage sampling procedure. Data were collected from the sample using the modified Flandersø interaction

analysis categories (MFIAC) and Government interest inventory (GII). The data were analyzed using simple percentage to enable the researcher answer the research questions, while the hypotheses were tested using multiple regressions and transformed t-test statistic. The results showed that classroom interaction patterns are dominated by teachers and students who have good self-concept and interpersonal relationship with others. The result also showed that a significant relationship exist between classroom interaction patterns and students' interest and achievement in government.

The study is useful to this study in the area of interaction patterns, which involves exhibition of intra and interpersonal soft skills thereby providing relevant information for this study. The study also informed the researcher on the application of regression analysis. However, students' achievement in Government differs from the students' achievement for this study. Moreover, the research design used also differed, the population of the study and area of study as well as the method of data analysis was also different. As a result of these, the two works were different which necessitated this study.

The study by Afuwape (2011) aimed at investigating the relationship between students' self-concept and their academic achievement in basic science, and also to examine gender difference in students' performance in basic science. The study was guided by three research questions. The ex-post facto research design was adopted for the study. The population of the study comprised all JSSII students in Olorunda Local Government Area of Osun State. A sample of three hundred (300) JSSII students from six public schools was drawn using simple random sampling and used for the study. The instruments used for data collection were adolescent personal data inventory (AFDI) and students' achievement test inventory (SATBS) which the researcher constructed and validated. In the data analysis, the researcher made use of t-test, Pearson correlation coefficient and analysis of variance statistics. The result established that self-

concept influences students' achievement. It also showed that students' gender influences achievement.

The above study can be criticized in terms of the design adopted. The design for the study preferably should have been a correlation design and not ex-post facto. This is because the study was basically concerned about determining relationships. Nonetheless, the use of inferential statistics in the study was quite unnecessary since it was not guided by any hypotheses, as such inferences cannot be drawn. Notwithstanding, the study was related to this study in two aspects; firstly, students' self-concept which is a contributing factor to intra-interpersonal soft skills, and secondly, the academic achievement in basic science. But the study was not explicitly focused on intra-interpersonal soft skills. However, the research design, population of the study, area of the study and method of data analysis were different from those used in the above study. For this reason, this study was necessary.

Azizi, Bachok, Yahaya, Boon and Hashin (2012) carried out a study to examine the impact of the five emotional intelligence or intrapersonal elements identified as self-awareness, emotional management, self-motivation, empathy and interpersonal skills on secondary school students' academic achievement. The study was also to identify whether these five elements of emotional intelligence have been able to contribute to academic achievement. Only one hypothesis guided the study, and the descriptive survey research design was employed. The population of the study consisted of students in secondary schools in Johor Bahru, Malaysia. Some secondary school students in the area were sampled. The data collected with the help of a questionnaire developed, and validated by the researchers were analyzed using Pearson-r and multiple regressions. The results showed that there is a significant relationship between self-awareness ($r = 0.21$), emotional management ($r = 0.21$), self-motivation ($r = 0.20$), empathy ($r = 0.21$) and interpersonal skills ($r = 0.24$) at the level of $P < 0.05$ with academic achievement. A

stepwise multiple regression analysis result also showed that only three elements of emotional intelligence; self-awareness ($r = 0.0261$), empathy ($r = 0.167$) and interpersonal skill ($r = .14$) significantly predicted the criterion (academic achievement).

The above study should have adopted the correlation or ex-post facto research designs and not descriptive survey design. Nevertheless, the study only showed a few results on emotional intelligence elements which intra-interpersonal soft skills depend on. It did not show a clear relationship between interpersonal skills and academic achievement which this present study considers a key variable. However, the study had relevance to this research because it studied emotional intelligence which covers intra-interpersonal soft skills as one of the variable this study. The analytical tools used also had relevance to this work. Moreover, the design of this study, the population and area of study were all different from those employed in the above study, hence, this study was needful.

Studies Related to Teamwork and Problem Solving Soft Skills

Bukunola and Idowu (2012) studied the effectiveness of cooperative learning strategies on Nigerian junior secondary students' academic achievement in basic science. Six hypotheses guided the study. In the study, the quasi-experimental research design of pretest-posttest control group type was adopted. The population of the study was made up of all junior secondary three (JSIII) students in three Local Government Areas in Ogun State, South-west Nigeria. A sample of one hundred and twenty (120) students was obtained from the intact classes of the three (3) selected schools in the area who participated in the study. Achievement Test for Basic Science Students (ATBSS), and Basic Science anxiety scale (BSAS) were instruments used to collect data from the students. Descriptive statistics and Analysis of covariance (ANOVA) were used to analyze the data collected. Also, multiple classification analysis (MCA) was used to determine the magnitude of the mean achievement scores of students exposed to the different treatment

conditions. The results showed that cooperative learning (teamwork) strategies has high effect on achievement mean scores of students. The study also revealed that cooperative learning (teamwork) or learning together is more effective in enhancing students' academic achievement and retention in basic science.

The study was useful to this present research work in two aspects; firstly, it studied the effectiveness of cooperative learning strategies which was liken to teamwork soft skills. Secondly, it studied junior secondary three (JSIII) academic achievements in basic science which this study also used. However, the result did not show explicitly the extent to which cooperative learning strategies influenced students' academic achievement which this study hoped to address. Moreover, the intended research design for this study, the population and area of study were different from those adopted above. As well, the instrument for data collection and the methods of data analysis were different from those employed by Bukunola and Idowu . Therefore, the two research works were different thereby necessitating this study.

In another study by Adeyemi (2008) aimed at investigating the effect of cooperative learning and problem-solving strategies on junior secondary school students' achievement in social studies, three(3) research questions guided the study. The pretest-posttest control group non-randomized quasi-experimental research design was adopted for the study. The population of the study comprised all junior secondary school students in public schools in Ife Central Local Government Area of Osun State, Nigeria. A sample of one hundred and fifty (150) students (80boys and 70girls) was selected for the study from junior secondary three (JSIII) in the area using stratified cluster sampling. A social studies achievement test with a split-half reliability coefficient of 0.78, and instructional packages on cooperative learning and problem solving strategies with a split-half reliability index of 0.92, and 0.84 respectively, were instruments developed and validated by the researcher, and used for data collection. Data collected were

analyzed using analysis of covariance (ANCOVA) and Duncan test. The result indicated that students exposed to cooperative learning strategies performed better than their counterparts in the other groups not exposed to such. The result also revealed that students exposed to problem-solving strategies performed better than their counterparts in the other groups that were not exposed to problem-solving strategies. The results also indicated that the effect of the strategies was gender sensitive.

The above study was important to this one because it studied students' cooperative learning and problem-solving strategies which were directly related to teamwork and problem-solving soft skills respectively in this study. However, the study did not show explicitly the extent to which cooperative learning and problem solving strategies contributed to students' academic achievement which this study considered necessary. Nonetheless, the research design for this study was different from the one adopted in the above study, the population and area of study were also different, the intended instruments for data collection and methods of data analysis were all different, hence the two works were different, which made this study imperative.

Another study was carried out by Ifamuyiwa and Ajilogba (2012) on problem solving model as a strategy for improving secondary school students' achievement and retention in further mathematics. The moderating effect of gender on achievement was also investigated. The study was guided by six (6) hypotheses, and adopted a pretest-posttest control group quasi-experimental research design. The population of the study comprised all the senior secondary two (SSII) students offering further mathematics in Ogun State, Nigeria. A sample of eighty (80) students (40 boys and 40 girls) from two purposively selected schools in the area participated in the study. Teachers' instructional guide (TIG), further mathematics achievement test (FMAT) with 0.76 reliability and students retention test (SRT) with a reliability of 0.75 were instruments

developed, validated by the researchers and used for data collection. Data collected were analyzed using analysis of covariance (ANOVA) at 5% level of significance. Findings showed that problem-solving strategies had significant main effect on students' achievement and retention in further mathematics.

The study was useful to this work because it studied problem solving model as a strategy for improving students' achievement which was directly related to problem-solving soft skills as a variable in this work, thereby providing information that supported it. But, the study did not indicate in quantitative terms the contribution of problem-solving strategies to students' achievement which this work considered necessary. Moreover, the research methods for this study were all different from those employed by Ifamuyiwa and Ajilogba in their study, so the two works varied. Therefore this research work was indispensable.

Studies Related to Time Management Soft Skills

In a study by Nzewi, Chiekezie and Ikon (2014) aimed at examining the relationship between time management and academic performance of postgraduate students in Nigerian universities, one null hypothesis guided the study. The descriptive survey research design was adopted for the study. The population comprised all postgraduate students in Nigeria universities. A sample of two hundred and forty six (246) students were selected from six (6) universities across the geo-political zones in Nigeria using cluster and stratified sampling technique according to the researchers, who participated in the study. The instrument used for data collection was a questionnaire developed and validated by the researchers. The data obtained were analyzed using mean and standard deviation. The Z-test statistic was later used to test the hypothesis at 0.05 level of significance. The result revealed that effective time management skills increased the cumulative Grade Point Average of postgraduate students in Nigeria, although, it failed to indicate quantitatively, how much academic performance can be accounted for

by time management which is a concern to this present work. However, the research design was different from the one used in the above study. The population of study, area of study, and instrument for data collection were also different. More so, the methods of data analysis were different, therefore, the two research works were not the same; as such this study has become pertinent.

A study was also carried out by Alaji (2012) on the effects of time management on academic adjustment of deviant in-school adolescents in Eastern senatorial zone of Kogi State, Nigeria. Five (5) research questions and five (5) null hypotheses guided the study. The researcher employed the quasi-experimental research design of pretest-posttest type involving control and treatment groups. The population of the study was made up of one-hundred and twelve (112) deviant in-school adolescents in the area. No sampling was done since the population was small and manageable. The instruments used for data collection were Academic Adjustment Rating Scale (AARS) and time management training programme constructed and validated by the researcher. The data collected were analyzed using mean and standard deviation to answer the research questions, while the hypotheses were tested using t-test and analysis of covariance (ANCOVA). The findings showed that time management techniques significantly enhance the academic adjustment of deviant in-school adolescents. More so, findings indicated that gender is not a significant factor in the academic adjustment of deviant in-school adolescents. Moreover, that the interaction effect of gender and time management on academic adjustment is not significant, while the interaction effect of location and time management on academic adjustment is significant.

Another study by Okorie (2014) investigated the relationships among peer pressure, time management and academic performance of in-school adolescents in Umuahia Education Zone, Abia State, Nigeria. Five research questions were posed and three hypotheses postulated to guide

the study. A sample of 500 in-school adolescents in the Zone was used for the study. The instrument used for data collection was a questionnaire designed by the researcher. Data collected were analyzed using mean and standard deviation, Pearson product moment of correlation coefficient while the hypothesis was tested at 0.05 level of significance using multiple regression analysis. Findings showed that there is a medium and significant positive relationship between time management and academic performance.

The above studies had relevance to this work because they studied the effects of time management on students' academic adjustment and achievement which are directly related to the time management soft skills variable in this study. The populations of the studies were also related to the population of this work but were different in terms of area and scope of study used. Hence, the above Alaji and Okorie's studies are different from this work which made this work imperative.

Summary of Literature Review

This chapter organized and reviewed relevant literature under the following subheadings: conceptual framework, theoretical framework, teaching and learning of Basic Science in Nigerian Secondary Schools, Soft Skills: nature and dimensions, moderator variables and predictive studies, empirical studies and summary of literature review. The conceptual framework was concerned with explanation of basic concepts related to the subject matter of the study schematically. The theoretical framework schematically illustrated the relationship between the basic tenets of Goleman's theory of emotional intelligence and the dimensions of students' soft skills. The theory explained that emotional intelligence provides the basis for emotional competencies that promote social and personal skills in individuals for better performance.

Teaching and learning of Basic Science in Nigerian secondary schools was considered as the presentation and acquisition of basic knowledge of science. In the review, evidence showed

that there has been underachievement of students in the subject. However, soft skills: nature and dimensions was also reviewed in relation to students' achievement. Soft skills were defined as emotional or affective competencies that complement mental abilities (hard skills) to ensure an optimum or favourable achievement. Soft skills reviewed included communication soft skills, intra-interpersonal soft skills, teamwork soft skill, problem solving soft skills and time management soft skills. Nonetheless, moderating variables and predictive studies were also reviewed. The review showed that moderating variables may influence the direction or magnitude of the relationship between a predictor variable and the criterion variables. Studies showed that integrated science achievement were predictors of future achievement in science related subjects. Also, age and gender were revealed as predictors of students' achievement.

Empirical studies related to communication soft skills, intra-interpersonal soft skills, teamwork soft skills, problem solving soft skill and time management soft skills were also reviewed. Studies reviewed suggested that communication skills/ interaction patterns, intra-interpersonal skills, teamwork skills, problem solving skill and time management skills can significantly contribute to achievement but were yet to show explicitly the proportion of variation in achievement that can be predicted by these skills. Hence, there is need for this present study. More so, it was also revealed that such skills in relation to achievement are gender sensitive. But the studies did not indicate the proportion of students' academic achievement that is predicted by their soft skills using gender as a moderating variable, thereby necessitating this current research. Most of the studies reviewed employed mean and standard deviation, correlation, t-test, ANOVA, ANCOVA and multiple regression analysis. None of the studies focused on the topic of this present study. Hence, this study was necessitated in the need to ascertain the extent to which students' soft skills predict their academic achievement in Basic Science and the moderating influence of gender in each dimension.

CHAPTER THREE

RESEARCH METHOD

This chapter discussed methods and procedures used in this study. The methods and procedures were presented under the following sub-headings: design of the study, area of the study, population of the study, sample and sampling technique, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection and method of data analysis.

Design of the Study

This study employed a correlational survey research design. According to Nworgu (2015), correlation study seeks to establish the relationship that exists between two or more variables. It enables a researcher to find out the proportion of variation in the dependent variable (criterion variable) that is predicted by the independent variable (predictor variable) using regression analysis. The design was appropriate for this study because the researcher was interested in determining the proportion of variation in students' academic achievement (criterion variable) that is predicted by students' soft skills (predictor variables).

Area of the Study

The area of study was Ogoja education zone of Cross River State, Nigeria. The zone comprises five (5) local government areas namely; Obanlikwu, Obudu, Bekwarra, Ogoja and Yala. The area is in the northern part of Cross River State. The inhabitants of the area were predominantly farmers, traders, artisans and civil servants. The area was chosen due to persistent underachievement of students in basic science and science-related subjects as observed by the researcher, and because no research has been carried out to determine the relationship between students' soft skills and their academic achievement in basic science in the area. Besides, the area has different personality of students with a variety of soft skills necessary for this study, and

also basic science is a compulsory subject for all junior secondary school students in the area; hence the area was suitable for this research work.

Population of the Study

The population of this study comprised all the JSS3 students in public or government owned secondary schools in the five (5) local government areas in Ogoja education zone of Cross River State. There are five thousand, seven hundred and twenty one (5,721) JSS3 students in the seventy five (75) public or government owned secondary schools in Ogoja education zone of Cross River State (Source: Ministry of education, zonal directorate, Ogoja. January, 2016. See Appendix 5 pg 95 for details).

Sample and Sampling Technique

A sample of 357 JSS3 students was used for this study. This sample size was randomly drawn from the population of five thousand, seven hundred and twenty one (5,721) JSS3 students in the seventy five (75) public or government owned junior secondary schools in the zone. The sample size represented 5% of the entire population as recommended by Cohen, Manion, and Morrison (2011) for a large population. A multi-stage sampling procedure was employed to determine the sample size. In the first stage, two local government areas (Obudu and Ogoja) were drawn for the study using simple random sampling technique. Using this technique, the names of the five (5) local government areas were written on pieces of paper, folded and put in a container, shuffled and the researcher then randomly drew the two local government areas from the container with replacement. The two local government areas (Obudu and Ogoja) constituted 53% of the population of JSS3 students in the zone. Obudu Local Government Area had twenty one (21) public or government owned secondary schools with a total of one thousand, five hundred and eighty two (1,582) JSS3 students, while Ogoja Local Government Area had nineteen (19) with a total of one thousand, four hundred and fifty one

(1,451) students. The simple random sampling technique was used in order to give each of the five (5) local government areas in the zone equal chance of being included in the sample of the study.

In the second stage, disproportionate stratified random sampling technique was used to draw twelve (12) secondary schools (7 and 5 from Obudu and Ogoja local government areas respectively) for the study. Also, in the third stage, disproportionate stratified random sampling technique was used to draw the 357 JSS3 students from the twelve (12) sampled secondary schools for the study. This was done using the formula; $\frac{n}{N} \times \frac{N_i}{N}$. Where n = number of students in a local government area, N = the total number of students in the two local government areas and 357 = the sample size. See appendix 96 for details of the sample distribution of students drawn from the twelve (12) secondary schools. Disproportionate stratified random sampling technique was adopted at the second and third stage in the sense that the relative proportion of the strata in the sample do not correspond to their relative proportion in the population.

Instrument for Data Collection

Two instruments; Students' Soft Skills Assessment Scale (SSSAS) and Students' Academic Achievement Proforma (SAAP) developed by the researcher were employed for data collection in this study. The Students' Soft Skills Assessment Scale (SSSAS) had two (2) sections; section A and section B. Section A sought information on students' demographic data such as; students' class, examination identification number and gender, while section B consisted of five (5) clusters (I, II, III, IV and V) with a total of forty eight (48) item statements modeled on a modified four (4) point Likert scale to seek information on students' soft skills (communication, intra-interpersonal, teamwork, problem solving, and time management soft skills). Thus, the respondents expressed their level of agreement or otherwise to each of the item

statements based on the modified four (4) point Likert-type scales of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) with numerical values or points of 4, 3, 2, and 1 respectively.

Students' Academic Achievement Proforma (SAAP) was used to collect the existing three consecutive end-of-term results for the 2014/ 2015 academic session of the sampled Junior Secondary School three (JSS3) students in basic science. The Proforma contained seven (7) columns: serial number, student registration number, column for first term results, column for second term results, column for third term results, total and average score. (See Appendix 97 for details).

Validation of the Instrument

The Students' Soft Skills Assessment Scale (SSSAS) and the Students' Academic Achievement Proforma (SAAP) were given to two experts in measurement and evaluation in the Department of Science Education, and one expert in educational psychology in the Department of Educational Foundations, all in the Faculty of Education, University of Nigeria, Nsukka.

For face validity, the experts were requested to assess the Students' Soft Skills Assessment Scale (SSSAS) with regard to clarity of items, simplicity of vocabulary, and relevance of items to the study. Also the experts were to assess the appropriateness and relevance of the columns in the Students' Academic Achievement Proforma (SAAP). Based on the observations, and suggestions of these experts, the research instruments were modified appropriately.

To establish the construct validity of the instrument, the ninety-three (93) item Students' Soft Skills Assessment Scale (SSSAS) initially developed by the researcher was subjected to factor analysis. Fifty copies of the ninety-three (93) item Students' Soft Skills Assessment Scale (SSSAS) were produced and administered to fifty JSS3 students in two schools drawn from Ikom

education zone of Cross River State which share similar characteristics with Ogoja education zone of the State. The responses of these students were then subjected to factor analysis on SPSS version 21 using the Principal Component Analysis (PCA) with Oblique rotation, precisely; direct Oblimin (See appendix page 104 for factor analysis output). During the analysis, five factors were extracted based on the Scree Plot. In order to select valid items, the researcher adopted Stevens (2002) criterion of 0.40 and above for substantive factor loadings for valid items. According to Stevens, only loadings of 0.40 and above on one factor should be considered substantive. Based on this benchmark, items 1, 2, 6, 7, 8, 11, 13, 20, 23, and 25 loaded on factor 1; items 3, 19, 21, 28, 29, 30, 33, 34, 36 and 58 loaded on factor 2; items 44, 45, 46, 48, 49, 53, 55, 56 and 60 loaded on factor 3; items 61, 64, 66, 69, 70, 71, 73, 77 and 80 loaded on factor 4; while items 63, 78, 79, 81, 82, 83, 84, 87, 88 and 89 loaded on factor 5. These 48 items were considered valid in that the items were factorially pure or they had a factor loading of 0.40 and above on one factor in each case. Hence, these 48 items of the Students' Soft Skills Assessment Scale (SSSAS) were considered valid and therefore retained in their corresponding clusters, and thus the instrument was modified accordingly. However, items 4, 5, 9, 10, 12, 14, 15, 16, 17, 18, 22, 24, 26, 27, 31, 32, 35, 37, 38, 39, 40, 42, 47, 50, 51, 52, 57, 59, 62, 65, 67, 68, 75, 76, 85, 86, 90, 91, 92 and 93 were considered factorially complex, and were therefore invalid. Simply put, these 40 items loaded 0.40 and above on more than one factor in each case, and thus were discarded. Nonetheless, items 41, 43, 54, 72 and 74 were considered factorially impure, or the 5 items loaded below 0.40 on all the factors, and on this note, the 5 items were also discarded.

Reliability of the Instrument

The reliability of the modified instrument; Students' Soft Skills Assessment Scale (SSSAS) was ascertained through trial-testing the instruments using a similar sample of students from other schools in Ikom education Zone of Cross River State. This is because Ogoja and

Ikom education zones of the State share similar characteristics. Thirty (30) students were used for the trial testing. The reason for trial-testing was to determine the internal consistency of the items. Cronbach Alpha method was used to ascertain the reliability of the Studentsø Soft Skills Assessment Scale (SSSAS). This is because the procedure applies to instruments that are polytomously scored (Nworgu, 2015). The reliability coefficients obtained were; 0.82, 0.87, 0.77, 0.83 and 0.79 for cluster I, II, III, IV and V respectively. However, a reliability coefficient of 0.91 was also obtained for the entire instrument (See appendix øDö pg101 for reliability output).

Method of Data Collection

Permission was sought from the authority/management of the selected schools to enhance data collection. The researcher administered the Studentsø Soft Skills Assessment Scale (SSSAS) directly to the students. The researcher administered the instrument and collected same on the spot with the assistance of some basic science teachers in the schools. This was done in order to ensure a high return rate. Also, the average scores for three consecutive end-of-the-termø examination results of the students in basic science was collected from the vice Principal (Academics) from the sampled schools using the Studentsø Academic Achievement Proforma (SAAP) designed by the researcher. The average score for the three consecutive end-of-the-termø examination results was used as a measure of the academic achievement level of the students.

Method of Data Analysis

The data collected were analyzed using regression analysis (correlation). The r^2 (coefficients of determination) obtained were used to answer research questions 1 and 2, while research question 3 was answered by comparing the r^2 for the males and females. Also, the regression model obtained was used to answer research question 4. However, the F-statistic obtained was used to test hypothesis 1 for the significance of the regression model, while hypothesis 2 was tested by the t-statistic for the significance of the regression coefficients/weights. In addition, the t-test of the significance of difference between two sample correlation coefficients was used to test hypothesis 3. All the hypotheses were tested at .05 level of significance.

CHAPTER FOUR

RESULTS

This chapter deals with the presentation of results of the study. The results are presented in line with the research questions and hypotheses that guided the study.

Research Question 1

Which of the dimensions of students' soft skills best-predict their academic achievement in Basic Science?

Table 1: Regression analysis of the amount of variation in students' academic achievement in Basic science that is best-predicted by the dimensions of students' soft skills

Variables	\bar{X}	SD	N	r	r^2
Communication Soft skills	29.10	2.37	357	.57	0.32
Intra-interpersonal Soft skills	28.36	3.65	357	.53	0.28
Teamwork Soft skills	27.86	2.62	357	.66	0.44
Problem solving Soft skills	28.60	3.70	357	.71	0.50
Time management Soft skills	29.93	3.61	357	.54	0.29

\bar{X} = mean, SD = Standard Deviation, N = Number of respondents (students),
r = Correlation coefficient, r^2 = Coefficient of determination

To answer the above research question, the scores from the responses of the respondents on the dimensions of students' soft skills were correlated with their Basic Science academic achievement. The result in Table 1 shows that correlation coefficients (r) of .57, .53, .66, .71 and .54 with associated coefficients of determination (r^2) of .32, .28, .44, .50 and .29 were obtained between students' communication soft skills, intra-interpersonal soft skills, teamwork soft skills, problem solving soft skills and time management soft skills and their basic science academic achievement respectively. This coefficients of determination (r^2) indicate that, 32%, 28%, 44%, 50%, and 29% variations in Basic Science academic achievement is predicted by communication soft skills, intra-interpersonal soft skills, teamwork soft skills, problem solving soft skills and

time management soft skills respectively. Based on these results, it can be deduce that problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) is the amount of variation that best-predicted students' academic achievement in Basic Science. It is followed by teamwork soft skills with a coefficient of determination (r^2) of .44 (44%), then communication soft skills with a coefficient of determination (r^2) of .32 (32%), followed by time management soft skills with a coefficient of determination (r^2) of .29 (29%) and lastly intra-interpersonal soft skills with a coefficient of determination (r^2) of .28 (28%).

Research Question 2

How much of the students' academic achievement in Basic Science can be accounted for by all the dimensions of their soft skills jointly?

Table 2: A model summary of the amount of variation in students' academic achievement in Basic Science that is accounted for by all the dimensions of their soft skills jointly

Model	r	r^2	Adjusted r^2
1	.79	.63	.62

r = Correlation coefficient, r^2 = Coefficient of determination

Result in Table 2 seeks to explain the amount of variation in students' academic achievement in Basic Science that is accounted for by all the dimensions of their soft skills jointly or the overall variance in students' academic achievement in Basic Science (criterion variable) that is explained by all the dimensions of their soft skills (predictor variables). The result as presented in Table 2 shows that a correlation coefficient (r) of .79 with associated coefficient of determination (r^2) of .63 was obtained between students' academic achievement in Basic Science (criterion variable) and all the dimensions of their soft skills (predictor variables). This coefficient of determination (r^2) indicates that 63% of variation in students' academic achievement in Basic Science (criterion variable) is accounted for by all the dimensions of their

soft skills (predictor variables) jointly. This implies that 37% of variation in students' academic achievement in Basic Science can be attributed to other variables not investigated by this study.

Research Question 3

How much variation in the prediction of students' academic achievement in Basic Science by their soft skills is moderated by gender?

Table 3: Regression analysis of the amount of variation in the prediction of students' academic achievement in Basic Science by their soft skills that is moderated by gender

Model	Variable (Gender)	N	r	r ²	Adjusted r ²
1.	Male	168	.79	.64	.63
2.	Female	189	.83	.69	.68

N = Number of respondents (students), r = Correlation coefficient, r² = Coefficient of determination

In order to answer the above research question, the scores from male and female respondents (students) on the dimensions of their soft skills were correlated with their academic achievement in Basic Science. The result in Table 3 shows that correlation coefficients (r) of .79 and .83 with associated coefficients of determination (r²) of .64 and .69 were obtained for male and female students respectively between their academic achievement in Basic Science (criterion variable) and all the dimensions of their soft skills (predictor variables). These coefficients of determination (r²) indicate that 64% variation in students' academic achievement in Basic Science was due to soft skills for male while 69% was due to soft skills for female. The difference in the variation of male and female students' academic achievement in Basic Science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female. Hence, gender moderated 5% of the variation in students' academic achievement in Basic Science in favour of the female than their male counterparts.

Research Question 4

What regression model can be used in predicting students' academic achievement in Basic Science based on their soft skills?

Table 4: Regression Model for predicting students' academic achievement in Basic Science based on their soft skills

	Coefficients				
	Unstandardized		Standardized	t	Sig.
	B	Std. Error	Beta		
(Constant)	7.35	1.966		3.740	.000
Communication soft skills (CSS)	.25	.054	.19	4.659	.000
Intra-interpersonal soft skills (IISS)	.15	.058	.10	2.602	.010
Teamwork soft skills (TWSS)	.32	.060	.24	5.296	.000
Problem solving soft skills (PSSS)	.48	.060	.37	7.936	.000
Time management soft skills (TMSS)	.11	.054	.09	2.082	.038

- a. Dependent Variable: Students' Basic Science Academic Achievement (SBSAA)
 b. Predictors: (Constant), Communication soft skills (CSS), Intra-interpersonal soft skills (IISS), Teamwork soft skills (TWSS), Problem solving soft skills (PSSS), Time management soft skills (TMSS)

From the result in Table 4, the regression model that can be used in predicting students' academic achievement in Basic Science based on their soft skills in raw score form is:

$$BSAA = 0.48PSSS + 0.32TWSS + 0.25CSS + 0.15IISS + 0.11TMSS + 7.35$$

While the regression model in standard score form is:

$$SBSAA = 0.37 PSSS + 0.24 TWSS + 0.19 CMM + 0.10 IISS + 0.09 TMSS + 7.35$$

From the regression model, the five predictor variables proved potent at predicting students' academic achievement in Basic Science to an appreciable extent with problem solving soft skills ($\beta = .37$) having the highest predictive capacity followed by teamwork soft skills ($\beta = .24$), then communication soft skills ($\beta = .19$), followed by intra-interpersonal soft skills ($\beta = .10$) and lastly, time management soft skills ($\beta = .09$). The regression model shows that one unit change in

students' problem solving soft skills will contribute 0.37 change in students' academic achievement in Basic Science, while one unit change in students' teamwork soft skills will produce 0.24 change in students' academic achievement in Basic Science. Also, one unit change in students' communication soft skills will account for 0.19 change in students' academic achievement in Basic science, whereas one unit change in students' intra-interpersonal soft skills will produce 0.10 change in students' academic achievement in Basic Science. And lastly, one unit change in students' time management soft skills will contribute 0.09 change in students' academic achievement in Basic Science, while 7.35 is the level of students' academic achievement in Basic Science without the influence of the predictor variables i.e. problem solving soft skills, teamwork soft skills, communication soft skills, Intra-interpersonal soft skills and time management soft skills.

Hypothesis 1

H₀₁: The regression model for predicting students' academic achievement in Basic Science by their soft skills is not significant.

Table 5: ANOVA F-test for the significance of the regression model for predicting students' academic achievement in Basic Science based on their soft skills

	Sum of Squares	df	Mean Square	F	Sig.
Regression	35750.996	5	7150.199	120.667	.000
Residual	20798.790	351	59.256		
Total	56549.787	356			

= 0.05 (Level of significance)

In order to test hypothesis 1 (H₀₁), F-test was used to test for the significance of the regression model. The result in Table 5 shows that an F-ratio of 120.667 with associated exact probability value of 0.000 was obtained for the significance of the regression model. This associated probability value of 0.000 was compared with the 0.05 set as the level of significance for testing the hypothesis and it was found to be significant. This is because, 0.000 is less than the 0.05 set as the criterion for rejecting or not rejecting the null hypothesis. Therefore, the null

hypothesis which stated that, the regression model for predicting students' academic achievement in Basic Science by their soft skills is not significant is hereby rejected. Inference drawn is that, the regression model for predicting students' academic achievement in Basic Science by their soft skills is significant. In other words, students' soft skills are good predictors of their students' academic achievement in Basic Science.

Hypothesis 2

H₀₂: The regression coefficients associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science are not significant.

Table 6: t-test analysis of the significance of the regression coefficients associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science

	Coefficients				
	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
B	Std. Error	Beta			
(Constant)	7.35	1.966		3.74	.00
Communication soft skills (CSS)	.25	.054	.19	4.66	.00
Intra-interpersonal soft skills (IISS)	.15	.058	.10	2.60	.01
Teamwork soft skills (TWSS)	.32	.060	.24	5.30	.00
Problem solving soft skills (PSSS)	.48	.060	.37	7.94	.00
Time management soft skills (TMSS)	.11	.054	.09	2.08	.04

= 0.05 (Level of significance)

In order to test hypothesis 2 (H₀₂), t-test analysis of the significance of the regression coefficients was used to test for the significance of the regression/beta coefficients () associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science. The result in Table 6 shows that t-values of 3.74, 4.66, 2.60, 5.30, 7.94 and 2.08 with associated probabilities of 0.00, 0.00, 0.01, 0.00, 0.00 and 0.04 were obtained for students'

communication soft skills ($r = .19$), intra and interpersonal soft skills ($r = .10$), teamwork soft skills ($r = .24$), problem solving soft skills ($r = .37$) and time management soft skills ($r = .09$) respectively. Since the associated probabilities for all the dimensions of students' soft skills were less than 0.05 level of significance set as the criterion for taking a decision, the regression/beta coefficients were all considered to be significant. Hence, the null hypothesis which stated that the regression coefficients associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science are not significant is rejected. The conclusion drawn is that the regression coefficients associated with each of the predictor variables; students' communication soft skills, intra and interpersonal soft skills, teamwork soft skills, problem solving soft skills and time management soft skills in predicting their academic achievement in Basic Science are significant.

Hypothesis 3

H₀₃: Gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills.

Table 7: t-test analysis of the significant difference between the correlation coefficients (r) of male and female students in the prediction of their academic achievement in Basic Science by their soft skills

Variables	r	N	df	S. E	t-cal	t-crit	Dec
(Gender)							
Male	0.794	168	351	0.105	-0.343	1.960	NS
Female	0.830	189					

Key: r = Correlation coefficient, N = Number of respondents (students), df= degree of freedom, SE = Standard Error, t-cal= t-test value calculated, t-crit= t-test critical or table value, Dec = Decision, NS = Not Significant.

In order to test hypothesis 3 (H₀₃), t-test analysis of the significant difference between two samples correlation coefficients (r) was used to test for the significant difference between the correlation coefficients (r) of male and female students in the prediction of their academic

achievement in Basic Science by their soft skills. The result as presented in Table 7 indicates that a calculated t-value of -0.343 was obtained, while the t-critical or table value at 0.05 level of significance and 351 degree of freedom was 1.960. The decision rule is to reject H_{03} if the calculated t is greater than the critical or table value of t, otherwise do not reject. Thus, since the calculated value of t (-0.343) is less than the t critical or table value (1.960), H_{03} which stated that gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills is not rejected. In other words, there is no significant difference between the correlation coefficients (r) of male and female students in the prediction of their academic achievement in Basic Science by their soft skills. Therefore, the conclusion drawn is that gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills. Any observed difference could be attributed to chance factors or sampling errors.

Summary of the Results

From the data analysis and interpretation of the results, the following findings emerged;

1. Problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) is the dimension with the amount of variation that best-predicted students' academic achievement in Basic Science.
2. The regression/beta coefficients (β) associated with each of the predictor variables; students' problem solving soft skills ($\beta = .37$), teamwork soft skills ($\beta = .24$), communication soft skills ($\beta = .19$), intra and interpersonal soft skills ($\beta = .10$), and time management soft skills ($\beta = .09$) in predicting their academic achievement in Basic Science are significant.
3. 63% of variation in students' academic achievement in Basic Science (criterion variable) is accounted for by all the dimensions of their soft skills (predictor variables) jointly,

which implies that 37% of the variation in students' academic achievement in Basic Science is attributed to other variables not investigated by this study.

4. The difference in the variation of male and female students' academic achievement in Basic Science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female. Hence, gender moderates 5% of the variation in students' academic achievement in basic science in favour of the female than their male counterparts.
5. Gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills. Any observed difference could be attributed to chance factors or sampling errors.
6. The regression model that can be used in predicting students' academic achievement in basic science based on their soft skills in raw score and standard score form are:

$$BSAA = 0.48PSSS + 0.32TWSS + 0.25CSS + 0.15IIS + 0.11TMSS + 7.35$$

and

$$SBSAA = 0.37 PSSS + 0.24 TWSS + 0.19 CMM + 0.10 IIS + 0.09 TMSS + 7.35$$

respectively.

7. The regression model for predicting students' academic achievement in Basic Science by their soft skills is significant.

CHAPTER FIVE

DISCUSSIONS OF THE FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND SUMMARY OF THE STUDY

In this chapter, the results presented in chapter four are discussed based on the four research questions and the three null hypotheses that guided the study. The chapter is organized based on the following sub-headings: discussion of the findings/results, conclusion, educational implications of the findings of the study, recommendations, limitation of the study, suggestions for further studies and summary of the study.

Discussions of the Findings/Results

The findings of the study are discussed under the relevant sub-headings in line with the research questions and hypotheses raised from the specific purposes in the study.

- The amount of variation in students' academic achievement in basic science that can be attributed to each of the dimensions of their soft skills.
- The amount of variation in students' academic achievement in basic science that can be accounted for by all the dimensions of their soft skills jointly.
- The amount of variation in the prediction of students' academic achievement in basic science by their soft skills that is moderated by gender.
- The regression model that can be used in predicting students' academic achievement in basic science based on their soft skills.

The amount of variation in students' academic achievement in basic science that can be attributed to each of the dimensions of their soft skills

The finding of this study as presented in Table 1 showed the amount of variation in students' academic achievement in basic science that can be attributed to each of the dimensions of their soft skills. The finding indicated that problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) is the amount of variation that best-predicted students' academic achievement in basic science, followed by teamwork soft skills with a coefficient of determination (r^2) of .44 (44%), then communication soft skills with a coefficient of determination (r^2) of .32 (32%), followed by time management soft skills with a coefficient of determination (r^2) of .29 (29%) and lastly intra-interpersonal soft skills with a coefficient of determination (r^2) of .28 (28%). The result of the corresponding hypothesis as presented in Table 6 revealed that the regression/beta coefficients/beta (β) associated with each of the predictor variables; problem solving soft skills ($\beta = .37$), teamwork soft skills ($\beta = .24$), communication soft skills ($\beta = .19$), intra and interpersonal soft skills ($\beta = .10$), and time management soft skills ($\beta = .09$) in predicting their academic achievement in Basic Science are significant.

These findings corroborate with earlier findings by other researchers. Findings on problem-solving soft skills agreed with findings from Ifamuyiwa and Ajilogba (2012), who found that problem-solving strategies had significant main effect on students' achievement and retention in further mathematics. Also, Adeyemi (2008) who revealed that students exposed to problem-solving strategies performed better than their counterparts in the other groups that were not exposed to problem-solving strategies. The explanation for this finding is that when students possess problem-solving soft skills such as the willingness to engage in a task, thinking critically and analytically before providing answers to questions, creative reasoning, self-confidence, motivation, curiosity and perseverance in solving class work, assignments and test or

examination, their academic achievement will be at a maximal level. This is because these skills will adequately complement their cognitive abilities which in turn increase achievement in school.

The findings on teamwork soft skills are consistent with finding from Bukunola and Idowu (2012), whose result revealed that cooperative learning strategies or learning together is more effective in enhancing students' academic achievement and retention in basic science. In the same vein, the finding is also in line with Adeyemi (2008) who found that students exposed to cooperative learning (teamwork) performed better than their counterparts not exposed to such strategies. This is due to the fact that students with teamwork soft skills always involve themselves in teams or small groups. As a team or group, members help, discuss and argue with each other, assess each other's current knowledge, and fill gaps in each other's understanding and this encourages them to work actively together in order to gain from each other on specific tasks and maximize learning. On this note, they have high chances of higher academic achievement in their school subjects.

Findings on communication soft skills are in consonance with the result from Azizi, (2009) which indicated that communication skills correlated quite significantly with students' academic achievement. Similarly, the finding agreed with the finding from Onwe (2013) whose result revealed that students' communication skills have significant influence on their performance in school. In essence, this means that students with communication soft skills such as active listening skills or paying keen attention during teaching and learning, clear understandable oral or verbal expressions that enable them to make meaningful written expressions or express ideas and concepts clearly, good questioning skills and the ability to appropriately use non-verbal cues such as eye contact and body language can achieve highly academically than those that lack these skills. This is because these skills enhances their

communication abilities which enable them pass on meaningful ideas either in verbal or non-verbal form, and this can promote their academic achievement in different school subjects. That is to say, students who cannot communicate ideas/opinions clearly either verbally or written, will stand a chance of performing low since the listener (s) or reader (s) will fail to understand their point of view.

The findings on intra and interpersonal soft skills are in line with the result by Azizi, Bachok, Yahaya, Boon and Hashin (2012) which showed that there was a significant relationship between intrapersonal skills such as self-awareness ($r = 0.21$), emotional management ($r = 0.21$), self-motivation ($r = 0.20$), empathy ($r = 0.21$) and interpersonal skills ($r = 0.24$) at the level of $P < 0.05$ with academic achievement. In addition, they found that emotional intelligence; self-awareness ($\beta = 0.0261$), empathy ($\beta = 0.167$) and interpersonal skills ($\beta = .14$) significantly predicted the criterion (academic achievement). The findings are also supported by earlier finding of Afuwape (2011) that self-concept which is an intra and interpersonal soft skill influences students' achievement. In the same way, finding by Ogbonna (2015) showed that a significant relationship exist between classroom interaction patterns and students' interest (intra and interpersonal soft skills) and their achievement in government. The reason for this is that interpersonal soft skills help students to ensure good rapport and a smooth interdependent relationship with others, clarify ideas within self and with others, reflect on issues, as well as concentrate on task(s) at hand which can enhance their academic achievement. In this sense, students who are lacking in these skills can have possible chances of achieving low academically.

Findings on time management soft skills corroborates with findings by Nzewi, Chiekiezie and Ikon (2014) who found that effective time management skills increased the cumulative Grade Point Average of postgraduate students in Nigeria. Also, Alaji (2012) whose result

showed that time management techniques significantly enhance the academic adjustment of deviant in-school adolescents. More so, the finding is in line with that of Okorie (2014) who reported that there is a medium and significant positive relationship between time management and academic performance. The explanation for this result is that students who prioritize time by having a plan for the numerous activities they face on daily basis can influence their academic achievement. This is because, it enables the students to complete their class work/assignments on time, prepare adequately for tests or examinations using their study time table and complete tasks on time which can increase their chances of high academic achievement. However, the low contribution of time management soft skills to students academic achievement in basic science could be due to the fact that students who are gifted and spend time playing with friends still achieve higher academically due to their giftedness, while those with low ability that spend time studying most times achieve at a low level.

The amount of variation in students' academic achievement in basic science that can be accounted for by all the dimensions of their soft skills jointly

The finding of the study as presented in Table 2 revealed that a coefficient of determination (r^2) of 0.63 was obtained, indicating that 63% of variation in students' academic achievement in basic science (criterion variable) is accounted for by all the dimensions of their soft skills (predictor variables) jointly, which implied that 37% of the variation in students' academic achievement in basic science is attributed to other variables not investigated by this study. This result is consistent with results on joint contribution of variables from other studies by Agah, Akobi and Okorie (2016) who found that computer anxiety, operation skill and attitude are good predictors of students' preparedness for computer-based-assessment with an r^2 (coefficient of determination) of .89 indicating that the variables jointly contributed 89% to students' preparedness for computer-based-assessment with .11 (11%) attributed to other variables not studied. Mamah (2015) indicated that .67 (67%) of variation in students' academic achievement was jointly predicted by the

predictor variables- parents' income, parents' education, parents' occupation and home education environment with .33 (33%) accounted for by other variables not studied. In essence, the finding of this study is an indication that students with all the dimensions of soft skills such as problem solving, teamwork, communication, intra and interpersonal, and time management soft can enhance their academic achievement in Basic Science significantly, which is attributable to the contribution of each of the dimensions as already discussed above. Hence, with a combination of the different dimensions of soft skills, higher academic achievement can be made by students, though other variables that account for the 37% of the variation in students' academic achievement in basic science may be considered to achieve maximally.

The amount of variation in the prediction of students' academic achievement in basic science by their soft skills that is moderated by gender

The findings of the study as shown in Tables 3 and 7 concern the amount of variation in the prediction of students' academic achievement in basic science by their soft skills that is moderated by gender. The findings revealed that the difference in the variation of male and female students' academic achievement in basic science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female. That is to say gender moderates 5% of the variation in students' academic achievement in basic science in favour of the female than their male counterparts. The result of the corresponding hypothesis (H_{03}) revealed that gender does not significantly moderate the prediction of students' academic achievement in basic science by their soft skills. The finding is in agreement with the findings in predictive studies by Oludipe (2014) who found that there was no significant effect of gender on students' mean score in basic science, and Omenka and Kurumeh (2012) whose result showed that gender does not significantly affect students' achievement in number and numeration using ethno mathematics approach. This implies that student exposed to the same content and subjected to the same

achievement tests can achieve at the same level whether male or female. So, gender has no significant influence on students' academic achievement since both male and female could possess the dimensions of soft skills that enhance school achievement. As such, any observed difference in this study could be attributed to chance factors or sampling errors.

The regression model that can be used in predicting students' academic achievement in basic science based on their soft skills

The finding of this study indicates that the regression model that can be used in predicting students' academic achievement in basic science based on their soft skills in raw score form is:

$$BSAA = 0.48PSSS + 0.32TWSS + 0.25CSS + 0.15IISS + 0.11TMSS + 7.35$$

While this regression model in standard score form is:

$$SBSAA = 0.37 PSSS + 0.24 TWSS + 0.19 CMM + 0.10 IISS + 0.09 TMSS + 7.35$$

From the model, problem solving soft skills ($\beta = .37$) has the highest predictive power followed by teamwork soft skills ($\beta = .24$), then communication soft skills ($\beta = .19$), followed by intra-interpersonal soft skills ($\beta = .10$) and lastly, time management soft skills ($\beta = .09$). In other words, the regression model shows that one unit change in students' problem solving soft skills will contribute 0.37 units change in students' academic achievement in basic science, while one unit change in students' teamwork soft skills will produce 0.24 units change in students' academic achievement in basic science. Also, one unit change in students' communication soft skills will account for 0.19 units change in students' academic achievement in basic science, whereas one unit change in students' intra-interpersonal soft skills will produce 0.10 units change in students' academic achievement in basic science. And lastly, one unit change in students' time management soft skills will contribute 0.09 unit change in students' academic achievement in basic science, while 7.35 is the level of students' academic achievement in basic science without the influence of the predictor variables i.e. problem solving soft skills, teamwork soft skills,

communication soft skills, Intra-interpersonal soft skills and time management soft skills. The result of the hypothesis (H_{01}) revealed that the regression model is significant for predicting students' academic achievement in Basic Science based on their soft skills. This implies that soft skills are good predictors of students' academic achievement in Basic Science.

Conclusions

The following conclusions are drawn based on the findings of this study.

1. Problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) is the dimension with the amount of variation that best-predicted students' academic achievement in basic science. However, the regression/beta coefficients (β) associated with each of the predictor variables; students' problem solving soft skills ($\beta = .37$), teamwork soft skills ($\beta = .24$), communication soft skills ($\beta = .19$), intra and interpersonal soft skills ($\beta = .10$), and time management soft skills ($\beta = .09$) in predicting their academic achievement in Basic Science are significant.
2. A coefficient of determination (r^2) of 0.63 obtained indicates that 63% of the variation in students' academic achievement in Basic Science (criterion variable) is accounted for by all the dimensions of their soft skills (predictor variables) jointly, which implies that 37% of the variation in students' academic achievement in Basic Science is attributed to other variables not investigated by this study.
3. The difference in the amount of variation of male and female students' academic achievement in Basic Science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female. Hence, gender moderates 5% of the variation in students' academic achievement in basic science in favour of the female than their male counterparts. Though gender does not significantly moderate the prediction of students'

academic achievement in Basic Science by their soft skills. Any observed difference could be attributed to chance factors or sampling errors.

4. The regression model that can be used in predicting students' academic achievement in basic science based on their soft skills in raw score and standard score form are:

$$BSAA = 0.48PSSS + 0.32TWSS + 0.25CSS + 0.15IIS + 0.11TMSS + 7.35$$

and

$$SBSAA = 0.37 PSSS + 0.24 TWSS + 0.19 CMM + 0.10 IIS + 0.09 TMSS + 7.35$$

respectively.

The regression model is significant for predicting students' academic achievement in Basic Science based on their soft skills.

Educational Implications of the Findings of the Study

The findings of this study have some educational implications on students, teachers, parents, education administrators, government and researchers alike.

The findings of this study indicated that problem solving soft skills best-predicted students' academic achievement in basic science, followed by teamwork soft skills, then communication soft skills, followed by time management soft skills and lastly intra-interpersonal soft skills. The implications of these findings are that students on their own have to adequately utilize the soft skills inherent in them to complement other abilities in order to enhance their academic achievement. Parents on their part can create a favourable home environment that will enable their children/wards develop, exhibit and improve on soft skills necessary for their academic success. The findings also imply that teachers should create an atmosphere that will enable students develop soft skills, especially problem solving soft skills in order to enhance their academic achievement in basic science and other subjects.

More so, educational administrators can formulate and implement different kinds of educational programmes that will duly consider students' development and improvement in soft skills or design the curriculum that integrates relevant soft skills into the content to complement the hard skills. Furthermore, the government can fund and support an educational system that teach and assess relevant soft skills.

Since 63% of variation in students' academic achievement in basic science is accounted for by all the dimensions of their soft skills jointly, this implies that 37% of the variation in students' academic achievement in the subject is attributed to other variables not investigated by this study. These other variables could be home-related, school-related and cognitive-related, therefore necessary efforts can be made by the different stakeholders to make the variables favourable for learning.

The difference in the variation of male and female students' academic achievement in basic science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female, which is not significant. Any observed difference could be attributed to chance factors or sampling errors. So, every teaching and learning situation has to be gender insensitive for adequate learning among everybody irrespective of gender.

Recommendation

Based on the findings of this study, the following recommendations were made.

1. The findings of this study indicated that problem solving soft skills best-predicted students' academic achievement in basic science, followed by teamwork soft skills, then communication soft skills, followed by time management soft skills and lastly intra-interpersonal soft skills. On this note, students should learn useful soft skills to enhance their achievement. Parents, teachers and education administrators should develop, teach and assess, encourage and support programmes that will duly consider students'

development and improvement on relevant soft skills. This can enhance their achievement in school generally.

2. Since 63% of variation in students' academic achievement in basic science is accounted for by all the dimensions of their soft skills jointly, while 37% of the variation in students' academic achievement in the subject is attributed to other variables not investigated by this study. Other variables such as home-related, school-related and cognitive-related should be taken into cognizance by the different stakeholders in order to create a favourable learning and achievement.
3. The difference in the variation of male and female students' academic achievement in basic science as predicted by all the dimensions of their soft skills is not significant. So, every teaching and learning situation should be made gender insensitive for adequate learning among students irrespective of gender.
4. Finally, education administrators and government should encourage and support programmes that will duly consider teaching and assessment of students' possession of soft skills in order to promote achievement in school and life generally.

Limitations of the Study

The limitations of this study included:

Research of this nature, which involves different personalities or human beings, must have some limitations. One of the limitations encountered in the course of conducting this study is the issue of respondents faking responses or distorting the required information by giving responses that are not actually true, which may have slightly affected the findings of the study.

The dimensions of students' soft skills; problem solving, teamwork soft skills, communication, time management and intra-interpersonal soft skills are psychological constructs

as such, were not sharply determined. Also, the sample size for this study may be inadequate, so care must be taken in generalizing the findings of this study to other areas not studied.

Suggestions for Further Studies

Based on the findings of the study, the following suggestions were made for further studies.

1. There is need to replicate the study in other Education Zones in Cross River State preferably with a larger sample.
2. Replication of this study may be undertaken over a long period of time to ascertain the consistency of the findings.
3. The influence of teachers' soft skills on students' academic achievement should be studied by future research.
4. The separate and joint contribution of both soft and hard skills to students' achievement should be investigated by a single study.

Summary of the Study

The general purpose of this study was to ascertain the extent to which students' soft skills predict their academic achievement in Basic Science and the moderating influence of gender in the prediction. The four (4) research questions include; (1) which of the dimensions of students' soft skills best-predict their academic achievement in Basic Science? (2) How much of the students' academic achievement in Basic Science can be accounted for by all the dimensions of their soft skills jointly? (3) How much variation in the prediction of students' academic achievement in Basic Science by their soft skills is moderated by gender? And, (4) what regression model can be used in predicting students' academic achievement in Basic Science based on their soft skills? The three (3) null hypotheses include;

H_{01} : The regression model for predicting Students' academic achievement in Basic Science by their soft skills is not significant.

Ho₂: The regression coefficients associated with the predictor variables-(students' communication, intra and interpersonal, teamwork, problem solving and time management soft skills) in predicting their academic achievement in Basic Science are not significant.

Ho₃: Gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills.

The study was carried out in Ogoja education zone of Cross River State, Nigeria. The review of literature for this study was organized under the following sub-headings; Conceptual framework, theory of emotional intelligence, theoretical framework, teaching and learning of basic science in Nigerian secondary schools, soft skills: nature and dimensions, moderator variables and predictive studies, empirical studies and summary of literature review. This study employed a correlation survey research design. A sample of 357 JSS3 students was used for this study. Two instruments; Students' Soft Skills Assessment Scale (SSSAS) and Students' Academic Achievement Proforma (SAAP) developed by the researcher were used for data collection for this study. Two experts in measurement and evaluation in the Department of Science Education, and one expert in educational psychology in the Department of Educational Foundations, all in the Faculty of Education, University of Nigeria, Nsukka face-validated the instruments. The initial ninety-three (93) item Students' Soft Skills Assessment Scale (SSSAS) developed by the researcher was further subjected to construct-validation using factor analysis after which 48 items were considered valid and therefore retained in the modified instrument. The Students' Soft Skills Assessment Scale (SSSAS) was trial-tested on a similar sample of students from schools in another education zone in Cross River State, and the reliability coefficient determined using Cronbach's Alpha was 0.91 which showed that the instrument was reliable. Permission was sought from the authority/management of the selected schools to

enhance data collection. The researcher administered the instrument and collected same on the spot with the assistance of some basic science teachers in the schools. The average scores for three consecutive ends-of- the term examination results of the students in basic science were collected and used as measure of the academic achievement level of the students. Data collected were analyzed using regression analysis. The r^2 (coefficients of determination) obtained were used to answer research questions 1 and 2, while research question 3 was answered by comparing the r^2 for the males and females. Also, the regression model obtained was used to answer research question 4. However, the F-statistic obtained was used to test hypothesis 1 for the significance of the regression model, while hypothesis 2 was tested by the t-statistic for the significance of the regression coefficients/weights. In addition, the t-test of the significance of difference between two sample correlation coefficients was used to test hypothesis 3. All the hypotheses were tested at 0.05 level of significance. The findings/results of the study revealed that:

1. Problem solving soft skills with a coefficient of determination (r^2) of .50 (50%) is the dimension with the amount of variation that best-predicted students' academic achievement in basic science, followed by teamwork soft skills with a coefficient of determination (r^2) of .44 (44%), then communication soft skills with a coefficient of determination (r^2) of .32 (32%), followed by time management soft skills with a coefficient of determination (r^2) of .29 (29%) and lastly intra-interpersonal soft skills with a coefficient of determination (r^2) of .28 (28%). However, the regression/beta coefficients (β) associated with each of the predictor variables; students' problem solving soft skills ($\beta = .37$), teamwork soft skills ($\beta = .24$), communication soft skills ($\beta = .19$), intra and interpersonal soft skills ($\beta = .10$), and time management soft skills ($\beta = .09$) in predicting their academic achievement in Basic Science are significant.

2. A coefficient of determination (r^2) of 0.63 obtained indicates that 63% of variation in students' academic achievement in basic science (criterion variable) is accounted for by all the dimensions of their soft skills (predictor variables) jointly, which implies that 37% of the variation in students' academic achievement in basic science is attributed to other variables not investigated by this study.
3. The difference in the variation of male and female students' academic achievement in basic science as predicted by all the dimensions of their soft skills jointly is 5% in favour of female. Hence, gender moderates 5% of the variation in students' academic achievement in basic science in favour of the female than their male counterparts. Though gender does not significantly moderate the prediction of students' academic achievement in Basic Science by their soft skills. Any observed difference could be attributed to chance factors or sampling errors.
4. The regression model that can be used in predicting students' academic achievement in basic science based on their soft skills in raw score and standard score form are:

$$BSAA = 0.48PSSS + 0.32TWSS + 0.25CSS + 0.15IIS + 0.11TMSS + 7.35$$

and

$$SBSAA = 0.37 PSSS + 0.24 TWSS + 0.19 CMM + 0.10 IIS + 0.09 TMSS + 7.35$$

respectively.

The regression model is significant for predicting students' academic achievement in Basic Science based on their soft skills.

The implications of the above findings of the study were examined and recommendations were made that students should learn useful soft skills to enhance their achievement. Parents, teachers and education administrators should develop, teach and assess, encourage and support programmes that will duly consider students' development and improvement on relevant soft

skills. This can enhance their achievement in school generally. Also, other variables such as home-related, school-related and cognitive-related were noted to be taken into cognizance by the different stakeholders in order to create a favourable learning and achievement. It was also recommended that every teaching and learning situation should be made gender insensitive for adequate learning among students irrespective of gender. In addition, that education administrators and government should encourage and support programmes that will duly consider teaching and assessment of students' possession of soft skills in order to promote achievement in school and life generally. The limitations of this study were highlighted and suggestions were made for further studies.

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APPENDIX A

**Population distribution of JSS3 Students in the five (5) Local Government Areas in Ogoja
Education Zone of Cross River State
(2014/2015 Academic Session)**

S/N	Name of LGA	Number of Schools	Number of JSS3 Students
1	Obanliku	12	906
2	Obudu	21	1582
3	Bekwarra	7	557
4	Ogoja	19	1451
5	Yala	16	1225
	Total	75	5,721

SOURCE: Ministry of Education, Zonal Directorate, Ogoja

APPENDIX B

Sample Distribution of Students in the Sampled Schools

S/N	Name of LGA/Schools sampled	Number of JSS3 Students in the school (s)	Number of Students sampled
	Obudu L. G. A		
1	Com. Sec. Sch. Bebuawhan, Obudu	86	26
2	Govt. Boys Sec. Sch., Obudu	98	30
3	Com. Sec. Sch. Utugwang	72	22
4	GirlsøSec. Sch., Obudu	125	38
5	Comp. Sec. Sch., Ukpe ó Obudu	83	25
6	Com. Sec. Sch. Alege ó Obudu	68	21
7	Kagbong Com. Sec. Sch., Obudu	77	24
			186
	Ogoja L. G. A		
8	Govt. Tech. College Abakpa, Ogoja	88	34
9	St. Thomas Sec. Sch. Igoli, Ogoja	79	31
10	Govt. Sec. Sch., Igoli ó Ogoja	132	51
11	Nkum-Iborr Sec. Sch. Aladim, Ogoja	67	26
12	Ikajuk Comp. Sec. Sch. Bansara, Ogoja	76	29
			171
	Total		357

**APPENDIX C: INSTRUMENT FOR DATA COLLECTION
(STUDENTS' SOFT SKILLS ASSESSMENT SCALE (SSSAS))**

REQUEST LETTER TO RESPONDENTS

Department of Science Education
Faculty of education
University of Nigeria
Nsukka.

21st July, 2016.

Dear Respondents,

REQUEST FOR COMPLETION OF QUESTIONNAIRE

My name is Andor Sebastine Ebummerh. I am a postgraduate student of the above named Department and institution, currently carrying out a research on the topic; **“Students’ soft skills as correlates of their academic achievement in basic science”**. You are kindly requested to supply relevant information by responding to the items contained in the questionnaire.

The researcher wishes to assure you that your responses will be treated in strict confidence and used for academic work only.

Please, accept my esteemed assurance of the highest regards

Thank you.

Yours faithfully,

Andor Sebastine Ebummerh
(Researcher)

STUDENTS' SOFT SKILLS ASSESSMENT SCALE (SSSAS)

SECTION A: PERSONAL DATA

Students' class í í í í í í Students' class/identification number í í í í í

Students' gender: male female

SECTION B: Subscales on Communication, intra and interpersonal, teamwork, problem solving and time management soft skills

KEYS: SA = Strongly Agree, A = Agree, D = Disagree, and SD = Strongly Disagree

Please tick (ç) as appropriate.

CLUSTER I: SUBSCALE ON STUDENTS' COMMUNICATION SOFT SKILLS

S/N	ITEM STATEMENT	SA	A	D	SD
1	I do listen attentively when other people are talking				
2	I can verbally explain something clearly to someone else				
3	I speak clearly when expressing myself				
4	When expressing my points to other students they always listen attentively				
5	I always avoid distractions when listening to the teacher/classmate				
6	I do make a summary note of what I have read				
7	I can present my ideas/points clearly in writing				
8	I always present my ideas in such a way that others will understand				
9	I usually offer my classmates opportunities for conversations about what we have learnt				
10	I express my opinions in a funny manner to make others understand me better				

CLUSTER II: SUBSCALE ON STUDENTS' INTRA AND INTERPERSONAL SOFT SKILLS

S/N	ITEM STATEMENT	SA	A	D	SD
11	I usually apply appropriate non-verbal cues to make my ideas understandable				
12	I always wait for people to finish talking before asking necessary questions				
13	I always have self confidence when expressing my ideas in class				
14	I do ask for clarifications from others in areas I do not understand				
15	I show gratitude to others after helping me to understand a lesson better				
16	I am always eager/ready to learn from others				
17	I do share my ideas on a topic with my classmates				
18	I do respect other people's opinions				
19	I have many friends that can help me understand a lesson better				
20	Other students like to work with me in my group				

CLUSTER III: SUBSCALE ON STUDENTS' TEAMWORK SOFT SKILLS

S/N	ITEM STATEMENT	SA	A	D	SD
21	I accept suggestions from other people				
22	I can engage in any group work no matter the members of the group				
23	I always participate actively in any work assigned to us as a group				
24	I always do a larger share of the work assigned to my group				
25	I often encourage others to work harder for us to achieve more				
26	I do accept corrections for my mistakes				
27	I always try to avoid trouble in my group by tolerating others				
28	I do make peace among members in my group				
29	I give others compliments when they work hard for the group				

CLUSTER IV: SUBSCALE ON STUDENTS' PROBLEM SOLVING SOFT SKILLS

S/N	ITEM STATEMENT	SA	A	D	SD
30	I do think critically before providing answers to questions				
31	I feel confident when doing something that is new to me				
32	I do persevere in solving questions even when they seem difficult				
33	I don't feel the pressure from my teacher/classmates when solving problems				
34	I like using other people's suggestions in solving some problems				
35	I often use my common sense to provide solutions/answers to questions				
36	I can solve many questions by myself without other people's assistance				
37	I like finding more than one solutions to solving problems				
38	I am quick to taking decisions on what I need to do				

CLUSTER V: SUBSCALE ON STUDENTS' TIME MANAGEMENT SOFT SKILLS

S/N	ITEM STATEMENT	SA	A	D	SD
39	I do complete my class work/assignments on time				
40	I have a study time table				
41	I make a plan for all my daily activities as quick as possible				
42	I always treat the most important tasks before others				
43	I always use the time I apportion for a particular task wisely				
44	I keep strictly to the time I have for each task				
45	I always complete tasks/work assign to me on time				
46	I often set the goals I can achieve within a given time				
47	I don't spend much of my time playing with friends.				
48	I can act fast to complete a task when the time assign to it is almost elapsing				

**STUDENTS' ACADEMIC ACHIEVEMENT PROFORMA (SAAP) FOR JUNIOR
SECONDARY SCHOOL THREE (JSS3) STUDENTS IN BASIC SCIENCE FOR
THE 2014/ 2015 ACADEMIC SESSION**

S/N	Student Id No. Or Name	1st term score	2nd term score	3rd term score	Total Score	Average score
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Appendix D: Reliability Output

Reliability

Scale: Students' Communication soft skills

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.823	10

Scale: Students' Intra and interpersonal Soft skills

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.873	10

Scale: Students' Teamwork Soft Skills

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.772	9

Scale: Students' Problem Solving Soft Skills

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.826	9

Scale: Students' Time Management Soft Skills

Case Processing Summary

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.794	10

Scale: Students' Soft Skills Assessment Scale (SSSAS)**Case Processing Summary**

		N	%
Cases	Valid	30	100.0
	Excluded ^a	0	.0
	Total	30	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.905	48

Appendix E: Factor Analysis Output

Factor Analysis: Oblique rotation (direct oblmin) with 5 extracted factors

Communalities		
	Initial	Extraction
item1	1.000	.710
item2	1.000	.592
item3	1.000	.881
item4	1.000	.754
item5	1.000	.800
item6	1.000	.563
item7	1.000	.822
item8	1.000	.674
item9	1.000	.671
item10	1.000	.680
item11	1.000	.437
item12	1.000	.721
item13	1.000	.705
item14	1.000	.805
item15	1.000	.769
item16	1.000	.646
item17	1.000	.464
item18	1.000	.574
item19	1.000	.636
item20	1.000	.561
item21	1.000	.387
item22	1.000	.211
item23	1.000	.300
item24	1.000	.539
item25	1.000	.316
item26	1.000	.385
item27	1.000	.597
item28	1.000	.526
item29	1.000	.414
item30	1.000	.262
item31	1.000	.710
item32	1.000	.592
item33	1.000	.881
item34	1.000	.754
item35	1.000	.800

item36	1.000	.563
item37	1.000	.822
item38	1.000	.674
item39	1.000	.671
item40	1.000	.680
item41	1.000	.051
item42	1.000	.505
item43	1.000	.426
item44	1.000	.710
item45	1.000	.592
item46	1.000	.881
item47	1.000	.754
item48	1.000	.800
item49	1.000	.563
item50	1.000	.822
item51	1.000	.674
item52	1.000	.671
item53	1.000	.680
item54	1.000	.437
item55	1.000	.721
item56	1.000	.705
item57	1.000	.805
item58	1.000	.769
item59	1.000	.646
item60	1.000	.464
item61	1.000	.574
item62	1.000	.636
item63	1.000	.561
item64	1.000	.445
item65	1.000	.451
item66	1.000	.675
item67	1.000	.732
item68	1.000	.381
item69	1.000	.520
item70	1.000	.401
item71	1.000	.436
item72	1.000	.133
item73	1.000	.499
item74	1.000	.493
item75	1.000	.344
item76	1.000	.597

item77	1.000	.073
item78	1.000	.710
item79	1.000	.592
item80	1.000	.881
item81	1.000	.754
item82	1.000	.800
item83	1.000	.563
item84	1.000	.822
item85	1.000	.674
item86	1.000	.671
item87	1.000	.680
item88	1.000	.437
item89	1.000	.721
item90	1.000	.705
item91	1.000	.805
item92	1.000	.769
item93	1.000	.646

Extraction Method: Principal
Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	23.194	24.940	24.940	23.194	24.940	24.940	14.933
2	10.639	11.440	36.380	10.639	11.440	36.380	11.306
3	8.611	9.259	45.638	8.611	9.259	45.638	10.541
4	7.622	8.196	53.834	7.622	8.196	53.834	12.492
5	6.350	6.828	60.662	6.350	6.828	60.662	14.330
6	5.137	5.524	66.186				
7	4.650	4.999	71.185				
8	3.967	4.266	75.451				
9	3.623	3.895	79.346				
10	3.038	3.267	82.614				
11	2.654	2.853	85.467				
12	2.479	2.666	88.133				
13	2.153	2.315	90.447				
14	1.563	1.681	92.128				

15	1.361	1.463	93.591			
16	1.151	1.238	94.828			
17	.889	.956	95.784			
18	.766	.823	96.608			
19	.672	.722	97.330			
20	.580	.624	97.954			
21	.542	.583	98.537			
22	.502	.539	99.076			
23	.371	.399	99.475			
24	.285	.307	99.782			
25	.203	.218	100.000			
26	1.020E-013	1.021E-013	100.000			
27	1.014E-013	1.015E-013	100.000			
28	1.013E-013	1.014E-013	100.000			
29	1.011E-013	1.012E-013	100.000			
30	1.007E-013	1.007E-013	100.000			
31	1.006E-013	1.006E-013	100.000			
32	1.005E-013	1.005E-013	100.000			
33	1.004E-013	1.004E-013	100.000			
34	1.004E-013	1.004E-013	100.000			
35	1.003E-013	1.003E-013	100.000			
36	1.003E-013	1.003E-013	100.000			
37	1.003E-013	1.003E-013	100.000			
38	1.002E-013	1.002E-013	100.000			
39	1.002E-013	1.002E-013	100.000			
40	1.002E-013	1.002E-013	100.000			

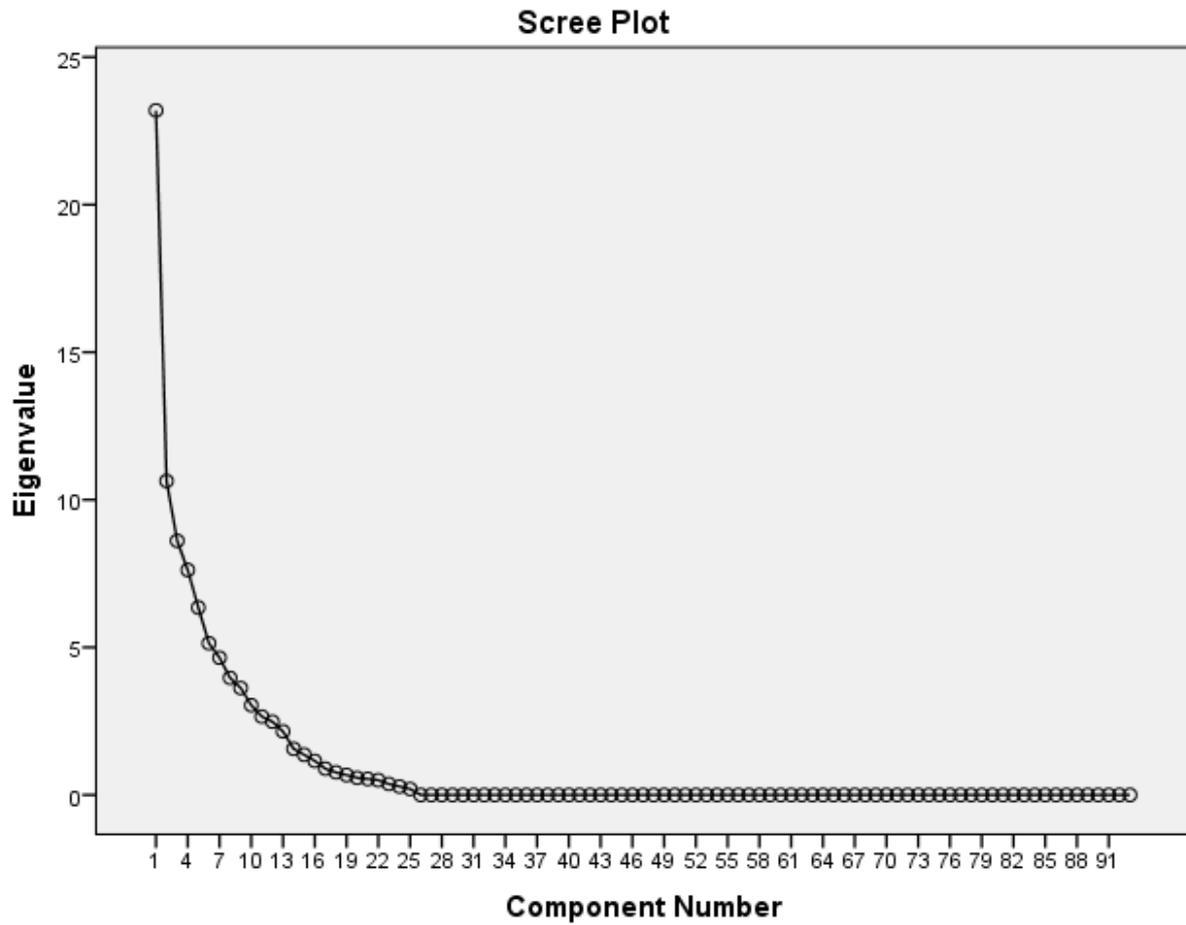
41	1.002E-013	1.002E-013	100.000				
42	1.001E-013	1.002E-013	100.000				
43	1.001E-013	1.001E-013	100.000				
44	1.001E-013	1.001E-013	100.000				
45	1.001E-013	1.001E-013	100.000				
46	1.001E-013	1.001E-013	100.000				
47	1.001E-013	1.001E-013	100.000				
48	1.001E-013	1.001E-013	100.000				
49	1.001E-013	1.001E-013	100.000				
50	1.001E-013	1.001E-013	100.000				
51	1.000E-013	1.001E-013	100.000				
52	1.000E-013	1.000E-013	100.000				
53	1.000E-013	1.000E-013	100.000				
54	1.000E-013	1.000E-013	100.000				
55	1.000E-013	1.000E-013	100.000				
56	1.000E-013	1.000E-013	100.000				
57	1.000E-013	1.000E-013	100.000				
58	1.000E-013	1.000E-013	100.000				
59	1.000E-013	1.000E-013	100.000				
60	-1.000E-013	-1.000E-013	100.000				

61	-1.000E-013	-1.000E-013	100.000				
62	-1.000E-013	-1.000E-013	100.000				
63	-1.000E-013	-1.000E-013	100.000				
64	-1.000E-013	-1.000E-013	100.000				
65	-1.000E-013	-1.000E-013	100.000				
66	-1.000E-013	-1.000E-013	100.000				
67	-1.001E-013	-1.001E-013	100.000				
68	-1.001E-013	-1.001E-013	100.000				
69	-1.001E-013	-1.001E-013	100.000				
70	-1.001E-013	-1.001E-013	100.000				
71	-1.001E-013	-1.001E-013	100.000				
72	-1.001E-013	-1.001E-013	100.000				
73	-1.001E-013	-1.001E-013	100.000				
74	-1.001E-013	-1.001E-013	100.000				
75	-1.001E-013	-1.001E-013	100.000				
76	-1.001E-013	-1.002E-013	100.000				
77	-1.002E-013	-1.002E-013	100.000				
78	-1.002E-013	-1.002E-013	100.000				
79	-1.002E-013	-1.002E-013	100.000				
80	-1.002E-013	-1.002E-013	100.000				

81	-1.003E-013	-1.003E-013	100.000			
82	-1.003E-013	-1.003E-013	100.000			
83	-1.003E-013	-1.003E-013	100.000			
84	-1.004E-013	-1.004E-013	100.000			
85	-1.004E-013	-1.005E-013	100.000			
86	-1.006E-013	-1.006E-013	100.000			
87	-1.007E-013	-1.007E-013	100.000			
88	-1.008E-013	-1.009E-013	100.000			
89	-1.011E-013	-1.012E-013	100.000			
90	-1.011E-013	-1.012E-013	100.000			
91	-1.014E-013	-1.015E-013	100.000			
92	-1.017E-013	-1.018E-013	100.000			
93	-1.028E-013	-1.030E-013	100.000			

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



Structure Matrix

	Component				
	1	2	3	4	5
item1	.590	-.193	-.454	.235	.271
item2	.720	.307	-.097	.288	.339
item3	.220	.861	-.160	.217	.163
item4	.770	.463	-.059	.327	.527
item5	.596	.434	.205	.226	.241
item6	.485	.227	.306	.173	.197
item7	.798	.314	-.292	-.117	.108
item8	.750	-.006	.006	.300	.327
item9	.473	.639	-.258	.021	.343
item10	.545	.429	-.771	.019	.019
item11	.575	.106	.264	.270	.115
item12	.235	.707	.619	.466	.152
item13	.507	.147	-.163	-.041	.180

item14	.514	.833	-.404	.536	.586
item15	.595	.745	-.787	.297	.243
item16	.709	.573	-.170	.672	.112
item17	.845	.550	-.191	-.091	.193
item18	.622	.517	.109	.743	.134
item19	.311	.727	-.280	.304	.296
item20	.541	-.078	-.446	.301	.242
item21	.015	.594	-.116	.056	-.053
item22	.852	.725	.193	.059	.167
item23	.538	.170	.075	.245	.286
item24	.623	.643	-.044	.324	.405
item25	.524	.268	-.405	.110	.338
item26	.591	.735	.192	.295	.122
item27	-.152	.458	.383	.597	-.053
item28	-.121	.519	-.143	.184	.207
item29	.053	.708	-.546	.323	.049
item30	-.184	.830	-.438	-.048	.086
item31	.590	.593	-.454	.435	.271
item32	.620	.307	-.097	.688	.339
item33	.220	.861	-.160	.217	.163
item34	.170	.463	-.059	.327	.127
item35	.596	.434	.205	.226	.841
item36	.285	.727	.306	.173	.197
item37	.798	.614	-.292	-.117	.108
item38	.750	.561	.006	.400	.327
item39	.473	.639	-.258	.021	.343
item40	.545	.591	-.771	.019	.019
item41	-.169	-.142	-.010	-.062	-.109
item42	.541	.218	.421	.576	.301
item43	.150	.033	.133	-.259	.246
item44	.190	-.193	.454	.235	.271
item45	.220	.307	.597	.288	.339
item46	.220	-.286	.560	.217	.263
item47	.170	.463	.589	.327	.274
item48	.260	.134	.605	.226	.241
item49	.085	.227	.445	.273	.197
item50	.798	.514	.592	-.117	.108
item51	.750	-.006	.006	.402	.327
item52	.473	.639	-.258	.021	.343
item53	.155	.291	.771	.019	.019
item54	-.126	.106	.164	.270	.115

item55	.235	.067	.619	.266	.152
item56	.007	.147	.627	-.041	.280
item57	.151	-.283	-.404	.536	.586
item58	.095	.745	-.787	.197	.243
item59	.209	-.357	-.170	.672	.512
item60	.184	.150	.791	-.091	.293
item61	.122	.117	.109	.743	.134
item62	.351	.073	-.280	.704	.596
item63	.241	-.078	-.446	.330	.542
item64	-.226	.260	-.402	.538	-.023
item65	-.138	.599	-.084	.426	.588
item66	.017	.340	-.228	.620	.237
item67	.261	.568	.588	.504	.562
item68	.108	.395	.243	.408	.402
item69	.121	.192	-.148	.679	.126
item70	-.573	-.025	.229	.893	-.009
item71	-.397	.165	-.093	.442	.230
item72	.160	.161	.107	.147	.202
item73	.051	.179	-.018	.734	.167
item74	.030	.193	-.139	-.076	.250
item75	.326	.214	-.008	.555	.504
item76	.265	.159	-.187	.635	.626
item77	.056	.002	-.154	.622	.049
item78	.290	-.193	-.454	.135	.711
item79	.220	.307	-.097	.188	.639
item80	.220	-.286	-.160	.741	.263
item81	.270	.046	-.059	.327	.527
item82	.260	.134	.205	.226	.841
item83	.185	.227	.306	.273	.897
item84	.198	.314	-.292	-.117	.844
item85	.750	-.006	.006	.400	.527
item86	.473	.639	-.258	.021	.343
item87	.155	.291	-.771	.019	.719
item88	-.126	.106	.264	.270	.615
item89	.235	.067	-.119	.166	.517
item90	.007	.515	-.163	-.041	.680
item91	.151	-.283	.404	.536	.586
item92	.095	.275	-.787	.597	.433
item93	.209	-.357	-.170	.672	.712

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3	4	5
1	1.000	.053	-.087	.140	.228
2	.053	1.000	-.038	.040	.139
3	-.087	-.038	1.000	-.002	-.095
4	.140	.040	-.002	1.000	.193
5	.228	.139	-.095	.193	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Appendix F: Output of data Analysis

Regression

Research Question 1

Descriptive Statistics

	Mean	Std. Deviation	N
BsAchi	52.3364	5.60348	357
ComSS	29.0952	2.37072	357
SumIntSS	28.3552	3.65462	357
SumTwSS	27.8616	2.62007	357
SumPSSS	28.5966	3.69919	357
SumTMSS	29.9336	3.61345	357

Correlations

		BsAchi	ComSS	SumIntSS	SumTwSS	SumPSSS	SumTMSS
Pearson Correlation	BsAchi	1.000	.574	.529	.664	.714	.543
	ComSS	.574	1.000	.428	.504	.492	.467
	SumIntSS	.529	.428	1.000	.471	.535	.396
	SumTwSS	.664	.504	.471	1.000	.632	.547
	SumPSSS	.714	.492	.535	.632	1.000	.534
	SumTMSS	.543	.467	.396	.547	.534	1.000
Sig. (1-tailed)	BsAchi	.	.000	.000	.000	.000	.000
	ComSS	.000	.	.000	.000	.000	.000
	SumIntSS	.000	.000	.	.000	.000	.000
	SumTwSS	.000	.000	.000	.	.000	.000
	SumPSSS	.000	.000	.000	.000	.	.000
	SumTMSS	.000	.000	.000	.000	.000	.
N	BsAchi	357	357	357	357	357	357
	ComSS	357	357	357	357	357	357
	SumIntSS	357	357	357	357	357	357
	SumTwSS	357	357	357	357	357	357
	SumPSSS	357	357	357	357	357	357
	SumTMSS	357	357	357	357	357	357

Research Question 2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.795 ^a	.632	.627	7.69778	.632	120.667	5	351	.000

a. Predictors: (Constant), SumTMSS, SumIntSS, ComSS, SumTwSS, SumPSSS

Hypothesis 1

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	35750.996	5	7150.199	120.667	.000 ^b
	Residual	20798.790	351	59.256		
	Total	56549.787	356			

a. Dependent Variable: BsAchi

b. Predictors: (Constant), SumTMSS, SumIntSS, ComSS, SumTwSS, SumPSSS

Research Question 4 and Hypothesis 2

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.352	1.966		-3.740	.000
	ComSS	.252	.054	.187	4.659	.000
	SumIntSS	.151	.058	.104	2.602	.010
	SumTwSS	.316	.060	.241	5.296	.000
	SumPSSS	.478	.060	.368	7.936	.000
	SumTMSS	.113	.054	.086	2.082	.038

a. Dependent Variable: BsAchi

Research Question 3

Regression

Descriptive Statistics^a

	Mean	Std. Deviation	N
BsAchi	54.7137	4.31394	168
ComSS	29.0274	3.53786	168
SumIntSS	27.7143	2.25022	168
SumTwSS	28.5083	3.27739	168
SumPSSS	29.6970	2.52265	168
SumTMSS	28.4292	3.20621	168

a. Selecting only cases for which Gender = male

Correlations^a

		BsAchi	ComSS	SumIntSS	SumTwSS	SumPSSS	SumTMSS
Pearson Correlation	BsAchi	1.000	.667	.665	.597	.684	.480
	ComSS	.667	1.000	.542	.545	.626	.499
	SumIntSS	.665	.542	1.000	.481	.614	.344
	SumTwSS	.597	.545	.481	1.000	.603	.511
	SumPSSS	.684	.626	.614	.603	1.000	.502
	SumTMSS	.480	.499	.344	.511	.502	1.000
Sig. (1-tailed)	BsAchi	.	.000	.000	.000	.000	.000
	ComSS	.000	.	.000	.000	.000	.000
	SumIntSS	.000	.000	.	.000	.000	.000
	SumTwSS	.000	.000	.000	.	.000	.000
	SumPSSS	.000	.000	.000	.000	.	.000
	SumTMSS	.000	.000	.000	.000	.000	.
N	BsAchi	168	168	168	168	168	168
	ComSS	168	168	168	168	168	168
	SumIntSS	168	168	168	168	168	168
	SumTwSS	168	168	168	168	168	168
	SumPSSS	168	168	168	168	168	168
	SumTMSS	168	168	168	168	168	168

a. Selecting only cases for which Gender = male

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
	Gender = male (Selected)				R Square Change	F Change	df1	df2	Sig. F Change
1	.794 ^a	.638	.627	8.13178	.638	57.134	5	162	.000

a. Predictors: (Constant), SumTMSS, SumIntSS, SumTwSS, ComSS, SumPSSS

ANOVA^{a,b}

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	18890.218	5	3778.044	57.134	.000 ^c
	Residual	10712.381	162	66.126		
	Total	29602.599	167			

a. Dependent Variable: BsAchi

b. Selecting only cases for which Gender = male

c. Predictors: (Constant), SumTMSS, SumIntSS, SumTwSS, ComSS, SumPSSS

Coefficients^{a,b}

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.200	2.907		-2.821	.005
	ComSS	.321	.083	.254	3.852	.000
	SumIntSS	.428	.090	.297	4.760	.000
	SumTwSS	.194	.083	.150	2.347	.020
	SumPSSS	.307	.101	.220	3.053	.003
	SumTMSS	.084	.077	.064	1.096	.275

a. Dependent Variable: BsAchi

b. Selecting only cases for which Gender = male

Regression

Descriptive Statistics^a

	Mean	Std. Deviation	N
BsAchi	50.1122	5.83783	189
ComSS	30.2667	3.13451	189
SumIntSS	29.2582	2.51225	189
SumTwSS	28.2868	3.98410	189
SumPSSS	29.6185	2.77472	189
SumTMSS	27.4931	3.05867	189

a. Selecting only cases for which Gender = female

Correlations^a

		BsAchi	ComSS	SumIntSS	SumTwSS	SumPSSS	SumTMSS
Pearson Correlation	BsAchi	1.000	.448	.348	.737	.740	.611
	ComSS	.448	1.000	.247	.447	.341	.424
	SumIntSS	.348	.247	1.000	.460	.444	.465
	SumTwSS	.737	.447	.460	1.000	.661	.585
	SumPSSS	.740	.341	.444	.661	1.000	.565
	SumTMSS	.611	.424	.465	.585	.565	1.000
Sig. (1-tailed)	BsAchi	.	.000	.000	.000	.000	.000
	ComSS	.000	.	.000	.000	.000	.000
	SumIntSS	.000	.000	.	.000	.000	.000
	SumTwSS	.000	.000	.000	.	.000	.000
	SumPSSS	.000	.000	.000	.000	.	.000
	SumTMSS	.000	.000	.000	.000	.000	.
N	BsAchi	189	189	189	189	189	189
	ComSS	189	189	189	189	189	189
	SumIntSS	189	189	189	189	189	189
	SumTwSS	189	189	189	189	189	189
	SumPSSS	189	189	189	189	189	189
	SumTMSS	189	189	189	189	189	189

a. Selecting only cases for which Gender = female

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
	Gender = female (Selected)				R Square Change	F Change	df1	df2	Sig. F Change
1	.830 ^a	.689	.681	6.68644	.689	81.253	5	183	.000

a. Predictors: (Constant), SumTMSS, ComSS, SumIntSS, SumPSSS, SumTwSS

ANOVA^{a,b}

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18163.583	5	3632.717	81.253	.000 ^c
	Residual	8181.659	183	44.709		
	Total	26345.242	188			

a. Dependent Variable: BsAchi

b. Selecting only cases for which Gender = female

c. Predictors: (Constant), SumTMSS, ComSS, SumIntSS, SumPSSS, SumTwSS

Coefficients^{a,b}

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.845	2.650		1.451	.148
	ComSS	.140	.069	.096	2.035	.043
	SumIntSS	.172	.077	.109	2.240	.026
	SumTwSS	.489	.080	.371	6.097	.000
	SumPSSS	.503	.070	.415	7.161	.000
	SumTMSS	.221	.073	.169	3.027	.003

a. Dependent Variable: BsAchi

b. Selecting only cases for which Gender = female

Hypothesis 3

t-test analysis for the significant difference between the correlation coefficients (R) of male and female students. Formula:

$$t = \frac{r_{\text{male}} - r_{\text{female}}}{\sqrt{\frac{1}{n_{\text{male}}} + \frac{1}{n_{\text{female}}}}}$$

Where; t = t-test statistic for the significant difference of two samples correlation coefficient.

$$r_1 = 0.794 \text{ (correlation coefficient for male)}$$

$$r_2 = 0.830 \text{ (correlation coefficient for female)}$$

$$n_1 = 168 \text{ (Number of male)}$$

$$n_2 = 189 \text{ (Number of female)}$$

$$\text{Degree of freedom (df)} = n_1 - 3 + n_2 - 3$$

Note: The estimated standard error (S.E) of the difference between independent correlation

$$\text{coefficients} = \sqrt{\frac{r_1^2}{n_1} + \frac{r_2^2}{n_2}}$$

Based on the computation: $df = 351$

$$t_{\text{cal}} = -0.343$$

$$t_{\text{crit}} = 1.960$$

$$S.E = 0.105$$

Decision: Not significant (NS)