DETERMINANTS OF STUDENTS' ACHIEVEMENT IN SENIOR SECONDARY SCHOOL MATHEMATICS IN SOUTH-WESTERN NIGERIA.

BY

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ABSTRACT

Students' under-achievement in Mathematics over the years in South-western, Nigeria has been partially attributed to ineffective school management and poor classroom interaction. Studies on Secondary School Mathematics achievement have so far concentrated on teacher-student related factors with less emphasis on the combination of principals' leadership styles, Teachers' job satisfaction and classroom management. This study investigated the causal relationship among principal factors, teachers' job satisfaction and classroom management, and students' achievement in Mathematics in South-western, Nigeria.

The study adopted a survey design with a hypothesised model. Two states (Oyo and Ogun) were randomly selected. Proportional sampling technique was used to select thirty Local Government Areas (LGAs) from the two states, while the simple random sampling technique was used to select five schools from each LGA; making a total of 150. In all, participants were 162 SS2 Mathematics teachers and 5,251 SS2 students. Principals' Supervisory Role Rating Scale (r = 0.70, CVR = 0.73); Teachers' Job Satisfaction Rating Scale (r = 0.76, CVR = 0.72), Teachers' Classroom Management Scale (r = 0.80, CVR = 0.71), Mathematics Achievement Test (r = 0.74, CVR = 0.69) and Multifactor Leadership Scale with four components(r = 0.70, CVR = 0.78) were used to collect data. Data were analysed using multiple regression and path analysis at $p \leq 0.05$.

The hypothesised and parsimonious model explained factors influencing Mathematics achievement with six discrepancies occuring out of the 59 cases which is just 10.2%. The model was predicted by all the independent variables at forty-two point two percent. One hundred and five pathways were established with 29 direct and 76 indirect. Out of the 11 variables influencing Mathematics achievement, 5 variables (Transformational; β=0.523, Democratic; β=0.291, Teacher job satisfaction; β=0.199, Laissez-faire; β=0.183 and Teacher classroom management; β=0.177) had direct effect on Mathematics achievement. Apart from principals' supervisory role, principals'gender, age, qualification, experience and autocratic leadership style had indirect effect on Mathematics achievement. Transformational leadership style had the most significant effect on Mathematics achievement (0.562), followed by democratic leadership style (-0.274), teacher's job satisfaction (0.270), laissez-faire leadership style (-0.190), classroom management (0.177), principals' gender (0.088), principasl' qualification (0.087), principals' age (0.082), autocratic leadership style (0.021) and principals' experience (0.008).

Principal's leadership styles and socio-demographic factors significantly influenced teachers job satisfaction, classroom management and ultimately, students' achievement in senior secondary schools in Oyo and Ogun states respectively. Principals should therefore be cautious in their leadership styles towards inproving teachers' job satisfaction, classroom management and students' achievement generally in their schools.

Keywords: Principal leadership styles, Teacher job satisfaction, Teacher classroom management, Achievement in Mathematics, South-western Nigeria

Word count: 408

DEDICATION

This work is dedicated to the ALMIGHTY GOD who enabled me to carry out the study successfully.

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CERTIFICATION

I certify that this study was carried out by Adesoye Taiwo Onabamiro in the International Centre for Educational Evaluation (ICEE), Institute of Education, University of Ibadan,Ibadan, Nigeria under my supervision.

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INTRODUCTION

1.1 Background to the problem

School effectiveness is determined among other things, by students' achievement in the various subjects being offered at the Secondary Educational level. School effectiveness has been an issue of great concern to all stakeholders (government, parents, teachers, school managers and policy makers) in Education. The reason for the concern is not far-fetched:When a school is not achieving its set goal, such a school is noted for ineffectiveness. What exactly then, is school effectiveness? According to Scheerens (2000), school effectiveness refers to the performance of the organisational unit called school. This performance, according to him, can be expressed as the output of the school, which in turn, is measured by pupils' achievement.

The level of Students' achievement in the secondary school system is to a great extent, the result of the leadership style adopted by the leaders, who are referred to as Principals. In fact, Loeb, Kalogridges and Horng (2010) are of the opinion that principals play key roles as the primary leaders of schools and thus greatly influence all aspects of the functions of the school with their behaviour, personal characteristics and biases. Kythreotis, Pashiardis and Kyriakides (2010) found a direct effect of principals' leadership style on students' academic achievement. In every school setting, the principal provides valuable insights into the school's daily practices that could foster an environment that is supportive of high-students'achievement. Experience has shown that principals could adopt various leadership styles among which are transformational, democratic, autocratic, laissez-faire, etc.

The leadership styles of principals may influence the job satisfaction of teachers, which in turn, might influence the effectiveness of the teachers in the classroom. The appropriate application of these leadership styles may have great positive impact on both the teachers and the students and thus, create a conducive environment for learning. What the teachers are able to effectively do in the classroom

affects students' achievement which is determined by the latter's scores in the various subjects. Most of the time, students look forward to obtaining high scores in the core subjects of Mathematics and English Language because of the importance attached to them in terms of their career prospects.

Mathematics is of great importance because it is essential for daily living and nearly everybody uses it. For example, civil servants use it in their offices for scheduling their duties, purchasing materials, working out benefits, etc, and the market women can also not do without it. In fact, it is used by both literates and non-literates. Oyedeji (2000) opines that Mathematics is a very desirable tool in virtually all spheres of human endeavour, be it science, engineering, industry, technology, geography and even the arts. Rand (2003: 18) underscores the importance of Mathematics in these words:

> *It is time that all of us educators, parents, and policymakers begin to see Mathematics as the enabling discipline for all of science and technology that it is and to recognize its power in providing tools for analytical thought and for concepts and language for quantitative descriptions of the world. We need to realize the importance of Mathematics and science in the lives of all of our children, and make it possible for them to become proficient in Mathematics and science.*

This is reiterating not only the importance of Mathematics, but also the need for all stakeholders to be fully aware that students should be proficient in it. It is almost impossible for anyone to make progress in the Sciences without being proficient in Mathematics. This is so because Mathematics knowledge is applied in solving problems involving calculations in Sciences. Ilori (2003) asserts that the importance of Mathematics has long been recognised all over the world as a basis for understanding other subjects and that is why all students are made to study Mathematics at the primary and secondary school levels, whether they have the aptitude for it or not. He further stated that students realise the importance and relevance of Mathematics rather too late, and that is only after they have failed to obtain a credit pass in it at the secondary school level.

Most students, while in school, aspire to pursue careers in Computer Science, Economics, Microbiology, Engineering, Medicine or law among others. Little do they know that a credit pass in Mathematics is a prerequisite to their dream career or profession. The table below reveals the achievement in Mathematics in West African Secondary School Certificate Examination (WASSCE) May/June 2000-2010.

Table 1: Analysis of WASSCE MAY/JUNE Mathematics Results (2000-2010)

Year	Total number of candidates	%	Total number of candidates with Credits pass	%	Total number of candidates who had between D7 and F9	%
2000	634604	100	208244	32.83	426360	67.17
2001	1023102	100	373955	36.55	649147	63.44
2002	908235	99.39*	309409	34.06	598826	65.33
2003	926212	97.49*	341928	36.91	561226	60.58
2004	832689	100	287484	34.53	545205	65.47
2005	730379	100	282394	38.66	447985	61.34
2006	1149277	97.16*	472674	41.12	644151	56.04
2007	1249028	97.71*	584024	46.75	917868	50.96
2008	1268213	98.35*	726398	57.28	520884	41.07
2009	1348528	96.01*	634382	47.04	660373	48.97
2010	1351557	94.63*	560974	41.50	717869	53.12

Source: **West African Examinations Council (2011).**

***The remaining percentages represent candidates whose results were withheld and those who were absent.**

As can be seen in Table 1, it was only in 2008 that at least 50% credit pass was recorded. Yet a credit pass in Mathematics at the school certificate level is a basic criterion for admission into Sciences and all the courses in Management and Social Sciences in Nigerian Universities. Although there was an improvement in candidates' performance from year 2005 to year 2008, this is not remarkable enough, especially in a subject which determines the future of the students. What then could be responsible for this low achievement in Mathematics? Could it be factors relating to school

management or some other factors? Does it have anything to do with the school manager (that is, the principal)?

Principals, regardless of the student population they serve, are held accountable for students' achievement in their schools. This is because they are at the helm of affairs and are expected to monitor everything that surrounds students' achievement. However, from studies reviewed, it was found that the direct effect of principals' behaviour on students' achievement is near zero (Hallinger and Heck, 1996; Leithwood, Jantzi, and Steinbach, 1999; Witziers, Bosker, and Kruger, 2003). Thus, holding principals accountable may be defensible, only if principals have the power to create organizational conditions through which improved teaching and learning can take place. In such situations, principals may be said to have an indirect influence on students' achievement. For example, Hallinger, Bickman, and Davis (1996) revealed that principals contribute to reading achievement through the creation of a positive instructional climate (high teacher expectations, student opportunity to learn, clear mission, and grouping for instruction). Also, Johnson, Livingston, Schwartz and Slate (2000) opined that principals have the ability to indirectly affect students' achievement by improving the tone or learning environment of a school.

School principals play important and varied roles in the day to day operations of schools. As instructional leaders, principals monitor and support teachers. They also ensure discipline. As administrative leaders, principals plan budgets, manage school facilities and develop relationships with the broader community. In addition to a broad range of responsibilities, principals have many constituents including students, parents, teachers, schools' board and superintendents (Davis, Linda, Michelle and Debra, 2005). Moses (2002) opines that for any organisation to be successful in achieving its objectives, important elements to consider include the achievement of productivity through good leadership and effective management of people as well as their level of commitment to and involvement with the organisation.Wan and Jamal (2012) found that the role of a principal is important in determining the high-academic performance of students in examinations. Despite the attention currently paid to principals as levers for school improvement, not many researchers have worked on how Principal factors affect teachers' job satisfaction and how this in turn affects classroom management and consequently, students' achievement.

The Principals' factors of interest in this study include age, gender, experience, qualification, leadership styles (autocratic, democratic, transformational and laissez-faire) and principals' supervisory role. School effectiveness is solely the responsibility of school principals as they account for whatever the school experiences, whether success or failure. If principals can supervise the teachers well, they in turn, will monitor the students and manage their classrooms effectively. This will lead to effectiveness in the school.

What role does age play in leadership? As some researchers have found that age is not a significant factor in determining leadership effectiveness, others believe it is. Experience has shown that older workers are more mature and are ready to face challenges with a strong will to overcome them. It is common knowledge that older leaders tend to be rigid, are prone to resisting change and innovation and therefore, tend to be a burden on the organisation. However, their years of experience make them more mature and wiser in anticipating problems. As a result, they respond to problems calmly and confidently. Mitchell (2000) reports that younger workers are more comfortable in exhibiting individualistic behaviour than their older counterparts do. He further reveals that younger and older managers have different profiles in their consultative and participatory leadership styles.

Kabacoff and Stoffey (2001) in their study on the influence of age differences in organisational leadership, report that younger workers feel more comfortable in fast changing environments, and are more willing to take risks and consider new approaches than older workers. Observations have shown that older and younger managers vary in their leadership styles. Older managers consult more on organizational affairs, and their decisions therefore reflect that of the majority of members in their units. He however reports that no significant statistical difference exists between older and younger managers under the laissez-faire style of leadership. The age of leaders therefore, can be a determining factor of their experience and that is why the experience of leaders cannot be waved aside when talking about leadership styles.

Ibrahim and Al-Taneiji (2013) found that a principal's style and effectiveness is not necessarily influenced or affected by the principal's experience. In essence, they believe that inexperienced principal can be effective if he/she is hardworking. Karen

(2002) observes that principals' experience in their current schools has significant effect on their leadership styles in the area of teachers' job satisfaction. This may mean that experience gained by the principal in his/her relationship with the teachers will affect the satisfaction of the teachers on the job. It is possible for older managers to have an advantage over younger ones as a result of the experience gained in the process of accumulation of knowledge, especially in the areas where new knowledge is built upon the previous knowledge. Adeboyeje (2006) has contrary view to this, that there is no significant relationship between the dimensions of principals' leadership behaviour and principals' experience.

Abgoli (2008) discovered that headmasters' leadership style did not have a significant relationship with their demographic variables such as gender, age, educational qualification, subject and experience. Nakpodia (2009) also in his study on leadership styles of principals as they influence teachers and students, concluded that there was no significant difference in the leadership styles of experienced and less experienced principals, as perceived by the latter group's responses. As leaders'varying experiences affect their leadership styles, leaders' gender can also affect their leadership styles since leaders differ in terms of gender.

Ibrahim and Al-Taneiji (2013) in their study entitled: "Principal Leadership Style, School Performance, And Principal Effectiveness In Dubai Schools" concluded that principals' style and effectiveness differed according to gender. Sawati, Anwar, and Majoka (2011) carried out a study on "Principals' Leadership Styles and Their Impact on Schools' Academic Performance at Secondary Level in Khyber Pakhtoonkhwa, Pakistan" and found that there are no gender differences in principals' leadership styles. That is, gender is not a determinant of leadership style adopted by the principals. Adeboyeje (2006) also reveals that there is no significant relationship between the dimensions of principals' leadership behaviour and principals' sex. Barbuto, Susan, Matkin and Marx (2007) observe that gender has no significant effects on ratings of transactional and/or transformational leadership behaviour. They however state that the main effects of gender on influence tactics were significant; women were rated as using significantly more pressure tactics than men.

Adeboyeje (2006) opines that there is no significant relationship between the dimensions of principals' leadership behaviour and principals' qualifications. On the

other hand, Nakpodia (2009) states that there is a significant difference between the leadership style of principals with degrees and professional educational qualifications and those without degrees and professional educational qualifications. Maiyoua (2012) opines that Principals' leadership practice has been identified as integral to successful school outcomes. This statement identifies principals' leadership styles as a pinnacle upon which the achievement of schools rest.

Kythreotis and Pashiardis (2006) state that there is direct effect of the principal's leadership style on students' achievement. Maicibi (2005) is of the opinion that without proper leadership, effective performance cannot be realized in schools. Even if the school has all the required instructional materials and financial resources, it may not have much effect if students are not directed on their usage, or if the teachers who guide them on the usage are not properly trained to do so. The study also confirmed the appropriateness of viewing the principal's role in determining school effectiveness through a conceptual framework that places the principal's leadership behaviour in the context of the school and its environment and that assesses leadership effects on students' achievement through mediating variables. Can teachers' job satisfaction be such a mediating variable?

Job satisfaction is considered to have an effect on the quality of teaching and on the pupils' achievement (Somech and Drach-Zahavy 2000;). It has been found to predict withdrawal cognition (Lam, Foong and Moo 1995; Hall, Pearson and Carroll 1992), and may therefore be seen as an important aspect in maintaining the stability of the teaching staff.

Nwachukwu (2007) observed that while almost every teacher works in order to satisfy his or her needs in life, he or she constantly agitates for need satisfaction. Job satisfaction in this context is the ability of the teaching job to meet teachers' needs and improve their job/teaching performance. Job satisfaction can be influenced by a variety of factors, including the quality of one's relationship with his/her supervisor, the quality of the physical environment in which he/she works, the degree of fulfillment in his/her work, etc. Rajaeepour, Arbabisarjou, Amiri, Nematiniya, Ajdai and Yarmohammadzadeh (2011) state that job satisfaction is critical to retaining and attracting well-qualified principals and teachers in educational environment. School management/authority should give more attention to teachers' job satisfaction because it would promote staff satisfaction, which in turn, would enhance efficiency at work.

Job satisfaction is not the same as motivation, although they are clearly linked. Ramesh**,** Jamil**,** Babar**,** Rehan and Assad (2013) observed that Job satisfaction largely determines the productivity and efficiency of human resource . It literally depicts the extent to which professionals like or dislike their jobs. Brief and Weiss (2001) define job satisfaction as a pleasurable emotional state resulting from the appraisal of one's job. It is an affective reaction to one's job (Weiss, 2002). Olaniyan and Obadara (2011) describe job satisfaction as how contended an individual is with his or her job.

From the above definitions, some issues are brought to mind that deal with what starts and energises human behaviour, how those forces are directed and sustained as well as the outcomes they bring about (performance). It follows therefore that, there is a relationship between motivation and job satisfaction which is paramount to any organization's existence. However, the concepts of motivation and job satisfaction are often confused with one another. Peretomode (1991) pointed out that the two terms are related but are not synonymous. They acknowledged that job satisfaction is one part of the motivational process. While motivation is primarily concerned with goal-directed behaviour, job satisfaction refers to the fulfillment acquired by experiencing various job activities and rewards.

It is pertinent therefore to say that a motivated teacher can be a satisfied one and invariably be an effective teacher. The leadership styles adopted by principals should therefore be such that can motivate teachers to work and love doing their job. Adeyemi (2011) in a study on principals' leadership styles and teachers' job performance in senior secondary schools in Nigeria reveals that teachers'job performance is better in schools with principals who adopt autocratic leadership style than in schools with principals using democratic or Laissez-faire leadership style. Choi and Lee (2011) assert that researches conducted to examine the relationship between leadership style and job satisfaction have indicated a substantial degree of co-relationship between these two variables.

Ronit (2001) reveals that Principals' transformational leadership style affects teachers' satisfaction both directly and indirectly through their occupation perceptions. Katharina (2002) in a study on teacher-job satisfaction, student achievement, and the cost of primary education in Francophone Sub-Saharan Africa concluded that teacher-job satisfaction does exert a positive and significant influence on student learning.

Sitha and Yoshinori (2003) in their study on 'Teacher Factors and Mathematics Achievement of Cambodian Urban Primary School Pupils' found that teacher-job satisfaction has statistically significant relationship with primary school pupils' achievement in Mathematics.

Job satisfaction and motivation are very crucial to the long-term growth of any educational system around the world. Teacher related sources of job satisfaction seem to have a greater impact on teaching performance. Paul and Kwame (2007) in their study on Teacher-Motivation in Sub-Saharan Africa and South Asia conclude that poor teacher motivation and inadequate incentives have far-reaching adverse impacts on the behaviour and overall performance of primary school teachers and students' learning outcomes.

Effective classroom management, which is a product of motivation and job satisfaction, cannot be separated from students' achievement.

Stephen and Sue (2002) observe that recent studies on differences in Mathematics achievement highlight the importance of classroom, teacher and school factors. Arends (2007) posits that when teachers talk about the most difficult problems they experienced in their first years of teaching, they mention classroom management and discipline more often. Classroom management is a term used by teachers to describe the process of ensuring that classroom lessons run smoothly even when students display disruptive behaviour. It has to do with laying down rules for students during the teaching and learning process. According to Bear (2008), rules give students concrete direction to ensure that teacher's expectation becomes a reality. Good classroom management is essential for condusive learning environment.

Classroom management focuses on teachers' actions, and how these contribute towards helping the students to willingly and freely participate in class discussions. This involves asking questions, attending to students and dealing with misbehaviour. Where the classroom is not properly managed, there will be disruption and teachers may not be able to achieve their set objectives. Having set the rules for the classroom, the teacher has to be consistent in enforcing the rules so that students do not make a mockery of such rules. Kauchak and Eggen (2008) explain classroom management in terms of time management. The goal of classroom management, according to them, is not only to maintain order but to optimize students' learning. Secondary education is not adequately funded in the country as it is poorly funded and most of the schools

experience classroom congestion, low students-classroom-space and low classroom utilization rates. These situations may likely affect secondary school students' academic performance adversely.

Arogundade and Alonge (2011), opines that effective teaching -learning process cannot be accomplished without good classroom management. Arising from this opinion is the fact that all activities put in place by the teacher and the school heads to ensure effective teaching-learning process in the classroom constitute what classroom management is all about. Emphasising the importance of classroom management, Atanda (2009) states that a school with a competent administrator may be a failure if majority of the teachers are mediocres and novices in the business of classroom management.

Waxler (2011) observes that classroom management is not about creating elaborate systems of rewards and punishments. Rather, effective classroom management is about keeping all of your students actively involved in all of your lessons. In this manner the teacher is addressing classroom management issues before they arise. The teacher is being pro-active rather than re-active. However, it is difficult to keep students actively involved if they are bored or uninterested. That's why student boredom is one of the two major factors contributing to classroom management issues. It is therefore, the teacher's job to ignite student interest and increase students' motivation to learn. The best way to do this is by making connections between what the students are learning and what is going on in their lives. In other words, find out what is important to them. It can therefore be seen that the connection between teacher classroom management and students' learning which invariably leads to students' achievement cannot be over emphasised.

1. Statement of the problem

The discouraging poor state of school effectiveness (which is measured among other things by students' achievement) in the recent past has become the concern of all stakeholders in the education sector in Nigeria. Examiners' reports on Mathematics results in SSCE show that majority of students have not been performing well in this subject. Yet, at least a credit pass in Mathematics at the school certificate level is a basic requirement for admission into courses in the Sciences, Management and most of the Social Sciences courses in tertiary institutions. It is common place

knowledge that failure or success of the students in the school system depends majorly on the availability of both human and material resources that could engender learning in Mathematics. In every school setting, it is the available quality human and material resources that determine the extent of students' learning and achievement. Principals as heads of schools harness both human and material resources to achieve these objectives.

Literature has shown that researches have been extensively carried out on the relationship between Principals' leadership styles and students' achievement, principals' leadership style and teachers' job satisfaction, effect of principals' monitoring of students' progress and the relationship with students' achievement, age and leadership effectiveness, principals' role and schools effectiveness as well as teachers' job satisfaction and students' achievement. The different variables in the aforementioned studies have not been collectively studied in relation to students' achievement. This study, therefore, investigated the link among principals' factors, job satisfaction as well as teachers' classroom management and students' achievement in Mathematics in South-western Nigeria.

1.3 Research questions

The following research questions were answered in this study.

1. What is the pattern of the profile of the principals used in this study?
2. What is the pattern of relationships (correlations) in the model consisting of Principals' gender, age, qualification, experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, supervisory role, teacher job satisfaction, classroom management and achievement in Mathematics?
3. Is the model which describes the causal effects among the variables (principals' gender, principals' age, principals' qualification, principals' years of experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, principals' supervisory role, teacher job satisfaction, teacher classroom management and Mathematics achievement) consistent with the observed correlations among these variables?

4. If the model is consistent, what are the estimated direct, indirect and total causal effects among the variables?

5. What is the relative importance of each exogenous and endogenous variable on the dependent variable?

1.4 Scope of the study

This study covered all the principals, SSS2 Mathematics teachers and SSS 2 students in senior secondary schools in South-western Nigeria. The variables comprise those already stated (age, gender, experience, qualification, leadership styles [autocratic, democratic, transformational and laissez-faire] principals' supervisory roles, teachers' job satisfaction and classroom management, and students' achievement in Mathematics) in the study.

1.5 Significance of the Study

The findings may help administrators and policy makers in the administration of schools. It could make the school heads to be aware of the fact that a single leadership style may not necessarily on a continuous basis promote school effectiveness. Therefore it is imperative to vary leadership styles as the situation demands. It may also help them discover how to create principal-teacher relationships which could enable principals enhance teachers' job satisfation so as to engender positive performance of their students. It may help teachers to be conscious of the fact that their level of satisfaction on their job has effect on their performance in the classroom and on their students' achievement. This might motivate them to perform their duties happily. It could also make teachers discover that there is a need for an ideal classroom situation for better performance of the students. Students could be in a better position to gain more as the two leaders (the principal in the school and the teacher in the classroom) who directly or indirectly affect their achievement now discover the most efficient ways to do it.

1.6 Definition of terms

Achievement: This is the score of students at the end of a learning activity.

Autocratic leadership: A leadership style in which a leader exerts a high level of power over his or her employees or team members or has no confidence or trust in the subordinates. The leader retains as much power and decision making authority as possible. Staff are expected to obey orders without receiving any explanations.

Democratic leadership: A leadership style in which a leader invites and encourages other members of the team to contribute to the decision making process. It is also known as participative leadership style.

Laissez-faire leadership: A leadership style in which a leader leaves his or her team members to get on with their work as they like. It is also known as the "hands-off" style. The leader provides little or no direction and gives staff as much freedom as possible.

Transformational leadership: A leadership style in which a leader inspires his or her team members with a shared vision of the future. He creates and sustains a context that maximizes human and organizational capabilities.

Job satisfaction: This is the level at which an employee is motivated to carry on with his or her job with very much interest or good attitude.

CHAPTER 2

LITERATURE REVIEW

Literature was reviewed under the following sub-headings.

2.0. Introduction

2.1. Theoretical Framework

2.2. Importance of Mathematics

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2.0. Introduction

Literature was reviewed based on the highlighted topics above. Other researchers have worked on these topics and the researcher therefore reviewed their findings and connected them with the current study.

2.1. Theoretical Background

Various theories on leadership styles have been propounded out of which we have the “trait theory”. Trait theory in psychology according to Saul (2003), is an approach to the study of human personality. Trait theorists are primarily interested in the measurement of *traits*, which can be defined as habitual patterns of behavior, thought, and emotion. The search for the characteristics or traits of leaders has been ongoing for centuries. History's greatest philosophical writings from Plato's *Republic* to Plutarch's *Lives* have explored the question "What qualities distinguish an individual as a leader?" Underlying this search was the early recognition of the importance of leadership and the assumption that leadership is rooted in the characteristics that certain individuals possess. This idea that leadership is based on individual attributes is known as the "trait theory of leadership".

The trait theory was explored at length in a number of works in the 19th century. Most notable are the writings of Thomas Carlyle and Francis Galton, whose works have prompted decades of research. In *Heroes and Hero Worship* (1841), Carlyle identified the talents, skills, and physical characteristics of men who rose to power. Galton's *Hereditary Genius* (1869) examined leadership qualities in the families of powerful men. After showing that the number of eminent relatives dropped off when moving from first degree to second degree relatives, Galton concluded that leadership was inherited. In other words, leaders were born, not developed. Both of these notable works lent great initial support for the notion that leadership is rooted in the characteristics of the leader.

In the late 1940s and early 1950s however, a series of qualitative reviews of these studies (e.g., Bird, 1940; Stogdill, 1948; Mann, 1959) prompted researchers to take a drastically different view of the driving forces behind leadership. In reviewing the extant literature, Stogdill (1948) and Mann (1959) found that while some traits

were common across a number of studies, the overall evidence suggested that persons who are leaders in one situation may not necessarily be leaders in other situations. Subsequently, leadership was no longer characterized as an enduring individual trait, as situational approaches (see alternative leadership theories below) posited that individuals can be effective in certain situations, but not in others. This approach dominated much of the leadership theory and research for the next few decades. New methods and measurements were developed after these influential reviews that would ultimately re-establish the trait theory as a viable approach to the study of leadership. For example, improvements in researchers' use of the round robin research design methodology allowed researchers to see that individuals can and do emerge as leaders across a variety of situations and tasks. Additionally, the 1980s' statistical advances allowed researchers to conduct meta-analyses, in which they could quantitatively analyze and summarize the findings from a wide array of studies. This advent allowed trait theorists to create a comprehensive picture of previous leadership research rather than rely on the qualitative reviews of the past. Equipped with new methods, leadership researchers revealed the following:

1. Individuals can and do emerge as leaders across a variety of situations and tasks.
2. Significant relationships exist between leadership and such individual traits as:

    1. intelligence
    2. adjustment
    3. extraversion
    4. conscientiousness
    5. openness to experience
    6. general self-efficacy

While the trait theory of leadership has certainly regained popularity, its re-emergence has not been accompanied by a corresponding increase in sophisticated conceptual frameworks. Specifically, Zaccaro (2007) noted that trait theories still:

1. focus on a small set of individual attributes such as Big Five personality traits, to the neglect of cognitive abilities, motives, values, social skills, expertise, and problem-solving skills;

2. fail to consider patterns or integrations of multiple attributes;
3. do not distinguish between those leadership attributes that are generally not malleable over time and those that are shaped by, and bound to, situational influences;
4. do not consider how stable leadership attributes account for the behavioral diversity necessary for effective leadership.

Another leadership style, situational leadership style eventually emerged. The situational leadership theory, is a leadership theory developed by Hersey and Blanchard (1969), Hersey, a professor and author of the book Situational Leader, and Ken Blanchard, leadership guru and author of *The One Minute Manager*, while working on the first edition of *Management of Organizational Behaviour* (now in its 9th edition). The theory was first introduced as "Life Cycle Theory of Leadership". During the mid-1970s, "Life Cycle Theory of Leadership" was renamed "Situational Leadership theory"(Harsey and Blanchard, 1977). In the late 1970s/early 1980s, the authors both developed their own models using the situational leadership theory; Hersey - Situational Leadership Model and Blanchard et al. Situational Leadership II Mode l(Blanchard, Zigarmi and Zigarmi).

The fundamental underpinning of the situational leadership theory is that there is no single "best" style of leadership. Effective leadership is task-relevant, and the most successful leaders are those that adapt their leadership style to the maturity ("the capacity to set high but attainable goals, willingness and ability to take responsibility for the task, and relevant education and/or experience of an individual or a group for the task") of the individual or group they are attempting to lead or influence. According to Hersey and Blanchard (1977), effective leadership varies, not only with the person or group that is being influenced, but it also depends on the task, job or function that needs to be accomplished. The Hersey-Blanchard Situational Leadership Model rests on two fundamental concepts; leadership style and the individual or group's maturity level. Hersey and Blanchard characterized leadership style in terms of the amount of Task Behaviour and Relationship Behaviour that the leader provides to their followers. They categorized all leadership styles into four behaviour types, which they named S1 to S4:

1. **S1: Telling** - is characterized by one-way communication in which the leader defines the roles of the individual or group and provides the what, how, why, when and where to do the task;

1. **S2: Selling** - while the leader is still providing the direction, he or she is now using two-way communication and providing the socio-emotional support that will allow the individual or group being influenced to buy into the process;

1. **S3: Participating** - this involves shared decision-making about aspects of how the task is accomplished, with the leader providing less task behaviours while maintaining high relationship behavior;

1. **S4: Delegating** - the leader is still involved in decision making; however, the process and responsibility has been passed to the individual or group. The leader stays involved, only to monitor progress.

Of these, no one style is considered optimal for all leaders to use all the time. Effective leaders need to be flexible, and must adapt themselves according to the situation. Based on the above, the researcher used situational leadership theory for the study. The reason for this is that different individuals with different tasks are working with the school principals and it will only be appropriate for the principals to define every one's duty or task. Not only that, the situation in one school may differ from the other and if the principals cannot be flexible in their leadership styles it may create problems for them if they have cause to change environment and thus, need to change their leadership style.

There are different forms of job satisfaction theories as we have in leadership styles. Job satisfaction is the most widely investigated job attitude, as well as one of the most extensively researched subjects in Industrial/Organizational Psychology (Judge and Church, 2000). Many work motivation theories have represented the implied role of job satisfaction. In addition, many work satisfaction theories have tried to explain job satisfaction and its influence, such include: Maslow's (1943) Hierarchy of Needs, Hertzberg's (1968) Two-Factor (Motivator-Hygiene) Theory, Adam's (1965) Equity Theory, Porter and Lawler's (1968), Locke's (1969) Discrepancy Theory, Hackman and Oldham's (1976) Job Characteristics Model, Locke's (1976)

Range of Affect Theory, Bandura's (1977) Social Learning Theory, and Landy's (1978) Opponent Process Theory.

As a result of this expansive research, job satisfaction has been linked to productivity, motivation, absenteeism/tardiness, accidents, mental/physical health, and general life satisfaction (Landy, 1978). A common idea within the aforementioned research has been that, to some extent, the emotional state of an individual is affected by interactions with their work environment. People identify themselves by their profession, such as a doctor, lawyer, or teacher. A person's individual well-being at work, therefore, is a very significant aspect of research (Judge and Klinger, 2007).

The most widely accepted explanation of job satisfaction was presented by Locke (1976), who defined job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (p. 1304). Additionally, job satisfaction has emotional, cognitive and behavioral components (Bernstein and Nash, 2008). The emotional component refers to feelings regarding the job, such as boredom, anxiety, or excitement. The cognitive component of job satisfaction refers to beliefs regarding one's job, for example, feeling that one's job is mentally demanding and challenging. Finally, the behavioural component includes people's actions in relation to their work, which might include being tardy, staying late, or pretending to be ill in order to avoid work (Bernstein and Nash, 2008).

There are two types of job satisfaction based on the level of employees' feelings regarding their jobs. The first and most studied, is global job satisfaction, which refers to employees' overall feelings about their jobs (e.g., "Overall, I love my job.") (Mueller and Kim, 2008). The second is job facet satisfaction, which refers to feelings about specific job aspects, such as salary, benefits, and the quality of relationships with one's co-workers (e.g., "Overall, I love my job, but my schedule is difficult to manage.") (Mueller and Kim, 2008). According to Kerber and Campbell (1987), measurements of job facet satisfaction may be helpful in identifying which specific aspects of a job require improvement. The result will aid organizations in improving overall job satisfaction or in explaining organizational issues such as high turnover (Kerber and Campbell, 1987).

The Herzberg's motivation-hygiene theory (also known as two-factor theory and dual-factor theory) states that there are certain factors in the workplace that cause

job satisfaction, while a separate set of factors cause dissatisfaction. It was developed by Frederick Herzberg, a psychologist, who theorized that job satisfaction and job dissatisfaction act independently of each other. Two-factor theory fundamentals: Attitudes and their connection with industrial mental health are related to Maslow's theory of motivation. His findings have had a considerable theoretical, as well as a practical, influence on attitudes towards administration. According to Herzberg (1966), individuals are not content with the satisfaction of lower-order needs at work, for example, those associated with minimum salary levels or safe and pleasant working conditions. Rather, individuals look for the gratification of higher-level psychological needs having to do with achievement, recognition, responsibility, advancement, and the nature of the work itself. So far, this appears to parallel Maslow's theory of a need hierarchy. However, Herzberg (1968) added a new dimension to this theory by proposing a two-factor model of motivation, based on the notion that the presence of one set of job characteristics or incentives leads to worker *satisfaction* at work, while another and separate set of job characteristics lead to *dissatisfaction* at work(fig. 2.1). Thus, satisfaction and dissatisfaction are not on a continuum with one increasing as the other diminishes, but are independent phenomena. This theory suggests that to improve job attitude and productivity, administrators must recognise and attend to both sets of characteristics and not assume that an increase in satisfaction leads to decrease in unpleasurable dissatisfaction.

Figure 2.1: Herzberg's two-factor model of motivation

The two-factor, or motivation-hygiene theory, was developed from data collected by Herzberg (1959) from interviews with a large number of engineers and accountants in the Pittsburgh area of U.S.A. From analyzing these interviews, he found that job characteristics related to what an individual *does* — that is, to the nature of the work he performs — apparently have the capacity to gratify such needs as achievement, competency, status, personal worth, and self-realization, thus making him happy and satisfied. However, the *absence* of such gratifying job characteristics does not appear to lead to unhappiness and dissatisfaction. Instead, dissatisfaction results from unfavourable assessments of such job-related factors as company policies, supervision, technical problems, salary, interpersonal relations on the job, and working conditions. Thus, if management wishes to increase satisfaction on the job, it should be concerned with the nature of the work itself — the opportunities it presents for gaining status, assuming responsibility, and for achieving self-realization. If, on the other hand, management wishes to reduce dissatisfaction, then it must focus on the job environment — policies, procedures, supervision, and working conditions. If management is however equally concerned with both (as is usually the case), then, managers must give attention to both sets of job factors.

The theory was based around interviews with 203 American accountants and engineers in Pittsburgh, chosen because of their professions' growing importance in the business world. The subjects were asked to relate times when they felt exceptionally good or bad about their present job or any previous job, and to provide reasons, and a description of the sequence of events giving rise to that positive or negative feeling. The study therefore adopted the Herzberg theory of job satisfaction.

Locke (1976) put forward the ideas of the range of affect theory. The theory explains that the importance of work facets differs for each individual. For example, one employee might feel that pay rate is extremely important while another feels that social relationships are more important. The hypothesis of this theory is that employees weigh facets differently when assessing job satisfaction (Locke, 1976). Consequently, this leads to an individual measure of satisfaction or dissatisfaction when expectations are, or are not met. For example, the job satisfaction of an employee who places extreme importance on pay would be positively impacted if he or

she receives a salary within expectation. Conversely, the level of pay would minimally impact the job satisfaction of an employee who places little importance on pay.

Field (2008) developed a model in order to explain the reasons for turnover and retention in organisations. The figure below is the model:

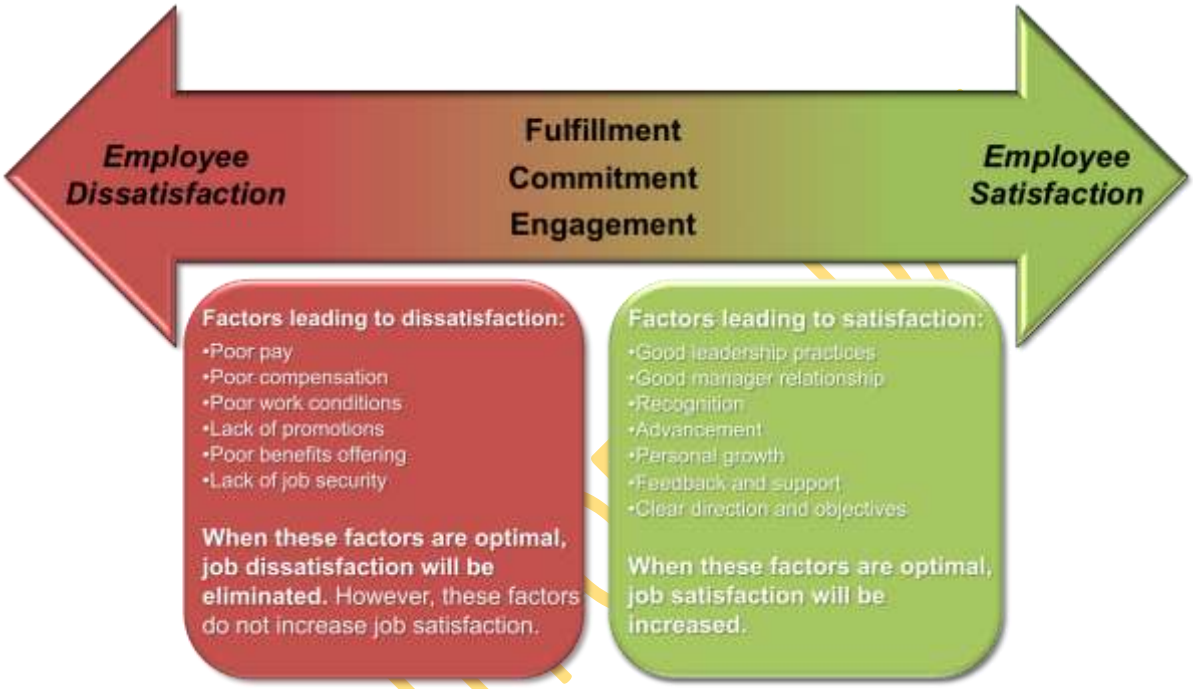


Figure 2.2. Job Satisfaction Model (Field, 2008).

The factors that are going to make some employees MORE dissatisfied are things like:

1. poor pay
2. poor compensation
3. poor work conditions
4. lack of promotions
5. poor benefits offering
6. lack of job security

Curiously enough, if you were to fix all these factors, you will still not get a satisfied employee. If you fixed everything above, you'd have an employee sitting somewhere

in the middle of the satisfaction scale, so they would be neither satisfied nor dissatisfied.

The factors that make an employee MORE satisfied are things like:

1. good leadership in the organisation
2. good relationship with their manager
3. recognition for their achievements (not necessarily monetary recognition)
4. advancement in their careers
5. personal growth and development
6. feedback and support (meaningful feedback, not just naked criticism)
7. clear direction and objectives

So, there is a lot that can be done on the positive side to increase satisfaction. Naturally, there are of course many opportunities on this side of the house where a good talent management solution can help things along. The study therefore adopted both Herzberg and Field models.

Classroom management is a term used by teachers to describe the process of ensuring that classroom lessons run smoothly despite disruptive behaviour by students. The term also implies the prevention of disruptive behaviour. It is possibly the most difficult aspect of teaching for many teachers; indeed experiencing problems in this area has caused some to leave teaching altogether. Classroom management is closely linked to issues of motivation, discipline and respect. Methodologies remain a matter of passionate debate amongst teachers; approaches vary depending on the belief a teacher holds regarding educational psychology. A large part of traditional classroom management involves behaviour modification, although many teachers consider using behavioral approaches alone as overly simplistic. Many teachers also establish rules and procedures at the beginning of the school year. According to Gootman (2008), rules give students concrete direction to ensure that expectations become a reality. Various theories have been propounded on classroom management. Among these are:

The Glasser Theory of Classroom Management: This is based on the principles that the classroom environment and curriculum should create a safe place for learning by meeting the needs for belonging, power, fun and freedom (William 2009) . Glasser

also stressed helping the students achieve success by teaching them to make appropriate behavioural choices. According to Glasser, behaviour is a matter of choice. A student's behaviour stems from the choices he or she makes. It's the teacher's responsibility to help the students make good choices, which would result in good behaviour. The Glasser Theory states that teachers should stress student responsibility, establish rules that lead to success, accept no excuses, call for value judgments, suggest suitable alternatives, invoke responsible consequences, be persistent, and carry out continual review. The benefit Glasser believed that students will have is that they will be provided with a choice in deciding the curriculum and classroom rules. This will help the students take ownership of the learning process, leading to increased enthusiasm, confidence and participation.

Teachers employing the Glasser Theory may need to deviate from the classical classroom structure in order to achieve success. Glasser favours having the students work together in small groups. This fosters a sense of belonging, motivates the students to work for the group, and reduces their dependence on the teacher. When divided into smaller groups, stronger students will help the weaker students, improving relationships and classroom harmony. The Glasser Theory alone won't eliminate all classroom behavioural problems however. Glasser suggests that the teacher organizes the classroom the best way possible to meet students' needs and then intervene with the supplied strategies to improve behaviour (William, 2009). Even when the theory is followed, Glasser concedes up to 25 percent of students may remain unproductive. This theory therefore cannot be the best for this study.

Kohn's theory of classroom management emphasises curiosity and cooperation above all else. This is true throughout Kohn's discussions on standards, standardized testing, homework, and classroom management. Kohn believes that the students' curiosity should govern what is taught inside the classroom; therefore, if standards are necessary at all, they should be kept very general. Because of this belief, Kohn is critical of standardized testing. He considers this sort of testing as extrinsic to real learning and also enforces a strict curriculum that is not flexible to students' interests and needs. Again, going back to Kohn's focus on curiosity and intrinsic rewards of education, Kohn feels that most homework serve to undermine these two goals as opposed to reinforcing them. Kohn's most recent book (*The Homework Myth:*

Why Our Kids Get Too Much of a Bad Thing (Da Capo Books, 2006)) deals with this topic extensively. In addition to these ideas about curriculum, Kohn has made his thoughts clear on classroom management.

Kohn believes that most traditional methods of classroom management foster extrinsic motivation rather than intrinsic. Because of this, he is a proponent of what could be termed a very "hands off" type of management approach. Kohn believes that if the classroom is run with cooperation in mind, and if the students' curiosity is being nurtured, then, students will act appropriately and neither reward nor punishment will be necessary. Overall, he posits that curiosity and cooperation should govern the classroom. In addition to understanding some of the basic foci of Kohn's ideas, it is important to be able to place these ideas in a greater context. For example, one should consider the predecessor of this type of thinking and the period during which Kohn was writing. While there are divergences, Kohn's beliefs are generally aligned with Critical Pedagogy, or the application of Marxist principles to the educational system. There are many other radical educational theorists, many of which preceeded Kohn, who would concur with many of his thoughts. Paulo Freire, Henry Giroux, and Michael Apple are just a few who come to mind and have surely influenced Alfie Kohn. In addition to this piece of context, it is important to note that Alfie Kohn was writing and publishing at a time when there was a strong movement to standardize education and create more accountability within the system. This has clearly influenced the focus of much of Kohn's writing and is important to bear this in mind when considering his contributions to the field of education. The teacher should meet with students individually to discuss their behavior, their successes, and their weaknesses. If a student understands the thinking behind a positive or negative behaviour, then the student is more likely to act accordingly without needing the reassurance of praise. Worthy of note is that the large class size in most schools today does not encourage the theory of Alfie Kohn.

Constructivism, according to Ozgur (2004), is a new approach in education that claims humans are better able to understand the information they have constructed by themselves. According to constructivist theories, learning is a social advancement that involves language, real world situations, interaction and collaboration among learners. The learners are considered to be central in the learning process. Learning is affected

by our prejudices, experiences, the times in which we live, and both physical and mental maturity. When motivated, the learner exercises his will, determination, and action to gather selective information, convert it, formulate hypotheses, test these suppositions via applications, interactions or experiences, and draw verifiable conclusions.

Constructivism transforms today's classroom into a knowledge-construction site where information is absorbed and knowledge is built by the learner. In constructivist classrooms, unlike the conventional lecturer, the teacher is a facilitator and a guide, who plans, organizes, guides, and provides direction to the learner, who in turn, is accountable for his own learning. The teacher supports the learner by means of suggestions that arise out of ordinary activities, by challenges that inspire creativity, and with projects that allow for independent thinking and new ways of learning. Students work in groups to approach problems and challenges in real life situations, this in turn leads to the creation of practical solutions and a diverse variety of student products. Jean Piaget and Lev Vygotsky are two eminent figures in the development of constructivist theories. They share the common belief that classrooms must be constructivist environments; however, there are differences in terms of their theories and variations as to how constructivism should be carried out in classrooms.

Piaget (1896-1980), remembered for his extensive research on developmental psychology, explains the learning process by schemes (the organization of information on how things work), assimilation (the placing of new information into schemes), and accommodation (transforming existing schemes or creating new ones). The motivation for learning is the predisposition of the learner to adapt to his environment, hence instituting equilibrium between schemes and the environment. Continuous interactions among existing schemes, assimilation, accommodation, and equilibrium create new learning. Piaget explores four sequential stages of the psychological development of the young learner and believes teachers should be cognizant of these stages. During the Sensory-motor Stage, (before the age of 2) sensory experiences and motor activities dominate. Intelligence is intuitive in nature and knowledge; it is acquired through mental representation during the Preoperational Stage (from age 2 to age 7). At the Concrete Operational Stage (from age 7 to age 11), intelligence is logical, conserved, and dependent on concrete references. The Formal Operational Stage (after 11 years of

age) is the stage when abstract thinking starts and the learner starts thinking about probabilities, associations, and analogies. Piaget's developmental theory of learning and constructivism are based on discovery. According to his constructivist theory, in order to provide an ideal learning environment, children should be allowed to construct knowledge that is meaningful for them. Piaget believes that a constructivist classroom must provide a variety of activities to challenge students to accept individual differences, increase their readiness to learn, discover new ideas, and construct their own knowledge.

Vygotsky (1896-1934), known for his theory of social constructivism, believes that learning and development is a collaborative activity and that children are cognitively developed in the context of socialization and education. The perceptual, attention, and memory capacities of children are transformed by vital cognitive tools provided by culture, such as history, social context, traditions, language, and religion. For learning to occur, the child first makes contact with the social environment on an interpersonal level and then internalizes this experience. Earlier notions and new experiences influence the child, who then constructs new ideas. Vygotsky's (1978, p. 56) example of being able to point a finger displays how this behavior, which begins as a simple motion, becomes a meaningful movement when others react to the gesture. A Vygotskian classroom emphasizes creating one's own concepts and making knowledge one's property; this requires that school learning takes place in a meaningful context, alongside the learning that occurs in the real world. As seen earlier in the Piagetian classroom, this model also promotes the active participation and collaboration of distinctive learners. The Vygotskian classroom stresses assisted discovery through teacher-student and student-student interaction. Some of the cognitive strategies that group members bring into the classroom are questioning, predicting, summarizing, and clarifying.

In a Vygotskian classroom, dynamic support and considerate guidance are provided based on the learner's needs, but no will or force is dictated. Students are exposed to discussions, research collaborations, electronic information resources, and project groups that work on problem analysis. This theory therefore fits into the study.

2.2. Importance of Mathematics

In the secondary school curriculum, according to National Policy on Education (2004) in Nigeria, there are core subjects as well as electives that students must offer. The core subjects are compulsory for all the students to study, whether or not they have aptitude for it. Mathematics is one of these core subjects. For students to further their studies in institutions of higher learning especially in the University,they are expected to have credit pass in Mathematics especially for students offering sciences, management courses and most of the social science courses. This makes Mathematics one of the essential subjects for students' advancement. In fact, Funkywizard-ga (2004) states that the importance of mathematics is two-fold. It is important in the advancement of science, it aids understanding of the workings of the universe and in this present age, and it is important to individuals for personal advancement, both mentally and in the work place.

Throughout the world, Mathematics is is considered as an essential tool in many fields, including natural science, engineering, medicine, and the social sciences. Applied mathematics, (the branch of mathematics concerned with application of mathematical knowledge to other fields), inspires and makes use of new mathematical discoveries and sometimes leads to the development of entirely new mathematical disciplines, such as statistics and game theory. Every branch of science, be it physics, chemistry, biology, astronomy, engineering, aeronautics, transportation and communication, etc., requires the person studying it to acquire the in-depth knowledge of mathematics so that he or she can understand the theories of the subject. Most scientific theories are also based on mathematical concepts.

The everyday use of arithmetic and the display of information by means of graphs is commonplace experience. These are the elementary aspects of mathematics. Advanced mathematics is widely used, but often in an unseen and unadvertised way.

1. The mathematics of error-correcting codes is applied to CD players and to computers.
2. The stunning pictures of far away planets sent by Voyager II could not have had their crispness and quality without such mathematics.
3. Voyager's journey to the planets could not have been calculated without the mathematics of differential equations.

4. Whenever it is said that advances are made with supercomputers, there has to be a mathematical theory which instructs the computer on what is to be done, thereby allowing it to apply its capacity for speed and accuracy.
5. The development of computers was initiated in this country by mathematicians and logicians, who continue to make important contributions to the theory of computer science.
6. The next generation of software requires the latest methods from what is called *category theory*, a theory of mathematical structures which has given new perspectives on the foundations of mathematics and logic.
7. The physical sciences (chemistry, physics, oceanography, astronomy) require mathematics for the development of their theories.
8. In ecology, mathematics is used when studying the laws of population change.
9. Statistics provides the theory and methodology for the analysis of a wide variety of data.
10. Statistics is also essential in medicine, for analysing data on the causes of illness and on the utility of new drugs. .
11. Travel by aeroplane would not be possible without the mathematics of airflow and control systems.
12. Body scanners are the expression of subtle mathematics, discovered in the 19th century, which makes it possible to construct an image of the inside of an object from information on a number of single X-ray views of it. Thus mathematics is often involved in matters of life and death

Mathematics as a subject is so important that many other fields of studies make use of it. In fact, Pragati (2010) identifies areas or disciplines where the role of Mathematics is widely accepted. The disciplines are: Physical Sciences, Fluid Dynamics, Physical Oceanography, Chemistry, Biological Sciences, Social Sciences, Economics, Actuarial Science, Insurance and Finance, Psychology and Archaeology, Mathematics in Social Networks, Political Science, Mathematical Linguistics, Mathematics in Music, Mathematics in Art, Mathematics in Management, Mathematics in Engineering and Technology, Mathematics in Computers. Judging from the number of disciplines that make use of Mathematics it can be concluded that

the subject is a must do for every secondary student. It is important to the extent that students should not take it with levity.

Stacie and Anne (2013) carried out a research on "Academic Achievement in First Generation College Students: The Role of Academic Self-Concept". 167 participants were involved in the study and the result showed that students with lower verbal and mathematics self-concepts had lower grade point averages. This shows the importance of Mathematics to students at higher educational level and how good performance in Mathematics aids students' achievement in their future aspirations.

Asante (2012) expresses the importance of Mathematics in these words:

> *"In today's fast paced world where individuals deal with information generated from computers and calculators to that of mental estimations of daily purchases, it is imperative that students become proficient in mathematics. Not only must learners deal with a wide range of operational skills, such as computing decimals, they must also understand underlying numerical concepts in order to succeed in a variety of day-to-day commercial and work place situations".*

What Asante is saying here is that Mathematics should not be seen just as a school subject, or one that must be passed in order to proceed academically, but also as a subject that determines one's ability to be useful in the society. When students master basic mathematics skills, they are less likely to fail in school and more likely to develop the higher-order thinking skills they need to graduate from high school and post-secondary school. Competency in these basic academic skills is also necessary for finding and keeping jobs that provide a steady income, benefits, and opportunities for advancement.

Akubuiro and Joshua (2004) observed that students' performance in Secondary School Certificate Examinations (SSCE) administered by the West African Examination Council (WAEC), and the National Examination Council (NECO), continues to deteriorate from year to year, particularly in the areas of Science and Mathematics. Isaac (2011) reiterated this when he said that for Nigeria, a developing country that needs Science and Technology for its development, the poor performance of students in Science and Mathematics and worse still, the very insignificant proportion of students who choose Mathematics as a course of study after secondary education has become an issue of great concern to the government and people of Nigeria.

Ukeje in Ekwueme and Ali (2012) asserts that Mathematics is a very important bedrock for the successful functioning of all aspects of human endeavour and that no nation can achieve any measure of scientific and technological advancement without a proper foundation in mathematics. Ekwueme and Ali (2012) support this assertion that the importance of Mathematics is shown in the position it occupies in admission into Nigerian higher institutions; that Joint Admission Matriculation Board (JAMB) brochure states that a credit pass in mathematics is required for admission into the sciences. A pass in mathematics is a necessary requirement for admission into any discipline in many higher institutions all over the world. Despite the important position mathematics occupies, it still remains one of the subjects that students persistently perform very poorly in. The alarming rate of poor performance in mathematics has become an issue of concern to all stakeholders, as regards the factors which contribute to this problem. The aforementioned attests to the reason why Mathematics is chosen as the criterion variable and other factors (principals' and teachers') are chosen as the independent variables.

2.3. Principals' gender and leadership styles

Moris and Linda (2010) carried out a research on the relationship between gender, years of administrative experience of principals and schools' academic growth. They found that female principals had higher growth trends in reading and Mathematics across the three-year academic span for 2005, 2006, and 2007. They also observed that female respondents who had been principals for fifteen years or more had higher gains in their academic achievement growths than the male principals with equal or more years of service as administrators. While Eagly, Johannesen-Schmidt and Van Eagen (2003) argued that their findings provided reliable evidence that gender differences did exist in leadership style, whereby women leaders, more than men, emphasized both interpersonal relations and task accomplishments, some researchers exploring gender disparities found a lack of support for the notion that women and men utilize different leadership styles (Eagen, and Willemsen, 2001; Pounder and Coleman, 2002).

Ibrahim and Al-Taneiji (2013) in their study: "Principal Leadership Style, School Performance, and Principals' Effectiveness In Dubai Schools" conclude that principal's style and effectiveness differed according to the principal's gender. Sawati,

Anwar, and Majoka,(2011) carried out a study on "Principals' Leadership Styles and Their Impact on Schools' Academic Performance at Secondary Level in Khyber Pakhtoonkhwa, Pakistan" and found that there are no gender differences in different leadership styles. That is to say, that gender is not a determinant of leadership style adopted by school principals. Adeboyeje (2006) also reveals that there is no significant relationship between the dimensions of principals' leadership behaviour and principals' sex. Barbuto, Susan, Matkin and Marx (2007) observe that gender has no significant effect on ratings of transactional and/or transformational leadership behavior. They however state that the main effects of gender on influence tactics were significant; women were rated as using significantly more pressure tactics than men.

5.6 Age of the principal and leadership styles

Kabacoff and Stoffey (2001) in their study of the influence of age differences in organisational leadership reported that younger workers felt more comfortable in fast changing environments, and were more willing to take risks and consider new approaches than the older workers. Osagbemi (2004) observed that older and younger managers have distinct leadership styles. Older managers consult more on organizational affairs and their decisions therefore reflect that of the majority of members in their units. He however reported that no significant statistical difference existed between older and younger managers who adopted the laissez-faire style of leadership. Adeboyeje (2006) observed that there was a significant relationship between the dimensions of principals' leadership behaviour and principals' age. Barbuto, Susan, Matkin and Marx (2007) agree that the effect of the leader's age on followers' ratings of transactional and/or transformational leadership style is significant, as clear differences emerged based on the age group of the leader. The age of leaders can be a determinant of their experience and that is why the experience of leaders cannot be waved aside when talking about leadership styles.

Robinson and Weimer (1991) noted that with sensible guidelines, early admission was generally successful. Especially significant were the several studies of early entrants who were in junior and senior high schools; the students were excelling

academically, participating in numerous extracurricular activities, and exhibiting strong, positive self-concepts. Less favourable consequences for those who start school early have, however, been reported in other studies. Olson (1989), for example, concluded that by the end of the first year of school, younger children experienced a disadvantage of three tenths of a year in reading and nearly the same amount in mathematics when compared to their older peers. Furthermore, this disadvantage persisted throughout their elementary school careers. Gilah and Peter (1995) carried out a study titled "achievement in the Australian Mathematics Competition: A Question of Age?" They found that younger students generally performed well above average on the Australian Mathematics Competition papers; the oldest group typical ly achieved substantially below the grade mean. There were proportionately more males than females in the older group but no gender differences were noted in the composition of the younger group. Mitchell (2000) reports that younger workers are more comfortable in exhibiting individualistic behaviour than their older counterparts do. He further reveals that younger and older managers have different profiles in their consultative and participative leadership styles.

2.5. Principals' experience and leadership styles

Greenfield (1991) observes that effective school leadership requires an administrator to function as a leader in several roles simultaneously. These roles include managerial, instructional, political, social, and even moral roles. He believes that these roles will make the principal acquire experience for leadership effectiveness. According to him, one of the greatest contributory factors to a leader's effectiveness is the leader's degree of prior experience in school leadership roles. One reason why prior leadership experience is so crucial to effective administrative function is its skill-building function. As Hutchison (1988) states, the degree of one's background in the leadership role directly relates to the acquisition and development of skills critical to effective school leadership. These critical skills are said to include information management skills, problem-solving and decision making skills, goal setting skills, project management skills, interpersonal communication skills, conflict and motivational management skills, as well as mentoring skills. Ibrahim and Al-Taneiji (2013) found that a principal's style and effectiveness did not differ according to the principal's experience. Karen (2002) observed that principals' experience in their

present schools has significant effect on their leadership styles in the area of teachers' job satisfaction. Osagbemi (2004) argue that older managers may have an advantage in the experience gained in the process of accumulation of knowledge over the younger managers, especially in the area where new knowledge is built upon previous knowledge. Adeboyeje (2006) found that there was no significant relationship between the dimensions of principals' leadership behaviour and principals' experience.

2.6. Leadership style and teachers' job satisfaction

Ramesh, Jamil, Babar, Rehan and Assad (2013) observe that Job satisfaction largely determines the productivity and efficiency of human resource . It literally depicts the extent to which professionals like or dislike their jobs. Brief and Weiss (2001) define job satisfaction as a pleasurable emotional state resulting from the appraisal of one's job. It is an affective reaction to one's job (Weiss, 2002). Olaniyan and Obadara (2011) describe job satisfaction as how content an individual is with his or her job.

Job characteristics have been shown to impact job satisfaction (Baker, 2004). According to Baker, leadership actions influence job satisfaction. Yamraj and Ross (2008) in their study on "What leadership styles have to do with teachers' job satisfaction: A review of a British Virgin Islands study", concluded that there was a positive correlation between leadership style and the degree of job satisfaction ($R = .70$; $p<.01$). Hariri (2011) investigated on Leadership styles, decision-making styles, and teacher job satisfaction: an Indonesian school context. Thirty-six principals and 475 teachers (a 92% response rate) in 36 schools were randomly selected from six districts. The data was analysed using descriptive statistics, multiple regression, ANOVA, and t-test. The study found that Principals mostly exhibited transformational leadership style and rational decision-making style. The relationships between principal leadership styles (transformational, transactional, and laissez-faire), principal decision-making styles (rational, dependent, intuitive, spontaneous, and avoidant), and teacher job satisfaction were mostly significant. In particular, among these principal leadership styles and principal decision-making styles, five variables (transformational leadership style, laissez-faire leadership style, rational decision-making style, intuitive decision-making style, and avoidant decision-making style) were significant predictors

of teachers' job satisfaction, with transformational leadership style and rational decision-making style identified as the best predictors.

2.7. School effectiveness

The effectiveness of a school is determined by what the school is able to bring out of its students at the end of their stay in the school within a particular set time. In today's competitive world, parents are more selective in the choice of schools for their children, so it becomes imperative that a school develops a positive image for itself if it plans to remain in business. A school's positive image is influenced by the effectiveness of the teaching-learning environment in the school. A school's positive image would encompass both "goodness" and effectiveness (Glickman, 1987). A 'good' school reflects smiles, care, and concern. An effective school is one that promotes the progress of its students in a broad range of intellectual, social and emotional outcomes. Extensive research has helped identify effective school correlates as effective instructional leadership (Palmer, 1996; Hallinger and Heck, 1996; Joshua, 1999), clear objectives, Faculty trust (Fitch, 1988; Depasquale, 1996). If principals therefore are effective in their supervisory roles, it will greatly help in having an effective school.

Day, Hadfield, Tolley and Beresford, (2000) state that, "Research findings from diverse countries and different school contexts have revealed the powerful impact of leadership processes related to school effectiveness and improvement. Essentially, schools that are effective and have the capacity to improve are led by head teachers who make a significant and measurable contribution to the effectiveness of their staff." Ladd (2009), finds an association between positive teacher working conditions and student achievement. Similarly, Wahlstrom, Seashore-Louis, Leithwood and Anderson (2010) find a correlation between schools with high level of student achievement and high ratings by teachers of "instructional climate." Instructional climate refers to "steps that principals take to set a tone or culture in the building that supports continual professional learning"

2.8. Students' Academic achievement

Academic achievement of the students generally and specifically in Mathematics is the concern of every citizen of this nation. In one of the Nation's daily newspaper 'This Day' of 11th December 2012, the concern of the Federal government was expressed in these words:

> *"The Federal Government yesterday said it was dissatisfied with the decline in students' performance in public examinations conducted by the West Africa Examination Council (WAEC), National Examination Council (NECO) and the Joint Admissions and Matriculation Board (JAMB) despite efforts to check the trend".*

The then Honourable Minister of Education, Professor Ruqayyatu Ahmed Rufa'i, also decried the poor quality of outcome in the country's education system. She stated that a close look at students' results over the years showed that there had been a steady decline in the number of candidates who obtained five credits and above, including English Language and Mathematics. She noted that this was worrisome considering the fact that the subjects were basic entry requirements for transition to higher education in the country. Parents, guardians and other stakeholders in the education sector have variously commented on the performances of secondary school students particularly in English Language and Mathematics (Adepoju, 2002).

According to Ladipo (2013), the following are the percentages of students who obtained five credits, including English and Mathematics in the May/June WAEC over the last five years: 23% (2008), 26% (2009), 24% (2010), 31% in 2011 and 39% in 2012. Regarding NECO, failure rate was 98% in 2008, 88% in 2009, 89% in 2010, 92% in 2011, and 68% in 2012. Adepoju and Oluchukwu (2011) state that the poor performance of secondary school students in English Language and Mathematics in SSCE has made it difficult for majority of students to gain admission into higher institutions of learning in recent times. The poor academic performance of students is posing a problem to educators and a serious concern to parents (Osonwa, Adejobi, Iyam and Osonwa, 2013).

Emmanuel, Oshati and Eze (2012) observed that, in recent years the quality of education in Nigeria, especially in our secondary schools has been a subject of public concern. The poor results of school certificate examinations over the years have provided justification for the expressed concerns. According to West African

Examination Council (WAEC, 2007), the failure rate for English language in the past five years surpasses that of the percentage of credits scored in Senior School Certificate Examination (SSCE) conducted between 2001 and 2005. While in Mathematics, a fluctuating trend was recorded by the candidates during this period. Punch (2008) in Emmanuel et al (2012) reveals that out of a total of 1,369,142 candidates that sat for West African Senior School Certificate Examination (WASSCE) in Nigeria in 2008, only 188,442 representing 13.76% obtained five credit passes and above in English Language, Mathematics and three other subjects. While 947,945 candidates representing 83% failed the examination. The analysis suggests that all is not well with students' performance in secondary schools.

2.9. Gender and achievement in Mathematics

Wong, Lam, and Ho (2002) observed in their study that girls perform better in school than boys in all major subjects. Alkhateeb (2010) researched on "Gender Differences in Mathematics Achievement among High School Students in the United Arab Emirates, 1991–2000". Record of two thousand students (100 males and 100 females for each of the 10 academic years), was taken from the Federal Ministry of Education and achievement results for males and females were compared. Findings indicated no significant overall differences. This indicated that there was no significant effect of gender on achievement in Mathematics. Abubakar and Adegboyega (2012) in their study, "Age and Gender as Determinants of Academic Achievements in College Mathematics" found no significant effect of gender on achievement in College Mathematics. They also found no significant difference between the achievement of female and male students in College Mathematics. Jabor, Machtmes, Kungu And Buntat (2011) also carried out a research on 'The Influence of Age and Gender on the Students' Achievement in Mathematics'. They found that gender has a siginificant effect on students' achievement in Mathematics with female students performing better than their male counterparts.

Nkoma, Zirim and Chimunhu (2013) assessed the magnitude of difference between boys and girls on mathematics achievement as measured by standardized achievement tests. A quasi-experimental design was employed to gather data, with a sample size of 18, 706 participants. Participants were randomly selected with 52% of

participants being male and 48% being female. The result showed a significant difference in the performance of boys and girls on standardized achievement tests, with girls performing better than boys in mathematics (t=-9.697 significant at 0.01 confidence level and t=-3.106 significant at 0.05 confidence level at Primary and Secondary levels respectively). This study showed a significant effect of gender on Mathematics achievement. Rohaty (2012) equally carried out a research on "Preschool Children's Early Mathematics Achievement Based on Gender and Ethnicity". One hundred and thirty-eight pupils consisting of seventy boys and sixty-eight girls were used in the study. It was found that gender had no significant effect on Mathematics achievement.

2.10. Age and achievement in Mathematics

Jabor, Machtmes, Kungu and Buntat (2011) carried out a research on 'The Influence of Age and Gender on the Students' Achievement in Mathematics'. They found that the age of the students significantly affected their achievement in Mathematics with students of lower age (19years and below) performing better than students of a higher age (above 19years). Abubakar and Adegboyega (2012) studied on "Age and Gender as Determinants of Academic Achievements in College Mathematics". They sampled 40 male students and 38 female students from NCE, selected from parts I to III academic levels. T-test, ANOVA and regression were used for the analysis of the data collected. They found that though age has positive effect on students' academic achievement, it was not at any significant level. Grissom (2004) in his study concluded that the negative relationship between age and achievement has remained constant over time. The above researchers have only used age and gender as independent variables and have investigated their effects on academic achievement. This study did not only consider the effect of age and gender on academic achievement but also on how they affect other independent variables.

2.11. Experience and achievement in Mathematics

Damon, Paco and Jonah (2009) investigated on "School Principals and School Performance". They found that there was a positive relationship between principal experience and school performance, particularly for Mathematics test scores and

students' absences. Dhuey and Smith, (2011) carried out a research titled: "How Important Are School Principals in the Production of Student Achievement?" They found that a one standard deviation improvement in principal quality can boost student performance by approximately 0.3 standard deviations in both math and reading. They also found that principals' experience did not exert any significant influence on students' performance. These researchers have considered the direct effect of experience on achievement in Mathematics. This study however, did not only investigate the direct effect of experience on Mathematics achievement, but also considered the indirect effect of experience on Mathematics achievement. That is, how experience affects other factors which in turn, affect Mathematics achievement.

2.12. Concept of Leadership styles

Leadership is a process by which a person influences others to accomplish an objective and directs the organization in a way that makes it more interconnected and consistent. Mullins (2010) defines leadership as the relationship in which one person influences the behaviour or actions of others. According to some, leadership is determined by distinctive dispositional characteristics present at birth (e.g., extraversion; intelligence; ingenuity). However, according to Forsyth (2009) there is evidence to show that leadership also is developed through hard work and careful observation. Thus, effective leadership can result from nature (i.e., innate talents) as well as nurture (i.e., acquired skills). Leaders shape workplace affective events. Examples – feedback giving, task allocation and resource distribution. According to Dasborough (2006), employee behaviour and productivity are directly affected by their emotional states. It is therefore imperative to consider employees' emotional responses to organizational leaders. In fact Peretomode (2012) defines leadership as an art or process by which a member of a group or organization persuades, inspires, influences the attitudes, behaviour and actions of others and directs their activities so that the group or organization members work willingly, cooperatively and enthusiastically toward the accomplishment of set goals and a new and improved position. Alageheband(1997) in Yusuf (2012) opines that administrator's leadership style influences the efficiency and also the effectiveness of the organization and it is the function of other several inter-related factors like the employee's level of

psychological and social maturation at work and their main expectations. What Alageheband is saying in essence is that leadership style of a leader affects the activities of his or her surbodinates either positively or negatively.

Emotional intelligence, which is the ability to understand and manage moods and emotions in oneself and others, contributes to effective leadership within organizations (George, 2006). The validity of the assertion that groups flourish when guided by effective leaders can be illustrated using several examples. Moreover, it has been documented that group performance, creativity, and efficiency all tend to climb in businesses with designated managers or CEOs (Jung, Wu and Chow, 2008; Zaccaro and Banks 2001). However, the difference leaders make is not always positive in nature. Leaders sometimes focus on fulfilling their own agendas at the expense of others, including their followers. Lipman-Blumen (2005) states that Leaders who focus on personal gain by employing stringent and manipulative leadership styles often make a difference, but usually do so through negative means. Various leadership styles are in operation and include transformational leadership style, laissez faire leadership style, autocratic leadership style and democratic leadership style.

2.12.1. Leadership styles and students' achievement in Mathematics

Sammons, Gu, Day and Ko (2011) found that leadership effects directly and indirectly on a range of school and classroom processes and effects indirectly on improvements in schools' academic results. However, classroom teaching may be impacted by principals' actions, such as setting and clearly communicating high expectations for all students, supervising teachers' instructional performance, evaluating students' progress, and promoting a positive teaching/learning environment. Randall and Joe (2002**)** found that principals' behaviour and attributes significantly influence individual student achievement. Karen, Kenneth, Kyla and Stephen(2010) conducted a research titled: *" Learning from Leadership: Investigating the Links to Improved Student Learning"* They found that principals play a central role in school leadership, but high-performing schools benefit from the leadership of many others, too, with the principal encouraging teachers, parents and others to participate in making decisions. Principals improve students' learning ability largely by motivating

teachers and encouraging the "professional community" – the help and guidance that teachers give one another to improve their teaching abilities. Kythreotis, Pashiardis, and Kyriakides (2010) conclude that a principal's human leadership frame affects students' achievement. On the other hand, Sawati, Anwar, and Majoka,(2011) found that there is no significant effect of any particular style on a school's academic results.

Witziers, Bosker, and Kruger (2003) found that school leadership does have a positive and noteworthy effect on student achievement while Waters, Marzano, and McNulty (2004) reported that effective school leadership substantially increases student achievement. Using a path analysis, Kruger, Witziers, and Sleegers (2007) found that school leaders indirectly influence student outcomes and school culture. In the context of Cyprus, Kythreotis and Pashiardis (2006), they found direct effects of the principal's leadership style on students' achievement and Kythreotis, Pashiardis, and Kyriakides (2010) reached the conclusion that "the principal's human leadership frame affects student achievement" .

2.12.2.Transformational Leadership Style and Achievement in Mathematics

A person with this leadership style is a true leader who inspires his or her team constantly with a shared vision of the future. Transformational leaders are highly visible, and spend a lot of time communicating. They don't necessarily lead from the front, as they tend to delegate responsibility amongst their team. While their enthusiasm is often infectious, they generally need to be supported by "detailed people". Brand (2000) asserts that transformational leadership concerns the transformation of followers' beliefs, values, needs and capabilities).

Leithwood and Mascall (2008) investigated the influence of "collective" leadership on learning outcomes. Their study revealed a relationship between the two: transformational leadership styles that engender decentralised authority and collective responsibility among all stakeholders, including students and parents as well as teachers, had a positive relationship with the level of school achievement. Aaron (2010) researched on "A Causal Study Examining How Instructional Leadership, Transformational Leadership, and the mediating effects of Teach-Self Efficacy influence the Math Achievement Scores of third through Fifth Grade Students as measured by the Maryland School Assessment". He sampled 57 administrators and

177 Mathematics teachers. He found that transformational leadership behaviours had a significant, direct and negative effect on students' achievement. This result was unexpected of transformational leadership style as it is one of the best leadership styles that contribute positively to achieving organisational goals. However the author suggested that the result could be as a result of the style versus the organisation and that the negative impact could be as result of the direct line of communication that has become education in recent years.

Northouse (2010) in Stephan (2012) argues that since the 1970s, much attention has been given to the notion and effectiveness of transformational leadership in the West. Stephan was of the opinion that transformational leadership is characterised by a focus on the concerns and needs of followers to develop them into semi-autonomous entities that can act to advance the goals of an organisation without the need of constant direction.

Transformational leadership is thought to increase the follower's intrinsic motivation through the expression of the value and importance of the leader's goals. This style of leadership therefore should be able to help in motivating teachers to do their work and invariably help the students to perform well. Hazlinah (2011) in his study: "the relationship between leadership style (transformational, transactional and laissez faire) and student's academic achievements" found that there is a relationship between transformational leadership and students academic achievements. Ofobruku (2013) carried out a study on "assessment of leadership style among those in the hospitality business in Abuja". He found that amongst the various leadership styles used in the hospitality industry, transformational leadership is most effective for the industry.

2.12.3.Autocratic Leadership Style and Achievement in Mathematics

Autocratic leadership is an extreme form of transactional_leadership where a leader has absolute power over his or her employees or team members. Employees and team members have little opportunity for making suggestions, even if these would be in the team or organization's interest. Balunywa (2000) argues that autocratic leaders in schools are more concerned with despotic influence in order to get the job accomplished rather than with the development and growth of subordinates. Most people tend to resent this kind of leadership. Because of this, autocratic leadership

usually leads to high levels of absenteeism and staff turnover. For some routine and unskilled jobs, the style can remain effective where the advantages of control outweigh the disadvantages. Autocratic leadership style is used when the leader tells his/her employees what s/he wants done and how s/he wants it done, without getting the advice of his/her followers. Some of the appropriate conditions where this leadership style can be effective include when the leader has all the information to solve the problem, he/she is short of time, and the employees are well motivated.

To use an autocratic leadership style, employees must be new and just learning on the job. The leader must be competent and be a good coach. The employee must be motivated to learn a new skill and the situation must be within a new environment for the employee. Some people tend to think of this style as a vehicle for yelling, using demeaning language, and leading by threats and abusing their power. This is not the authoritarian style, rather it is an abusive, unprofessional style called bossing people around. It has no place in a leader's repertoire.

Akif and Sahar (2013) researched on "The Impact of Leadership Styles Used by the Academic Staff in the Jordanian Public Universities on Modifying Students' Behavior: A Field Study in the Northern Region of Jordan". They found that Autocratic leadership style has no effect on modifying students' behavior. The authoritarian style should normally only be used on rare occasions. If you have the time and want to gain more commitment and motivation from your employees, then you should use the democratic style. If this style of leadership (autocratic) is wrongly applied, it can affect the teacher negatively and this can discourage the teacher from putting in his/her best and invariably affecting students' achievement.

Adeyemi and Bolarinwa (2013) carried out research on "Principals' Leadership Styles and Student Academic Performance in Secondary Schools in Ekiti State, Nigeria". 140 public secondary schools and 2,560 teachers were selected for the study using the stratified random sampling technique. Two instruments were used to collect data for the study. They found that autocratic leadership style was the most effective in enhancing better academic performance of students. The result might be influenced by the fact that some people do not do their work unless they are forced.

2.12.4.Democratic Leadership Style and achievement in Mathematics

Democratic leadership styleconnotes the ,involvement of one or more employee(s) in the decision making process (determining what to do and how to do it). David's (2007) study focuses on a survey on the effectiveness of democratic and participatory school administration and management in one school division in the Philippines. Indicators of participatory school administration, leadership and management effectiveness, according to this study, correlated with the stakeholders' level of trust. This is a mark of productivity as the stakeholders will not have trust in any organisation that is not achievement oriented. Using this style is not a sign of weakness; rather it is a sign of strength that your employees will respect. This is normally used when you have some part of the required information, and your employees have some other part.

Oyetunyi (2006) in Yusuf (2008) points out that the major point of focus is sharing; the manager shares the decision-making process with his/her subordinates. He went further to state that the style is not appropriate for use in times of crisis when the situation demands on-the-spot decision. Although a democratic leader will make the final decision, he or she invites other members of the team to contribute to the decision-making process. This not only increases job satisfaction among employees or team members, but also helps to develop people's skills. Employees and team members feel in control of their own destiny, such as the promotion they desire, and so, are motivated to work hard for reasons other than just receiving a financial reward. As participation takes time, this approach can lead to things happening more slowly, but often, the end result is better.

A democratic leadership style is used with a team of workers who know their job. The leader knows the problem, but does not have all the information. The employees know their jobs and want to become part of the team. Note that a leader is not expected to know everything, that is why he/she employs knowledgeable and skillful employees. Using this style is of mutual benefit -- it allows them to become part of the team and allows you to make better decisions. Sense of belonging is the fruit of democratic leadership style which on its own, can help the teacher to put in his/her best possible. The work is seen as his or hers and effectiveness is brought into it. Students should then be able to gain maximally in such a situation.

2.12.5.Laissez-faire Leadership Style and achivement in Mathematics

This French phrase "**Laissez-faire"** means "leave it be" and is used to describe a leader who leaves his or her colleagues to get on with their work. Most often, laissez-faire leadership works for teams in which the individuals are very experienced and skilled self-starters. This is in line with the assertion of Dubrin, (1998) who said that Laissez-faire style of leadership may be effective with well-motivated and experienced employees. Unfortunately, it can also refer to situations where managers are not exerting sufficient control. Oluremi (2008) conducted a research work which investigated the effect of principal's leadership behaviour on school learning culture in some selected secondary schools in Ado-Ekiti, Nigeria. A descriptive survey design was employed. The study population comprised all the secondary schools in Ekiti State. 65 schools were randomly selected out of 161 secondary schools in the state. The instrument used to collect data was a questionnaire tagged: "Teachers Perception of Principal's Leadership and School Learning Culture Questionnaire (TPPLSLCQ)". Data collected was analysed using the spearman rank correlation and the one way ANOVA. Findings showed that leadership behaviour of a school principal affects the school learning.

Mohd (2012) opines that Laissez-Faire leadership is in operation when leaders are hands-off and allow group members to make the decisions. With this style, freedom is fully determined by group goals, techniques, and working methods. Leaders rarely intervene. Kiige, (2013) researched on Leadership ability to manage a Positive Organizational Climate. Fifty colleges were selected from four universities, using proportionate stratified random sampling techniques. Thirty nine private management aided colleges (79 percent of 50) and 11 government colleges (21 percent of 50) were selected in proportion to the Arts and Science colleges in the private and government sector in Kerala. Proportionate Stratified random sampling was adopted in selecting female and male principals and teachers. A sample of 400 teachers and 400 students were selected from 50 colleges i.e. 8 teachers and 8 students from each college. It was discovered that a negative association existed between the laissez-faire leadership and a variety of subordinate performance, effort and attitudinal indicators.

Research shows that Laissez-faire leadership style has no effect on modifying students' behavior (Akif and Sahar, 2013). It can be effective if the leader monitors what is being achieved and communicates this back to his or her team regularly. In laissez-faire leadership style, the leader allows the employees to make the decision.

However, the leader is still responsible for the decisions that are made. This is used when employees are able to analyze the situation and determine what needs to be done and how to do it. You cannot do everything! You must set priorities and delegate certain tasks. A note of warning though - this is not a style to use so that you can blame others when things go wrong, rather this is a style to be used when you have complete trust and confidence in your surbodinates. Do not be afraid to use it, however, use it wisely!

2.13. Principals' supervisory role and achievement in Mathematics

The Nigerian public to an increasing degree, have expressed dissatisfaction with students' achievement and with incompetent teaching. Increased emphasis on students' achievement, accountability and teacher's competence have brought about increased pressure for evaluation of teachers' performance. Supervision is a technical service requiring expertise, the goal of which is improvement in the growth and development of the learner. It is seen as a process whereby leadership encourages a continuous involvement of all school personnel in a cooperative attempt to achieve the most effective school programme.

Pansiri and Dambe (2005) stated that it is one of the factors that influence students' performance in schools. Kose (2007) in Jayeoba and Atanda (2011) stressed that instructional supervision is critical for the effective teaching and learning processes. Adeolu (2012) carried out a study on "Assessment of Principals'Supervisory Roles for Quality Assurance in Secondary Schools in Ondo State, Nigeria". He stated that effective school principals establish clearly defined goals for academic achievement, and they concentrate their available resources and their operations on attaining these goals, providing adequate time-table for teaching, conducting routine check of lesson notes and subject dairies, observing classroom instructions, continuously monitoring students progress to determine whether their instructional goals are being met, providing feed-back on students' performance, motivating teachers for improved performance, reinforcing students for excellent performance, maintaining and making appropriate use of physical facilities, enforcing discipline to ensure a peaceful atmosphere, organizing capacity building programmes for teachers for effective service delivery and providing instructional facilities and

materials to enhance quality teaching-learning processes. Once quality teaching and learning is enhanced, there will be good performance on the part of the students.

Chappelear and Ted (2012) in their study titled: "Teachers' Perceptions of High School Principal's Monitoring of Student Progress and the Relationship to Student Achievement" found that a statistically significant relationship exists between teachers' perceptions of principals' monitoring student progress and student achievement .Gregory, Eric and Steven (2013) investigated on Measuring the impact of effective principals. They concluded that highly effective principals raise the achievement of a typical student in their schools between two and seven months of learning in a single school year; ineffective principals lower achievement within the same time frame.

The Principals' supervisory role will be successful and have the desired impact on teaching and learning of Mathematics when they are in constant contact with the teachers and students and possess those personal traits of warmth, friendliness, patience, and a sense of humour that are essential not only for supervision but also for teaching. Chappelear and Ted (2012) carried out a research titled: "Teachers' Perceptions of High School Principal's Monitoring of Student Progress and the Relationship to Student Achievement". They conclude that a statistically significant relationship exists between teachers' perceptions on how well principals' monitor student progress and student achievement. As a service-oriented agent for improvement, Principals must be inspired with the spirit counselors referred to as "the helping relationship,"- the desire to give oneself to be of assistance to others. Beyond this, Principals as supervisors need the kind of persuasiveness and infectious enthusiasm that inspires teachers to want to make changes for the better. Principals should be "idea people," those who lead people to think about new and improved ways of doing things. They need to convey the attitude of valuing and seeking ideas from others while not appearing to have answers to all the problems teachers face. Principals who are helpers to teachers are able to effect a democratic environment in which the contributions of each participating member is valued. Above all, principals need to possess a predisposition to change and must constantly promote improvement.

2.14. Teachers job satisfaction and students' achievement in Mathematics

Job satisfaction and dissatisfaction do not only depend on the nature of the job, but also on the expectation of the employee, that is, what the job provides for the employee (AL-Hussami, 2008). It is influenced by factors like salary, working environment, autonomy, communication, and organizational commitment (Lane, Esser, Holte and Anne, 2010; Vidal, Valle and Aragón, 2007). According to Brian (2013), an employee's overall satisfaction with his job is the result of a combination of factors, and financial compensation is only one of them. Management's role in enhancing employees' job satisfaction is to make sure the work environment is positive, morale is high and employees have the resources they need to accomplish the tasks they have been assigned. Every worker would rather desire working conditions that will result in greater physical comfort and convenience. The absence of such working conditions, amongst other things, can impact poorly on the worker's mental and physical well-being. Robbins (2001) in Kabir (2011) advocates that working conditions should influence job satisfaction, as employees are concerned with comfortable physical working environment. In turn, this will enhance a more positive level of job satisfaction. It has been argued that satisfaction is generally viewed as a broad concept and service quality is a component of satisfaction (Zeithaml and Bitner, 2003). This is because satisfaction derives from various sources, such as service encounter satisfaction and overall satisfaction. In other words, a little satisfaction from each service encounter leads to overall satisfaction with the service.

The role of teachers in transferring knowledge to students is very vital. Saravia-Shore (2008) in Mohd (2012) affirms that teachers play the main role in ensuring that students perform better every year since they are in charge of the classroom and the curriculum. If teachers are therefore satisfied with their job, there is a likelihood of improvement in their performances as well as the willingness to ensure good performance on the part of their students. Ashley (2013) emphasised the importance of job satisfaction when he related it to other factors. He stated that job satisfaction has been linked to many variables, including performance, absenteeism, and turnover. Job satisfaction is significant because a person's attitude and beliefs may affect his or her behavior. Attitudes and beliefs may cause a person to work harder, or, the opposite may occur, and he or she might be less committed to work. Job satisfaction also affects a person's general well-being for the reason that people spend a good part of the

day at work. Consequently, if a person is dissatisfied with his/her work, this could lead to dissatisfaction in other areas of his/her life.

Literature on teacher-job satisfaction has consistently shown a significant relationship between teacher-job satisfaction and student achievement (Heller, Rex and Cline, 1992; Leslie, 1989). Roy (2003) investigated the relationship among school facility characteristics, teachers' job satisfaction and student achievement. The results revealed that the most significant correlation was revealed between teacher satisfaction and student behaviour. In his research, Moosung (2006) discovered that the difference in the job satisfaction between the two faculties seemed to result in an educational gap such as student enrolment rates and achievement between the schools. Ladd (2009) finds an association between positive teacher working conditions and student achievement.

Hollyene (2007) in his study **"**Predictors of Teachers' Job Satisfaction in Urban Middle" found that there was a statistically significant relationship between job satisfaction and school academic achievement in mathematics and reading. Baotham and Sangsawang (2010) carried out a research on "The effects of job satisfaction on organizational commitment of Thai employees in five Rajabhat universities in the northern group". The result showed that job satisfaction had a significant positive effect on organizational commitment in all the universities.

2.15. Teachers' classroom management and achievement in Mathematics

Classroom management is the ability to maintain decorum in the classroom for the optimum benefits of the students despite unruly behaviour that students might exhibit. The ability to manage, lead and supervise students during the learning process is an indispensable component of effective teaching and learning, it is more so in the majority of our schools today where the challenge of overcrowded classrooms hinders effective teacher instruction in the classroom. For the classroom to serve its purpose, the teacher must be able to establish order. The goal of classroom management according to Kauchak and Eggen (2008) is not only to maintain order, but to optimize student learning. They divide class time into four overlapping categories, namely allocated time, instructional time, engaged time, and academic learning time. Allocated time is the total time allotted for teaching, learning, and routine classroom procedures like attendance and announcements. Allocated time is also what appears on a student's

schedule, for example "Introductory Algebra: 9:50-10:30 a.m." or "Fine Arts 1:15-2:00 p.m."Instructional time is what remains after routine classroom procedures are completed. That is to say, instructional time is the time wherein teaching and learning actually takes place. Teachers may spend two or three minutes taking attendance, for example, before their instruction begins. Engaged time is also called time on task. During engaged time, students are participating actively in learning activities—asking and responding to questions, completing worksheets and exercises, preparing skits and presentations, etc. Academic learning time occurs when students (1) participate actively and (2) are successful in learning activities. Effective classroom management maximizes academic learning time.

Turanli and Yildirim (1999) carried out a research on the expectation of students from the teachers for effective performance. It was found that students wanted teachers to clearly describe objectives, thus decreasing ambiguity. They also expected teachers to be open to, and provide time for, questions as well as offer necessary feedback. Students wanted teachers to manage time, student behaviors, and environment effectively. They expected teachers to be considerate about time management. They also expected teachers never to laugh at students for any reason. The importance of classroom management is emphasised by Moore (2004), when he stated that teachers are trained in the acquisition of certain competencies related to aspects of classroom management, long-term medium-term and short-term planning, recording and reporting students' work leading to the achievement of prescribed, assessable and (presumably) acquired-for-life 'standards'.

Durowoju and Onuka (2012) carried out a research on "Teacher Self-Efficacy And Effective Classroom Management As Determinants Of Students' Achievement In Economics In Public Secondary Schools In Ibadan, Oyo State". They made use of Multi-stage sampling technique to select six out of eleven Local Government Area Councils in Ibadan, 60 schools and subsequently 60 SS Economics Teachers whose classes were used intact. They found that teacher self-efficacy and teacher classroom management effectiveness individually significantly determined the academic achievement of the students in Economics.

Waxler (2011) observed that there is a definite and direct correlation between classroom management style and academic achievement. He went further to state that if a teacher is having problems with classroom management, then his/her students will certainly record low academic achievement scores. Lamb and Fullarton (2002) in their study: "Classroom and school factors affecting mathematics achievement: a comparative study of Australia and the United States using TIMSS" found that classroom differences account for about one-third of the variation in student achievement in the US and over one-quarter in Australia. According to Iverson (2003), classroom management is a preventive activity that results in decreased discipline problems. It also involves the act of supervising relationships, behaviours, and instructional settings and lessons for communities of learners. The inability of teachers to effectively manage classroom behaviour often contributes to low academic achievement (Harrell, Leavell, Van Tassel and Mckee, 2004).

Robert, Jana and Debra (2003) in their book "Classroom Management That Works" observe that teachers play various roles in a typical classroom, but that of a classroom manager is very important. Effective teaching and learning cannot take place in a poorly managed classroom. If students are disorderly and disrespectful, and no apparent rules and procedures guide their behaviour, chaos becomes the norm. In these situations, both teachers and students suffer. Teachers struggle to teach, and students most likely learn much less than they should. In contrast, well-managed classrooms provide an environment in which teaching and learning can flourish. But a well-managed classroom doesn't just appear out of nowhere. It takes a good deal of effort to create—and the person who is most responsible for creating it is the teacher. Tom, Eric, John and Amy (2010) in Stephen (2011) found that, while overall teaching practice was the best predictor of student achievement, classroom management was more highly correlated with better math performance than the teachers' use of questioning. Great driving skills don't matter when the car won't move. Similarly, great instructional skills won't matter if students in the classroom are disengaged or out of control. Both novice and experienced teachers consider classroom management to be a high priority and an area of concern (Sokal, Smith, and Mowat, (2003) in James, Pamela and Jennifer (2013). Teachers learn "tricks of the trade" from such sources as watching other teachers, reading about the topic, and reflecting on what is occurring in

their classrooms. While mastering effective classroom management techniques takes work, effective teachers make classroom management look easy. When an effective teacher is in the driver's seat, one knows that a preventative, proactive, positive approach is in place to ensure that learning is on course.

2.16. Appraisal of Literature reviewed and gap filled

The literature reviewed showed that there is a significant relationship between principal's performance, teaching materials and maintaining discipline in the school and that there is a powerful influence of leadership in the effectiveness of the school. Principals as school administrators are expected to function in various areas of the school in order to effectively and positively affect the school. Experience of the leaders in terms of skills acquired was found to influence their leadership roles. Literature also showed that leadership varies across gender. Also as some literature revealed no direct influence of principals on students' academic achievement, some revealed that there is a significant impact of principals' leadership on academic achievement. Achievement of students in Mathematics as reviewed was found to be correlated with teachers' job satisfaction. That is, the happier the teachers are, the better the performance of the students. It was also found from literature that teachers' classroom management abilities directly affect achievement in Mathematics to an extent that if a teacher has problem in classroom management, there will be low academic performance by the students.

From the literature reviewed, it was noted that the variables under study have not been brought together in a study. For example, studies were carried out on "Principals' gender, experience and academic growth", on "Leadership styles and students' learning", on "School facilities, teachers' job satisfaction and students' achievement". Several others researched on leadership as an entity, job satisfaction as related to performance etc. This study however, fills a gap in research by bringing all the variables (twelve in number) together in a study, not only as they affect achievement, but also as they affect one another before affecting achievement in Mathematics.

CHAPTER 3

METHODOLOGY

3.0 Introduction

This chapter presents the methodology of the study under the following headings: Research design, sampling procedures and samples, instrumentation, data collection and analysis procedure.

3.1 Research Design

This study adopted expost-facto research type. This is because the researcher did not have direct control on the independent variables because their manifestations have already occurred.

3.2 Variables of the Study

Exogenous Variables:

Age, gender

Endogenous variable:

Pincipals' experience, leadership styles (autocratic, democratic, laissez-faire and transformational), principals' supervisory role, teacher classroom management and job satisfaction and Achievement in Mathematics

3.3 Population

The target population for the study comprised all Senior Secondary Schools, the principals, SS2 Mathematics teachers and Senior Secondary School two (SS2) students, in South-western Nigeria.

3.4 Sampling Technique and Sample

A multistage sampling technique was used in the selection of sample for this study as follows: The six states in the South-western, Nigeria (Lagos, Ogun, Ondo, Oyo, Osun and Ekiti states) were clustered into Coastal (Lagos, Ogun and Ondo) and Inland states (Oyo, Osun and Ekiti), from which Ogun and Oyo states were randomly selected for use in this study. Thirty Local Government Areas (LGAs) were selected from the two states using proportionate to size sampling technique while simple random sampling was used to select 5 schools from each LGA, making a total of 150 (55 schools from Ogun and 95 from Oyo). All the principals in each of the sampled schools were selected. All the SS2 Mathematics teachers in each of the schools were included irrespective of their number. An intact SS2 class was selected from each of the schools.

The distribution is as shown in table 3.1 below.

Table 3.1 Sampling Frame for the study according to LGAs, number of schools in each state and students involved by gender.

States	**No. of LGAs**	**No. of LGAs selected**	**No. of Senior sec schools in each state**	**No. of schools sampled in each state**	**No of students used from each state based on gender**		**No of teachers used from each state based on gender**	
					Male	**Female**	**Male**	**Female**
Ogun	20	11	290	55	986	1181	32	30
Oyo	33	19	417	95	1449	1635	45	55
Total	**53**	**30**	**707**	**150**	**2435**	**2816**	**77**	**85**

3.5 Instrumentation:

Five instruments were used for this study. They are; Multi-factor Leadership Scale (MLS), Principals' Supervisory Role Rating Scale (PSRRS), Teacher's Job Satisfaction Rating Scale (TJSRS), Teachers' Classroom Management Scale (SRTCMS) and Mathematics Achievement Test (MAT).

Multi-factor Leadership Scale (MLS)

Multi-factor rating scale is a scale that has sub-scales within it.This rating scale consisted of two sections A and B: Section A focused on the bio-data of the teachers. This consisted of the teachers' gender, age, experience and qualifications. Section B consisted of sixty items adapted from the work of Bass and Avolio (1995), multifactor leadership scale was placed along five options (Likert scale) ranging between 0 and 4.The sixty items were sub divided into four sections namely; transformational, democratic, autocratic and Laissez-faire leadership styles with each having fifteen items. These sub-scales were not treated as one consruct but as four different consructs to be able to determine the effectiveness of each leadership style. The reliability and content validity coefficients of this instrument were established using Cronbach Alpha and Lawshe method respectively. The coefficients were r = 0.70 and 0.78 for the combination of the styles, 0.69 and 0.74 respectively for transformational leadership style, 0.72 and 0.71 for democratic, 0.81 and 0.75 for autocratic and 0.70 and 0.65 for Laissez-faire.

2. Principals' Supervisory Role Rating Scale (PSRRS)

The scale was constructed by the researcher. It consisted of two sections A and B. Section A was on the bio data of the principals which consisted of the principals' gender, age, experience and qualification. Section B consisted of eighteen items on principals' supervisory roles placed along five options (Likert scale) ranging between 0 and 4. The reliability and content validity coefficients of this instrument were established using Cronbach Alpha and Lawshe method respectively. The coefficients were 0.76 and 0.78 respectively.

3. Teachers' Job Satisfaction Rating Scale (TJSRS):

This rating scale consisted of two sections A and B: Section A was on the bio data of the teachers which consisted of the teachers' gender, age, experience and qualification. Section B consisted of thirty-five items on how satisfied teachers are on their job, placed along six options (Likert scale) ranging between 1 and 6. This was also adapted from the work of Karen (2002). The reliability and content validity coefficients of this instrument were established using Cronbach Alpha and Lawshe method respectively. The coefficients were 0.76 and 0.72 respectively.

4. Teachers' Classroom Management Scale (TCMS)

This rating scale was constructed by the researcher. It consisted of two sections, A and B. Section A focused on the bio data of the students. It consisted of the students' school, gender and age. Section B consisted of twenty-five items on teachers' classroom management placed along five options (Likert scale) ranging between 0 and 4. The reliability and content validity coefficients of this instrument were established using Cronbach Alpha and Lawshe method respectively. The coefficients were 0.80 and 0.71 respectively.

5. Mathematics Achievement Test (MAT)

This instrument consisted of two sections, A and B: Section A was on the bio data of the students which consisted of the students' age and sex. Section B consisted of 60 items constructed from five topics in SS2 first term curriculum. The test blueprint on 60 items was contructed based on the first three levels of Bloom's taxonomy of educational objectives and was trial tested. The difficulty indices and discriminating indices of the items were found. The items with difficulty indices between 0.40 and 0.75 and with discriminating indices between 0.32 and 0.45 were finally selected. This reduced the items to forty which were finally used for the study. The table below shows the final test blueprint for the selected items. The numbers inside brackets are the question numbers for the topics and the objectives.

Table 3.2: Test Blueprint

S/N	Content/objective	Knowledge	Comprehension	Application	Total
1	Indices/Logarithms	3(2, 3, 7)	3(1, 4, 5)	1 (6)	7
2	Circle geometry	1(8)	4(9, 10, 11, 12)	3(13, 14, 15)	8
3	Quadratic equations	1(18)	5(16, 17, 19, 20, 21)	1(22)	7
4	General arithmetic	6(23, 24, 27, 28, 29, 30)	2(25, 25)	0	8
5	Trigonometry	1(31)	3(35, 38, 39)	6(32, 33, 34, 36, 37, 40)	10
	Total	**12**	**17**	**11**	**40**

The content validity coefficient of the test was established using Lawshe method in which the instrument was given to ten raters for assessment. The Lawshe formula:

CVR $= \frac{Ne - N/2}{N/2}$ was then used to calculate the content validity coefficient of each of the item. The average value of these coefficients was found and used as the coefficient of the instrument. The content validity coefficient was 0.69.

CVR = Content Validity Ratio

N_e = No of panels rating the item good

N = Total number of panels

Kuder Richardson 20 (KR-20) was used to establish the reliability coefficient.

$$R = \frac{N}{N-1}\frac{\delta x 2 - \sum pq}{\delta x 2}$$

Where δx^2 = variance of testees' scores

P= proportion of testees that answered each item correctly.

Q= proportion of testees that answered each item wrongly.

The reliability coefficient was 0.74.

3.6 Procedure for Administration of Instruments

To administer the instrument, twenty-five research assistants were trained. The content of each instrument was explained to them and the way and manner of administering the instruments was explained. The training lasted for two weeks. In each school, the research assistants and/or the researcher sought permission from the school authority and then distributed copies of the scales to the respondents and gave instructions on how to fill them. After the administration of the instruments, the researcher and the assistants collected the instruments back for analysis. This lasted for six weeks.

3.7 Data Analysis

Data was analysed, using two multivariate analytical techniques: Multiple regression and Path analysis. These helped in identifying the joint effects of the variables and in identifying the total effects i.e. direct and indirect effects of independent variables. Path analysis provided the researcher with the method for explicitly formulating hypotheses and exploring the tenability of causal linkages among the exogenous and endogenous variables of the hypothesized (theoretical) causal model. The model was developed based on extensive literature review and logical assumption that helped the researcher in tracing the implications of a set of causal assumptions.

Causal modeling according to Blalock (1964) is a technique for selecting those variables that are perceived to be determinants of the effects made by each cause or predictor variable through the application of path analysis technique. This is subject to three assumptions of the recursive system (Kerlinger and Pedhazzur, 1973):

(i) There is no reciprocal causation between variables,

(ii) The residuals are uncorrelated with variables preceding them in the model, and among themselves; and

(iii) Each of the endogenous or dependent variables is directly related to all the variables preceeding it in the hypothesized causal sequence.

The construction of the hypothesized causal model is subject to theory, information from previous research and temporal order as opined by Blalock (1964), Duncan (1966) and Bryant and Doran (1977).

3.7.1 Building the Hypothesized Recursive Path Model

The building of hypothesized recursive path model stands upon a number of assumptions that must be met as stated below (Kerlinger and Pedhazur, 1973;; Mertler and Vannatta, 2005):

1 There is a one way causal flow in the system. That is, reciprocal causation between variables is ruled out,

2 The residuals are not correlated among themselves, nor with the variables preceding them in the model;

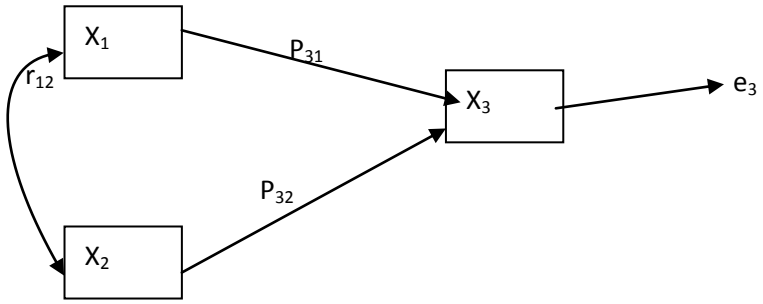
3 Each of the endogenous or dependent variables is directly related to all the variables preceding it in the hypothesized causal sequences;

4 The relations among the variables in the model are linear, additive and causal. Consequently, curvilinear, multiplicative or interactional relations are excluded.

However, it is important to note that the hypothesized recursive model being presented in this study is not the only possible version considering the submission of Turner and Stevens (1979) that for a five-variable study, several thousand-path diagrams are possible. Thus, the decision as to most meaningful diagram was made in consideration of temporal order, research findings, theory, logic, expert opinions and personal observations and experiences.

Causal Modeling based on Theory: A particular causal order can be hypothesized by a researcher who then goes ahead to test his theory. It is on this premise that one can submit that principal factors can affect teachers' job satisfaction and students' achievement. Experience has also shown that principals' gender has a great influence on their leadership behaviour. Also, the level of teachers' job satisfaction will have great impact on how effective he/she will be; which affects students' achievement. That is the reason it is theorized in the model that principals' factor will causally influence teachers' job performance and students' academic achievement.

Causal Modelling based on Temporal Order: If a variable occurs in time before another one with which it is known or assumed to be causally related, it becomes obvious that the latter variable will be a function of the former and not vice-versa. This is what Rex (2005) refer to as time precedence. For example, in this study, gender and age will influence principals' qualification and experience and not versa. Also the principals' qualification and experience will affect principals' leadership styles. Principals' leadership styles will also influence teachers' job satisfaction and job satisfaction will affect students' achievement. Examples are illustrated in the figures below:



Key:

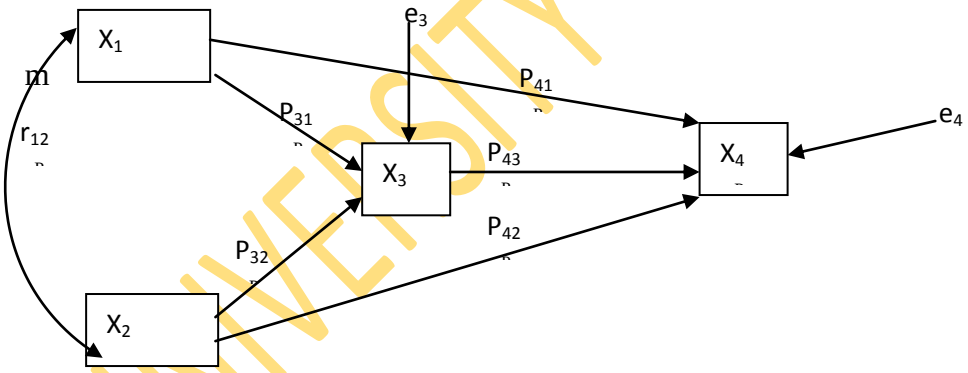
X_1 = Gender of the principal

X_2 = Age of the principal

X_3 = Qualification of the principal

Figure 3.1 – Hypothesized Causal Linkages of Variables X_1, X_2 and X_3

Considering the linkages among variables X_1, X_2, X_3, as shown in fig. 3.1, based on temporal order, principals' gender and age existed before principals' qualification. It is therefore believed that principal's age and gender will affect his/her qualification.



Key:

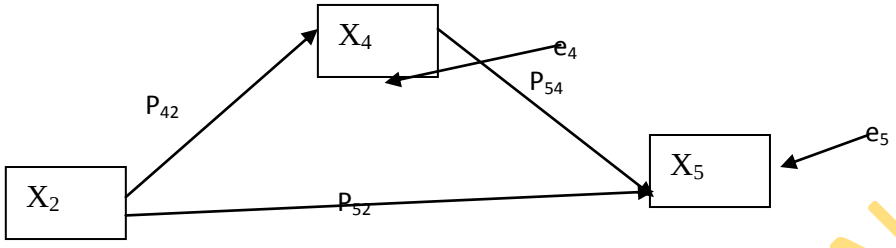
X_1 = Gender of the principal X_2 =Age of the principal

X_3 = Qualification of the principal X_4 =Experience of the principal

Figure 3.2 – Hypothesized Causal Linkages of Variables X_1, X_2, X_3 and X_4

Considering the linkages among variables X_1, X_2, X_3 and X_4, as shown in fig. 3.2, based on temporal order, it is known that principals' gender and age existed before principals' qualification and principals' qualifications existed before their experience. From literature, Haas, Orav and Goldman (1995) found that there is a relationship

between board certification and the rates of the recommended number of prenatal visits and low birth weight. That is, the experience in making recommendation depends on their certification or qualification.

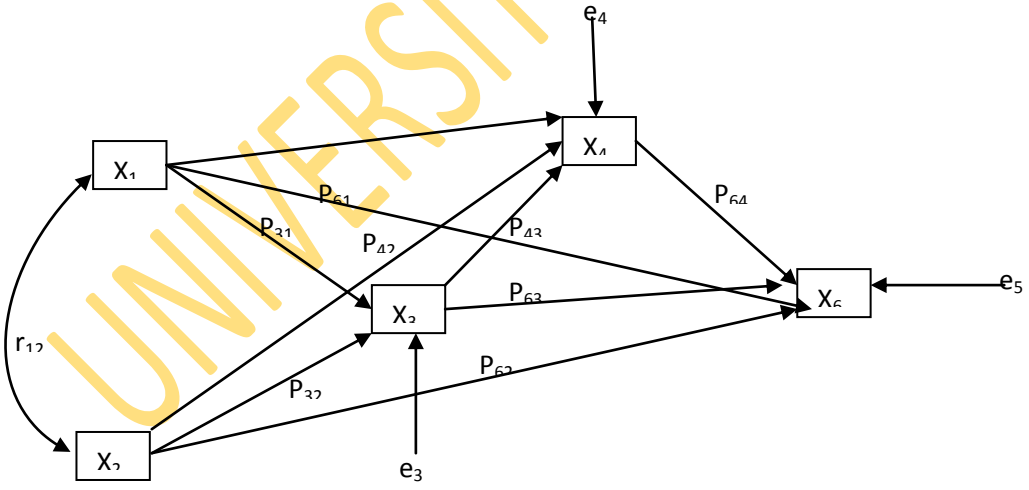


Key:

X_2=Age of the principal X_4=Experience of the principal X_5 =Autocratic leadership

Figure 3.3 – The Hypothesized Causal Linkages of Variables, X_2, X_4 and X_5

Considering the linkages among variables X_2, X_3, and X_5, as shown in fig. 3.3, on temporal order, principals' age and experience existed before principals' leadership styles. Also from literature, Kakabadse, Kakabadse and Myers (1998) state that older workers are mature, see challenges and initiatives through to completion and have longer-term perspectives in managing people and system. They are in essence saying that the age of principals affect their leadership styles.

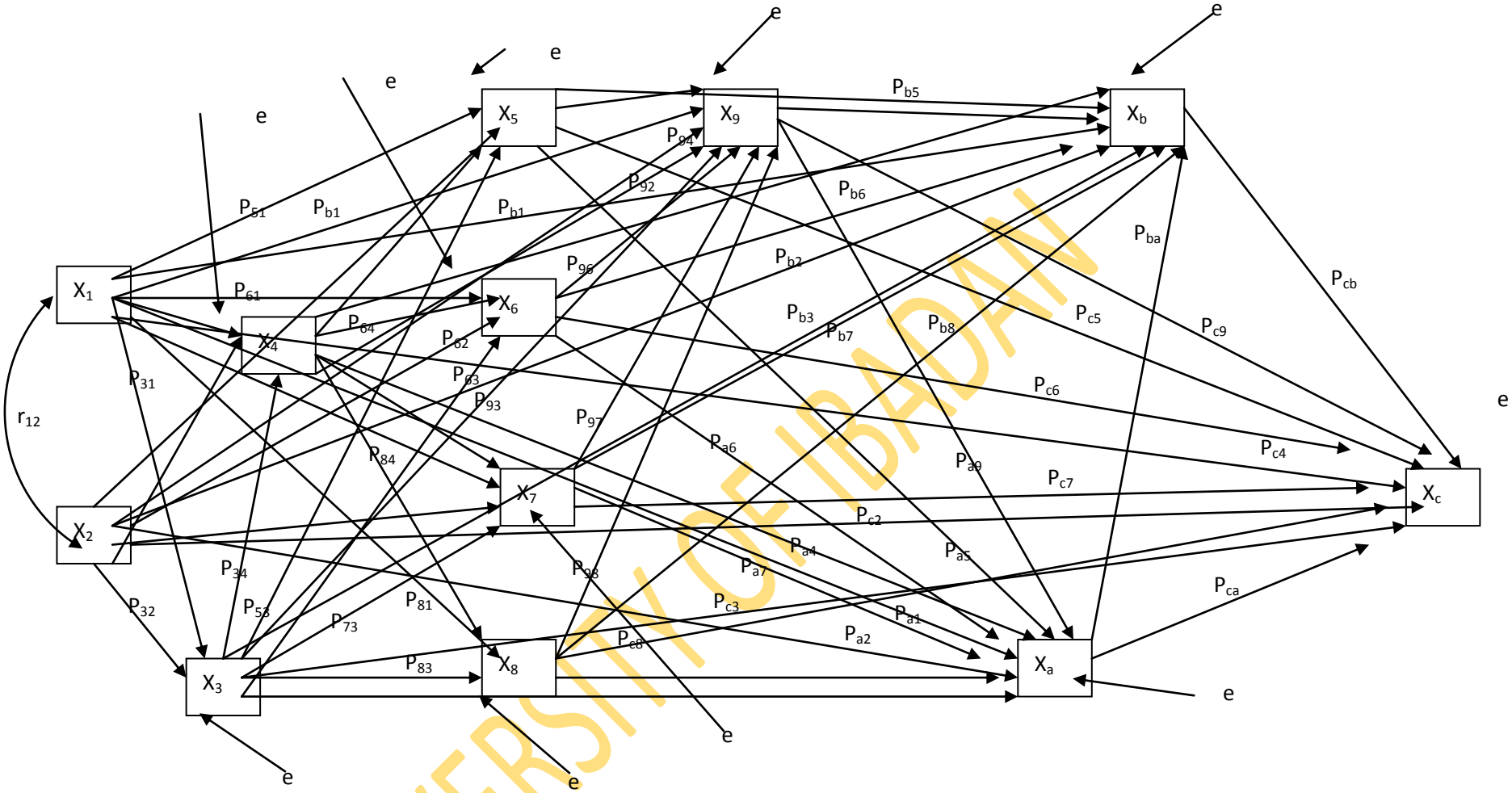


Key:

`X_1=Gender of the principal X_2= Age of the principal X_3=Qualification of the principal X_4= Experience of the principal X_6=Democratic leadership

Figure 3.4 – The Hypothesized Causal Linkages of Variables X_1, X_2, X_3, X_4 and X_6

On temporal order, age and gender existed before qualification and experience and qualification and experience before leadership style. From literature, Nakpodia (2009) reveals that there is a significant difference between the leadership styles of principals with degrees and professional educational qualifications and those with degrees and without professional educational qualifications, meaning that principals' qualification affects their leadership styles. Vinnicombe and Kakabadse (1999) argue that the more matured managers are in attitude and years of experience, the better their performance than the less mature managers. The implication of this is that principals' years of experience have significant effect on their leadership styles.



Key: x_1 = Gender of the Principal, x_2 = Age of the Principal, x_3 = Qualification of the Principal, x_4 = Experience of the Principal, x_5 = Autocratic leadership, x_6 = Democratic leadership x_7 = Laissez-faire leadership x_8 = Transformational leadership, x_9 = Principals' supervisory role x_a = Teachers' job satisfaction, x_b = Teachers' classroom management x_c = Achievement in Mathematics

Figure 3.5: The hypothesized linkages among the twelve variables

Figure 3.5 reveals the relationship among the twelve variables. Gender and the age of the principals are the two exogenous variables. Qualification, experience and leadership styles of the principals including teachers' job satisfaction and achievement in Mathematics are the endogenous variables. The exogenous variables affect the endogenous variables and not vice versa. Of all the variables, achievement in Mathematics is the criterion variable which all other variables affect.

3.7.2 Identifying the paths in the model

The researcher identified the significant paths in the model following a careful examination of the hypothesized linkages from a set of equations labeled 3.1 to 3.9, employing the technique of path analysis theorem (Wolfe, 1977) and Wright's law (Asher, 1977). The relative importance of each of the eleven variables to Achievement in Mathematics was also found. The best way to evaluate the relative importance of variables is to compare the effect coefficients (total effects) because zero order correlation, partial correlation and multiple regression coefficients are not the appropriate techniques, in that generally, they produce misleading judgements about the relative importance of variables (Lewis-Beck 1974, 1977, Blalock 1961b; Uslaner and Weber 1975; Tompkins 1975; Pedhazur 1982; Schoenberg 1972) in Olobatuyi (2006).

Structural equations of the hypothesized model

$X = P_{31}X_1 + P_{32}X_2 + e_3$ 3.1

$X_4 = P_{41}X_1 + P_{42}X_2 + P_{43}X_3 + e_4$ 3.2

$X_5 = P_{51}X_1 + P_{52}X_2 + P_{53}X_3 + P_{54}X_4 + e_5$ 3.3

$X_6 = P_{61}X_1 + P_{62}X_2 + P_{63}X_3 + P_{64}X_4 + P_{65}X_5 + e_6$ 3.4

$X_7 = P_{71}X_1 + P_{72}X_2 + P_{73}X_3 + P_{74}X_4 + P_{75}X_5 + P_{76}X_6 + e_7$ 3.5

$X_8 = P_{81}X_1 + P_{82}X_2 + P_{83}X_3 + P_{84}X_4 + P_{85}X_5 + P_{86}X_6 + P_{87}X_7 + e_8$ 3.6

$X_9 = P_{91X1} + P_{92}X_2 + P_{93}X_3 + P_{94}X_4 + P_{95}X_5 + P_{96}X_6 + P_{97}X_7 + P_{98}X_8 + e_9$ 3.7

$X_b = P_{b1X1} + P_{b2}X_2 + P_{b3}X_3 + P_{b4}X_4 + P_{b5}X_5 + P_{b6}X_6 + P_{b7}X_7 + P_{b8}X_8 + P_{b9}X_9 + e_b$ ..3.8

$X_c = P_{c1X1} + P_{c2}X_2 + P_{c3}X_3 + P_{c4}X_4 + P_{c5}X_5 + P_{c6}X_6 + P_{c7}X_7 + P_{c8}X_8 + P_{c9}X_9 + P_{cb}X_b + e_c$ ...3.9

3.8 Methodological Challenges

The researcher was faced with the following methodological challenge: the calculation of the reproduced correlation with a scientific calculator was initially an arduous task but with the introduction of the computer based calculation, the researcher was able to overcome the challenge by painstakingly going through the equations and calculating the coefficients using computer.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents and discusses the results of this study. The study investigated the causal relationship among principals' factors, teacher job satisfaction and classroom management as well as students' academic achievement in Mathematics. The results are presented based on the stated research questions in chapter one.

4.1. Results

4.1.1 Research question1: What is the pattern of the profile of the principals used in this study?

Table 4.1. Pattern of the principals' profile

Principals' Gender		
Male	93	62.0%
Female	57	38.0%
Principals' Age		
41-50 years	21	14%
51-60 years	129	86%
Principals' Qualification		
First degree	79	52.7%
Masters	49	32.7%
PhD	22	14.7%
Principals' years of experience		
16-20 years	7	4.7%
21-25 years	25	16.7%
26-30 years	65	43.3%
31-35 years	53	35.3%

The table showed that out of one hundred and fifty principals who participated in this study, 93 (62.0%) were male while 57 (38.0) were female. None of the principals was aged 30-40years, 21 (14%) fell within the age limit of 41-50years and majority 129 (86%) fell within the retirement age (51-60 years). Majority of the principals 79 (52.7%) have first degree, 49 (32.7%) have masters degree and 22 (14.7%) have PhD. 7 principals, that is, 4.7% of the total population have years of

experience that range from 16-20years, 25 principals (16.7%) have years of experience ranging from 21-25years, 65 of them (43.3%) have years of experience ranging from 26-30years and 53 of them (35.3%) have years of experience ranging from 31-35years.

4.1.2 Research question2 : What is the pattern of relationships (correlations) in the model consisting of Principals' gender, age, qualification, experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, supervisory role, teachers' job satisfaction, classroom management and achievement in Mathematics?

Table 4.2. The Original Correlation Matrix for the Twelve Variables

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Za	Zb	Zc
Z1	1.0	.04	-.31*	-.10	.03	.17*	.31*	.23*	-.31*	.12	.18*	.05
Z2		1.0	.16	.57*	.18*	.29*	.27*	.20*	.05	.06	.17*	.11
Z3			1.0	.26*	.15	.12	-.06	.12	.10	.01	.39*	.14
Z4				1.0	.22*	.14	.16	.06	.22*	.10	.15	.15
Z5					1.0	-	-	-	-.12	.13	.47*	.28*
Z6						1.0	-	-	-.04	.21*	.33*	.21*
Z7							1.0	-	-.21*	.15	-.24*	-.18*
Z8								1.0	-.04	.36*	.49*	.56*
Z9									1.0	.02	.23*	.03
Za										1.0	.25*	.37*
Zb											1.0	.40*
Zc												1.0

*Means that the relationship is significant

The table shows a significant relationship between gender and qualification, democratic leadership style, laissez-faire leadership style, transformational leadership style, Principals' supervisory role and teachers' classroom management. Age has significant relationship with principals' years of experience, autocratic, democratic, laissez-faire, transformational leadership styles and teachers' classroom management. Qualification has significant relationship with Principals' supervisory role and teachers' classroom management. Principals' years of experience has significant relationship with autocratic leadership syle and Principals' supervisory role. Autocratic

leadership style has significant relationship with teachers' classroom management and achievement in Mathematics. Democratic leadership style has significant relationship with teachers' job satisfaction, classroom management and achievement in Mathematics. Laissez-faire leadership style has significant relationship with Principals' supervisory role and achievement in Mathematics. Transformational leadership style has significant relationship with (teachers' job satisfaction; classroom management and achievement in Mathematics. Principals' supervisory role has significant relationship with teachers' classroom management. Teachers' job satisfaction has significant relationship with teachers' classroom management and achievement in Mathematics. Teachers' classroom management has significant relationship with achievement in Mathematics.

4.1.3 Research question3:Is the model which describes the causal effects among the variables (principals' gender, principals' age, principals' qualification, principals' years of experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, principals' supervisory role, teachers' job satisfaction, teachers' classroom management and Mathematics achievement) consistent with the observed correlations among these variables?

In order to answer this question, the path coefficients have to be considered in line with regression coefficients. All the paths which had significant regression coefficients and beta values greater than 0.05 were retained while the paths which had insignificant regression coefficients and beta values equal or less than 0.05 were deleted. After this, another ten regression analyses were conducted without the deleted paths. These new path coefficients were now used to determine the original correlations and the reproduced correlations. Table 4.1 displays original correlations and the reproduced correlations.

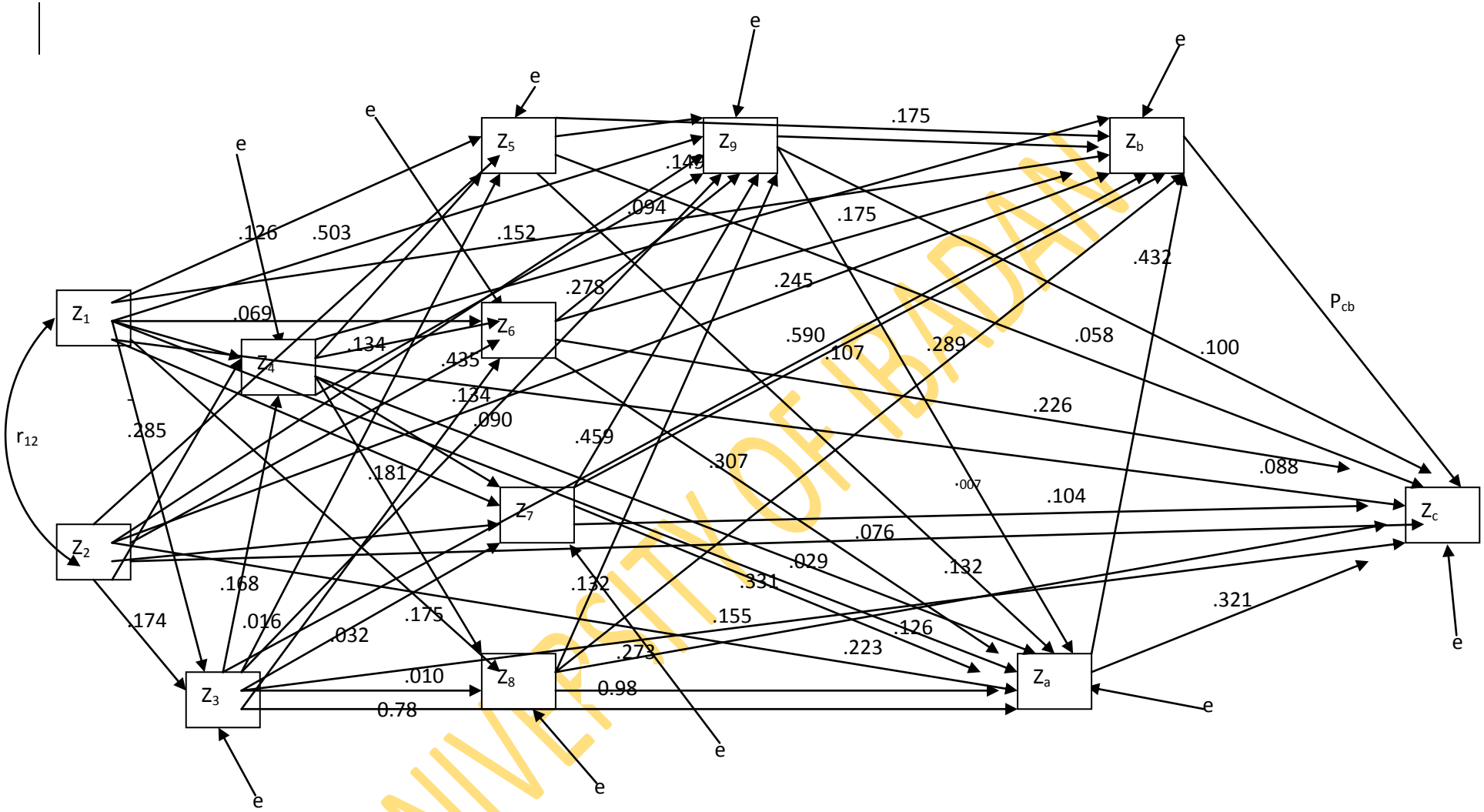
Table 4.3. The Original and Reproduced Correlation Matrix for the Twelve Variables

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Za	Zb	Zc
Z1	1.0	.04	-.31	-.10	.03	.17	.31	.23	-.31	.12	.18	.05
Z2	.04	1.0	.16	.57	.18	.29	.27	.20	.05	.06	.17	.11
Z3	-.22*	.15	1.0	.26	.15	.12	-.06	.12	.10	.01	.39	.14
Z4	-.12	.58	.31	1.0	.22	.14	.16	.06	.22	.10	.15	.15
Z5	.02	.18	.08	.19	1.0	-	-	-	-.12	.13	.47	.28
Z6	-.17	.38	.14	.15	-	1.0	-	-	-.04	.21	.33	.21
Z7	.31	.31	-.12	.16	-	-	1.0	-	-.21	.15	-.24	-.18
Z8	.22	.25	.06	.23	-	-	-	1.0	-.04	.36	.49	.56
Z9	-.58	-.13	.12	.16	.19*	-.22	-.55	-.04	1.0	.02	.23	.03
Za	-.12	.42	.12	.22	.18	.26	.38	.13*	-.09	1.0	.25	.37
Zb	.15	-.10	.42	.05*	.20	.09	-.21	.44	.07	.52*	1.0	.40
Zc	.05	.16	.14	.15	.18*	-.15	-.15	.71	.13	.39	.43	1.0

* The difference between original and reproduced correlations is greater than .05

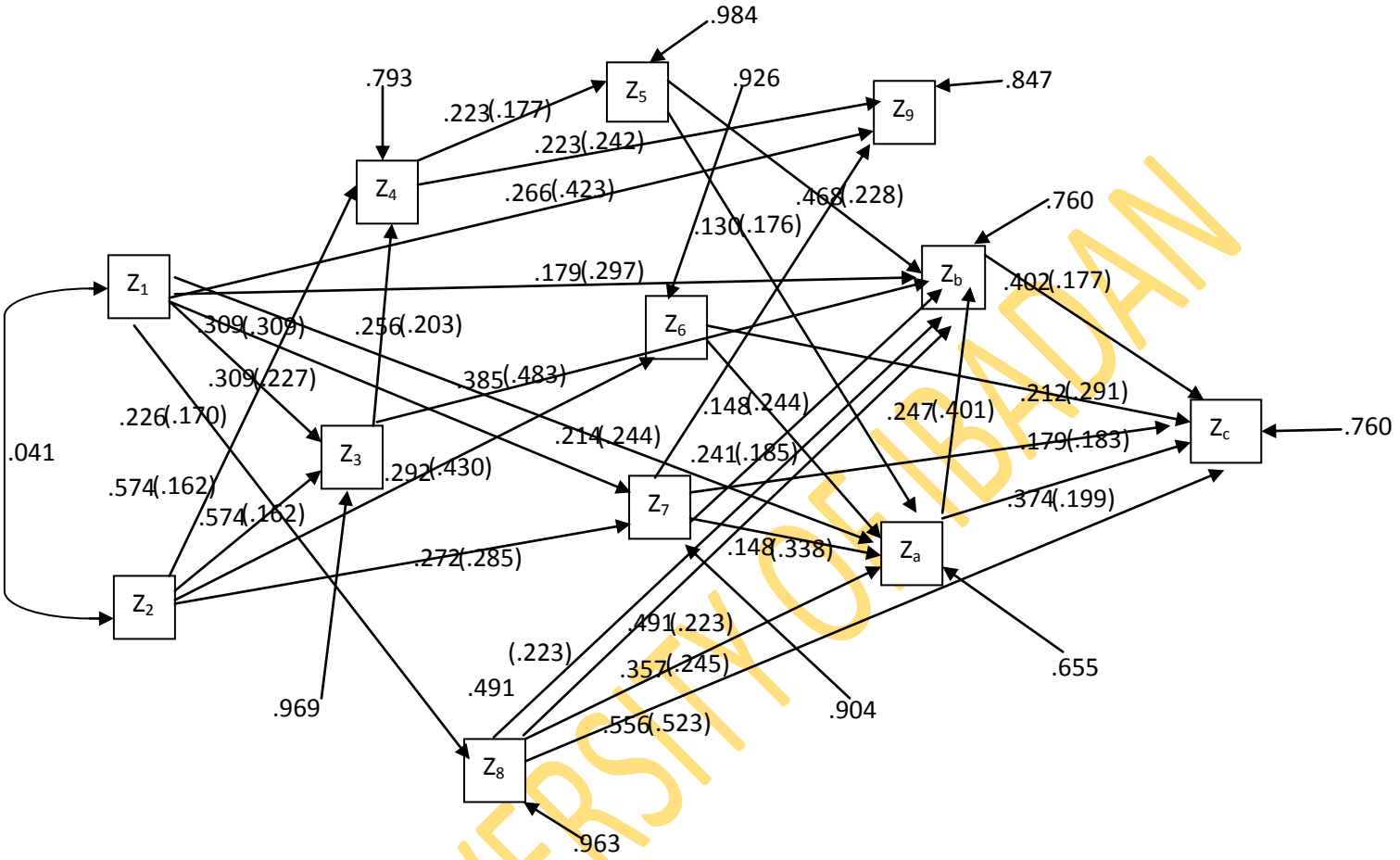
The original correlation coefficients are shown above the diagonal while the reproduced are shown below the diagonal.

Table 4.3 shows that fewer numbers (6 out of 59) of the difference between original correlations and the reproduced correlations exceed 0.05. This indicates that the model which describes the causal relationship among the variables (principals' gender, principals' age, principals' qualification, principals' years of experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, principals' supervisory role, teachers' job satisfaction, teachers' classroom management and Mathematics achievement) is consistent with the observed correlations among these variables. Both hypothesised and revised models are displayed in figures 4.1 and 4.2.



► **Key:** Z_1 = Gender of the Principal, Z_2 = Age of the Principal, Z_3 = Qualification of the Principal, Z_4 = Experience of the Principal, Z_5 = Autocratic leadership, Z_6 = Democratic leadership Z_7 = Laissez-faire leadership Z_8 = Transformational leadership, Z_9 = Principals' supervisory role Z_a = Teachers' job satisfaction, Z_b = Teachers' classroom management Z_c = Achievement in Mathematics

Figure 4.1. The initial or hypothesized causal linkages among the twelve variables



Key: Z_1 = Gender of the Principal, Z_2 = Age of the Principal, Z_3 = Qualification of the Principal, Z_4 = Experience of the Principal, Z_5 = Autocratic leadership, Z_6 = Democratic leadership Z_7 = Laissez-faire leadership Z_8 = Transformational leadership, Z_9 = Principals' supervisory role Z_a = Teachers' job satisfaction, Z_b = Teachers' classroom management Z_c = Achievement in Mathematics

Figure 4.2. The new causal linkages among the twelve variables

It can be observed from figures 4.1 and 4.2 that the 'es' in figure 4.1 have been replaced with values in figure 4.2. The values are the residual values. The square of the residual value associated with each of the endogenous variable in the new model when multiplied by hundred, indicates the percentage of the variance in each endogenous variable which is due to variables outside the model.

4.1.4 Research question4: If the model is consistent, what are the estimated direct, indirect and total causal effects among the variables?

To answer this question, the direct, indirect and total effects of variables affecting each endogenous variable have to be shown. These are shown in tables 4. 4a- 4.4j

Table 4.4a. Summary of Direct, Indirect and Total Causal Effects for principals' qualification

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z3(Principals' qualification)	Z1(Principals' gender)	-0.227	-	-0.227
Adjusted R^2 =0.062	Z2(Principals' age)	0.162	-	0.162

From table 4.4a, the direct effect of principals' gender on qualification which was -0.227 indicates that for every one standard deviation unit change in gender, there was a 0.227 unit change in principals' qualification controlling for other predictor variables. There was no indirect effect of gender on qualification. The total effect (-0.227) means that for a standard deviation unit change in gender, there was a (-0.227) unit change in qualification via all presumed direct and indirect causal links.

The direct effect of age 0.162 implies that for every one standard deviation unit change in age, there was a 0.162 unit change in qualification controlling for other predictor variables. There was no indirect effect of age on qualification. The total effect (0.162) means that for every one standard deviation unit change in age, there was a 0.162 unit change in qualification via all presumed direct and indirect causal links. The adjusted R^2 (0.062) means that only 6.2% of the variance in principals' qualification was accounted for by both their gender and age. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4b. Summary of Direct, Indirect and Total Causal Effects for principals' years of experience

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z4(Principals' experience)	Z1(Principals'gender)	-	-0.046	-0.046
Adjusted R^2 =0.371	Z2(Principals'age)	0.546	0.033	0.579
	Z3(Principals' qualification)	0.203	-	0.203

Table 4.4b shows that there was no direct effect of gender on principals' years of experience. The indirect effect (-0.046) indicates that there was a 0.046 unit change in principals' years of experience for every one standard deviation unit change in gender through qualification. The total effect (0.046) means that for every one standard deviation unit change in gender, there was a 0.046 unit change in principals' years of experience via all presumed direct and indirect causal links.

The direct effect of age 0.546 implies that for every one standard deviation unit change in age, there was a 0.546 unit change in principals' years of experience controlling for other predictor variables. The indirect effect (0.033) indicates that there was a 0.033 unit change in principals' years of experience for every one standard deviation unit change in age through qualification, that is the age has effect on principals' years of experience through principals' qualification. The total effect (0.579) means that for every one standard deviation unit change in age, there was a 0.579 unit change in principals' years of experience via all presumed direct and indirect causal links.

The direct effect of qualification 0.203 implies that for every one standard deviation unit change in qualification, there was a 0.203 unit change in principals' years of experience, controlling other predictor variables. There was no indirect effect of qualification on principals' years of experience. The total effect (0.203) means that for every one standard deviation unit change in qualification, there was a 0.203 unit change in principals' years of experience via all presumed direct and indirect causal links. The adjusted R^2 (0.371) means that only 37.1% of the variance in principals' years of experience was accounted for by their gender, ages and qualification. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4c. Summary of Direct, Indirect and Total Causal Effects for principals' autocratic leadership style

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z5(Autocratic leadership)	Z1(Principals'gender)	-	-0.008	-0.008
Adjusted R^2 =0.031	Z2(Principals'age)	-	0.097	0.097
	Z3(Principals' qualification)	-	0.036	0.036
	Z4(Principals' experience)	0.177	-	0.177

Table 4.4c reveals that there was no direct effect of gender on autocratic leadership style. The indirect effect (-0.008) indicates that there was a 0.008 unit change in autocratic leadership style for every one standard deviation unit change in gender through qualification and principals' years of experience. The total effect (0.008) means that for every one standard deviation unit change in gender, there was a 0.008 unit change in autocratic leadership style via all presumed direct and indirect causal links.

There was no direct effect of age on autocratic leadership style. The indirect effect (0.097) indicates that there was a 0.097 unit change in autocratic leadership style for every one standard deviation unit change in age through qualification and principals' years of experience. The total effect (0.097) means that for every one standard deviation unit change in age, there was a 0.097 unit change in autocratic leadership style via all presumed direct and indirect causal links.

There was no direct effect of qualification on autocratic leadership style. The indirect effect (0.036) indicates that there was a 0.036 unit change in autocratic leadership style for every one standard deviation unit change in qualification through principals' years of experience. The total effect (0.036) means that for every one standard deviation unit change in qualification, there was a 0.036 unit change in autocratic leadership style via all presumed direct and indirect causal links.

The direct effect of principals' years of experience (0.177) implies that for every one standard deviation unit change in principals' years of experience, there was a 0.177 unit change in autocratic leadership style controlling for other predictor

variables. It was only principals' experience that had direct positive effect on principals' autocratic leadership style. It follows then, that the more the principals' experience on the job, the better their knowledge of the right time to use the autocratic leadership style. There was no indirect effect of principals' years of experience on autocratic leadership style. The total effect (0.177) means that for every one standard deviation unit change in principals' years of experience, there was a 0.177 unit change in autocratic leadership style via all presumed direct and indirect causal links. The adjusted R^2 (0.031) means that only 3.1% of the variance in principals' autocratic leadership style was accounted for by their gender, age, qualification and years of experience. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4d. Summary of Direct, Indirect and Total Causal Effects for principals' democratic leadership style

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z6(Democratic leadership)	Z2(Principals'age)	0.430	-	0.430

Adjusted R^2 =0.143

The direct effect of age (0.430) implies that for every one standard deviation unit change in democratic leadership style, there was a 0.430 unit change in democratic leadership style controlling for other predictor variables. There was no indirect effect of age on democratic leadership style. The total effect (0.430) means that for every one standard deviation unit change in principals' age, there was a 0.430 unit change in democratic leadership style via all presumed direct and indirect causal links.

There was no direct and indirect effect of principals' gender, qualification and years of experience on democratic leadership style. This means that in the model, principals' gender, qualification and years of experience are not linked with democratic leadership style either directly or indirectly. The adjusted R^2 (0.143) means that only 14.3% of the variance in principals' democratic leadership style was accounted for by their gender, ages, qualification and years of experience. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4e. Summary of Direct, Indirect and Total Causal Effects for principals' leissez-faire leadership style

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z7(Laissez-faire leadership)	Z1(Principals'gender)	0.309	-	0.309
Adjusted R^2 =0.183	Z2(Principals'age)	0.285	-	0.285

The direct effect of gender (0.309) implies that for every one standard deviation unit change in gender, there was a 0.309 unit change in laissez-faire leadership style controlling for other predictor variables. There was no indirect effect of gender on the laissez-faire leadership style. The total effect (0.309) means that for every one standard deviation unit change in gender, there was a 0.309 unit change in laissez-faire leadership style via all presumed direct and indirect causal links.

The direct effect of age (0.285) implies that for every one standard deviation unit change in age, there was a 0.285 unit change in laissez-faire leadership style controlling for other predictor variables. There was no indirect effect of age on the laissez-faire leadership style. The total effect (0.285) means that for every one standard deviation unit change in age, there was a 0.285 unit change in laissez-faire leadership style via all presumed direct and indirect causal links.

There was no direct and indirect effect of principals' qualification and years of experience on the laissez-faire leadership style. This means that in the model, principals' qualification and years of experience are not linked with the laissez-faire leadership style either directly or indirectly. The adjusted R^2 (0.183) means that only 18.3% of the variance in principals' laissez-faire leadership style was accounted for by their gender, ages, qualification and years of experience. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4f. Summary of Direct, Indirect and Total Causal Effects for principals' transformational leadership style

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z8(transformational leadership)	Z1(Principals'gender)	0.170	-	0.170

Adjusted R^2 =0.073

The direct effect of gender (0.170) implies that for every one standard deviation unit change in transformational leadership style, there was a 0.170 unit change in transformational leadership style controlling for other predictor variables. There was no indirect effect of gender on the transformational leadership style. The total effect (0.170) means that for every one standard deviation unit change in principals' gender, there was a 0.170 unit change in democratic leadership style via all presumed direct and indirect causal links.

There was no direct and indirect effect of principals' age, qualification and years of experience on transformational leadership style. This means that in the model, principals' qualification and years of experience are not linked with transformational leadership style either directly or indirectly. The adjusted R^2 (0.073) means that only 7.3% of the variance in principals' transformational leadership style was accounted for by their gender, age, qualification and years of experience. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4g. Summary of Direct, Indirect and Total Causal Effects for principals' supervisory role

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Z9(Principals'supervisory role)	Z1(Principals'gender)	-0.423	-0.130	-0.553
Adjusted R^2 =0.283	Z2(Principals'age)	-	0.132	0.132
	Z3(Principals' qualification)	-	0.049	0.049
	Z4(Principals' experience)	0.242	-	0.242
	Z7(Laissez-faire leadership)	-0.422	-	-0.422

The direct effect of gender (-0.423) implies that for every one standard deviation unit change in gender, there was a -0.423 unit change in principals' supervisory role controlling for other predictor variables. The indirect effect (-0.130) indicates that there was a 0.130 unit change in principals' supervisory role for every one standard deviation unit change in gender through age, principals' qualification and years of experience. The total effect (-0.553) means that for every one standard deviation unit change in gender, there was a 0.553 unit change in principals' supervisory role via all presumed direct and indirect causal links.

There was no direct effect of age on principals' supervisory role. The indirect effect (0.132) indicates that there was a 0.132 unit change in principals' supervisory role for every one standard deviation unit change in age through qualification and principals' years of experience. The total effect (0.132) means that for every one standard deviation unit change in age, there was a 0.132 unit change in principals' supervisory role via all presumed direct and indirect causal links. There was no direct effect of qualification on principals' supervisory role. The indirect effect (0.049) indicates that there was a 0.049 unit change in principals' supervisory role for every one standard deviation unit change in qualification through principals' laissez-faire leadership style. The total effect (0.049) means that for every one standard deviation unit change in qualification, there was a 0.049 unit change in principals' supervisory role via all presumed direct and indirect causal links. The direct effect of principals' years of experience (0.242) on principals' supervisory role implies that for every one standard deviation unit change in principals' years of experience, there was a 0.242

unit change in principals' supervisory role. There was no indirect effect of principals' years of experience on principals' supervisory role. The total effect (0.242) means that for every one standard deviation unit change in principals' years of experience, there was a 0.242 unit change in principals' supervisory role via all presumed direct and indirect causal links.

The direct effect of laissez-faire leadership style (-0.422) implies that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.422 unit change in principals' supervisory role controlling for other predictor variables. There was no indirect effect of laissez-faire leadership style on principals' supervisory role. The total effect (-0.422) means that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.422 unit change in principals' supervisory role via all presumed direct and indirect causal links. The direct negative effect of laissez-faire leadership style on principals' supervisory role is not surprising because this style allows surbodinates to do things the way they like.

There was no direct and indirect effect of autocratic leadership style, democratic leadership style and transformational leadership style on principals' supervisory role. This means that in the model, autocratic leadership style, democratic leadership style and transformational leadership style are not linked with principals' supervisory role either directly or indirectly. The adjusted R^2 (0.283) means that only 28.3% of the variance in principals' supervisory role was accounted for by their gender, ages, qualification and years of experience, autocratic leadership style and laissez-faire leadership style. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4h. Summary of Direct, Indirect and Total Causal Effects for teachers' job satisfaction

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Za(Teachers' job satisfaction) Adjusted R^2 =0.571	Z1(Principals'gender)	-	0.041	0.041
	Z2(Principals'age)	-	0.126	0.126
	Z3(Principals' qualification)	-	0.006	0.006
	Z4(Principals' experience)	-	0.031	0.031
	Z5(Autocratic leadership)	0.176	-	0.176
	Z6(Democratic leadership)	0.244	-	0.244
	Z7(Laissez-faire leadership)	0.338	-	0.338
	Z8(transformational leadership)	0.245	-	0.245

The direct effect (0.244) of gender on teachers' job satisfaction shows that for every one standard unit change in gender, there was a 0.244 unit change in teachers' job satisfaction. The indirect effect (0.041) indicates that there was a 0.041unit change in teachers' job satisfaction for every one standard deviation unit change in gender through principals' qualification, experience, autocratic leadership style, laissez-faire leadership style and transformational leadership style. The total effect (0.041) means that for every one standard deviation unit change in gender, there was a 0.041 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

There was no direct effect of age on teachers' job satisfaction. The indirect effect (0.126) indicates that there was a 0.126 unit change in teachers' job satisfaction for every one standard deviation unit change in age through principals' qualification, experience, autocratic leadership style, democratic leadership style and laissez-faire leadership style. The total effect (0.126) means that for every one standard deviation unit change in age, there was a 0.126 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

There was no direct effect of principals' qualification on teachers' job

satisfaction. The indirect effect of qualification on teachers' job satisfaction (0.006) means that for every one standard unit change in principals' qualification, there was a 0.006 unit change in teachers' satisfaction. The total effect (0.006) means that for every one standard deviation unit change in qualification, there was a 0.006 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

There was no direct effect of principals' years of experience on teachers' job satisfaction. The indirect effect of principals' years of experience on teachers' job satisfaction (0.031) means that for every one standard unit change in principals' years of experience, there was a 0.031 unit change in teachers' job satisfaction. The total effect (0.031) means that for every one standard deviation unit change in principals' years of experience, there was a 0.031 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

The direct effect (0.176) of autocratic leadership style on teachers' job satisfaction indicates that for every one standard deviation unit change in autocratic leadership style, there was a 0.176 unit change in teachers' job satisfaction. There was no indirect effect of autocratic leadership style on teachers' job satisfaction. The total effect (0.176) means that for every one standard deviation unit change in democratic leadership style, there was a 0.176 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

The direct effect (0.244) of democratic leadership style on teachers' job satisfaction indicates that for every one standard deviation unit change in democratic leadership style, there was a 0.244 unit change in teachers' job satisfaction. There was no indirect effect of democratic leadership style on teachers' job satisfaction. The total effect (0.244) means that for every one standard deviation unit change in democratic leadership style, there was a 0.244 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

The direct effect (0.338) of laissez-faire leadership style on teachers' job satisfaction indicates that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.338 unit change in teachers' job

satisfaction. There was no indirect effect of democratic leadership style on teachers' job satisfaction. The total effect (0.338) means that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.338 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

The direct effect (0.245) of transformational leadership style on teachers' job satisfaction indicates that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.245 unit change in teachers' job satisfaction. There was no indirect effect of transformational leadership style on teachers' job satisfaction. The total effect (0.245) means that for every one standard deviation unit change in transformational leadership style, there was a 0.245 unit change in teachers' job satisfaction via all presumed direct and indirect causal links.

There was no direct or indirect effect of principals' supervisory role on teachers' job satisfaction. This means that in the model, principals' supervisory role was not linked with teachers' job satisfaction either directly or indirectly. The adjusted R^2 (0.571) means that 57.1% of the variance in teachers' job satisfaction was accounted for by principals' gender, age, qualification, democratic leadership style, laissez-faire leadership style and transformational leadership style. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4i. Summary of Direct, Indirect and Total Causal Effects for perceived teachers' classroom management

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTA
Zb(Classroom management)	Z1(Principals'gender)	0.297	-0.129	0.168
Adjusted R^2 =0.420	Z2(Principals'age)	0.239	0.104	0.343
	Z3(Principals' qualification)	0.483	0.009	0.492
	Z4(Principals' experience)	-	0.045	0.045
	Z5(Autocratic leadership)	0. 228	0.071	0.299
	Z6(Democratic leadership)	-	0.098	0.098
	Z7(Laissez-faire leadership)	0.185	-0.042	0.143
	Z8(transformational leadership)	0.223	0.058	0.281
	Z9(Principals'supervisory role)	-	-	-
	Za(Teachers' job satisfaction)	0.401		0.401

The direct effect (0.297) of gender on students' perceived teachers' classroom management effectiveness implies that for every one unit standard change in gender, there was a 0.297 unit change in teachers' perceived classroom management. The indirect effect (-0.129) indicates that there was a 0.129 unit change in students' perceived teachers' classroom management effectiveness for every one standard deviation unit change in gender through qualification, autocratic leadership style and laissez-faire leadership style, principals' supervisory role and teachers' job satisfaction. The total effect (0.168) means that for every one standard deviation unit change in gender, there was a (0.168) unit change in students' perceived teachers' classroom management via all presumed direct and indirect causal links.

The direct effect (0.239) of age on students' perceived teachers' classroom management effectiveness indicate that in every one standard deviation unit change in age, there was a 0.239 unit change in teachers'

perceived classroom management effectiveness. The indirect effect (0.104) indicates that there was a 0.104 unit change in students' perceived teachers' classroom management effectiveness for every one standard deviation unit change in age through principals' qualification, years of experience, autocratic leadership style, democratic leadership style and laissez-faire leadership style. The total effect (0.343) means that for every one standard deviation unit change in age, there was a (0.343) unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links. The direct effect (0.483) of qualification on students' perceived teachers' classroom management effectiveness indicates that in every one standard deviation unit change in age, there was a 0.483 unit change in students' perceived teachers' classroom management effectiveness. The indirect effect (0.009) indicates that there was a 0.009 unit change in students 'perceived teachers' classroom management effectiveness for every one standard deviation unit change in qualification through principals' years of experience and autocratic leadership style. The total effect (0.492) means that for every one standard deviation unit change in qualification, there was a (0.492) unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links.

There was no direct effect of principals' years of experience on teachers' perceived classroom management. The indirect effect (0.045) indicates that there was a 0.045 unit change in students' perceived teachers' classroom management for every effectiveness one standard deviation unit change in principals' years of experience through autocratic leadership style. The total effect (0.045) means that for every one standard deviation unit change in principals' years of experience, there was a 0.045 unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links between them.

The direct effect(0.228) of autocratic leadership style on students' perceived teachers' classroom management effectiveness implies that for every one unit change in autocratic leadership style, there was a 0.228 unit change in students' perceived teachers' classroom management. The indirect effect (0.071) indicates that there was a 0.071 unit change in students'

perceived teachers' classroom management for every effectiveness one standard deviation unit change in autocratic leadership style through teachers' job satisfaction. The total effect (0.299) means that for every one standard deviation unit change in autocratic leadership style, there was a (0.299) unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links.There was no direct effect of democratic leadership style on students' perceived teachers' classroom management effectiveness. The indirect effect (0.098) indicates that there was a 0.098 unit change in students' perceived teachers' classroom management effectiveness for every one standard deviation unit change in democratic leadership style through teachers' job satisfaction. The total effect (0.098) means that for every one standard deviation unit change in democratic leadership style, there was a 0.098 unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links.

The direct effect (0.185) of laissez-faire leadership style on students' perceived teachers' classroom management effectiveness indicates that for every one standard unit change in laisseiz-faire leadership style, there was a 0.185 unit change in students' perceived teachers' classroom management Effectiveness. The indirect effect (-0.042) indicates that there was a 0.042 unit change in students' perceived teachers' classroom management effectiveness for every one standard deviation unit change in laissez-faire leadership style through teachers' job satisfaction. The total effect (0.143) means that for every one standard deviation unit change in laissez-faire leadership style, there was a (0.142) unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links.

The direct effect of transformational leadership style (0.223) on students' perceived teachers' classroom management effectiveness means that for every one standard unit change in transformational leadership style, there was a 0.223 unit change in students' perceived teachers' classroom management effectiveness. The indirect effect (0.058) of transformational leadership style on students' perceived teachers' classroom management

effectiveness implies that for every one standard unit change in transformational leadership style, there was a 0.058 unit change in students' perceived teachers' classroom management effectiveness. The total effect (0.281) means that for every one standard deviation unit change in transformational leadership style, there was a 0.281 unit change in students' perceived teachers' classroom management effectiveness via all presumed direct and indirect causal links.

There were no direct and indirect effects of principals' supervisory role on students' perceived teachers' classroom management effectiveness. This means that in the model, principals' supervisory role did not link with students' perceived teachers' classroom management effectiveness .either directly or indirectly.

The direct effect (0.401) of teachers' job satisfaction on students' perceived teachers' classroom management effectiveness shows that for every one standard deviation unit change in teachers' job satisfaction, there was a 0.401 unit change in teachers' classroom management. There was no indirect effect of teachers' job satisfaction on teachers' classroom management effectiveness. The total effect (0.401) means that for every one standard deviation unit change in teachers' job satisfaction, there was a (0.401) unit change in teachers' classroom management effectiveness via all presumed direct and indirect causal links. The adjusted R^2 (0.420) means that 42.0% of the variance in students' perceived teachers' classroom management effectiveness was accounted for by their gender, age, qualification, years of experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, supervisory role, and teachers' job satisfaction. The remaining percentage variance was as a result of other variables not included in the model.

Table 4.4j. Summary of Direct, Indirect and Total Causal Effects for Mathematics Achievement

OUTCOME	DETERMINANTS	DIRECT	INDIRECT	TOTAL
Zc (Mathematics achievement) Adjusted R^2 =0.422	Z1(Principals'gender)	-	-0.088	-0.088
	Z2(Principals'age)	-	-0.082	-0.082
	Z3(Principals' qualification)	-	0.087	0.087
	Z4(Principals' experience)	-	0.008	0.008
	Z5(Autocratic leadership)	-	0.021	0.021
	Z6(Democratic leadership)	-0.291	0.017	-0.274
	Z7(Laissez-faire leadership)	-0.183	-0.007	-0.190
	Z8(transformational leadership)	0.523	0.039	0.562
	Za(Teachers' job satisfaction)	0.199	0.071	0.270
	Zb(Classroom management)	0.177	-	0.177

There was no direct effect of gender on Mathematics achievement. The indirect effect (-0.088) indicates that there was a 0.088 unit change in Mathematics achievement for every one standard deviation unit change in gender through all other independent variables. The total effect (0.088) means that for every one standard deviation unit change in gender, there was a 0.088 unit change in Mathematics achievement via all presumed direct and indirect causal links.

There was no direct effect of age on Mathematics achievement. The indirect effect (-0.082) indicates that there was a 0.082 unit change in Mathematics achievement for every one standard deviation unit change in age through principals' qualification, laissez-faire leadership style, transformational leadership style, principals' supervisory role, teachers' job satisfaction and teachers' classroom management effectiveness. The total effect (0.082) means that for every one standard deviation unit change in age, there was a 0.082 unit change in Mathematics achievement via all presumed direct and indirect causal links.

There was no direct effect of qualification on Mathematics achievement. The indirect effect (0.087) indicates that there was a 0.087 unit change in Mathematics achievement for every one standard deviation unit change in qualification through principals' years of experience, autocratic leadership style, teachers' job satisfaction and teachers' classroom management effectiveness. The total effect (0.087) means that for every one standard deviation unit change in qualification, there was a 0.087 unit change in Mathematics achievement via all presumed direct and indirect causal links.

There was no direct effect of principals' years of experience on Mathematics achievement. The indirect effect (0.008) indicates that there was a 0.008 unit change in Mathematics achievement for every one standard deviation unit change in principals' years of experience through autocratic leadership style, job satisfaction and classroom management. The total effect (0.008) means that for every one standard deviation unit change in principals' years of experience, there was a 0.008 unit change in Mathematics achievement via all presumed direct and indirect causal links. There was no direct effect of autocratic leadership style on Mathematics achievement. The indirect effect (0.021) indicates that there was a 0.021 unit change in Mathematics achievement for every one standard deviation unit change in autocratic leadership style through principals' supervisory role. The total effect (0.021) means that for every one standard deviation unit change in autocratic leadership style, there was a 0.021 unit change in Mathematics achievement via all presumed direct and indirect causal links.

The direct effect (-0.291) of democratic leadership style on Mathematics achievement shows that for every one standard deviation unit change in democratic leadership style, there was a 0.291 unit change in Mathematics achievement controlling for the effect of other variables. The indirect effect (0.017) indicates that there was a 0.017 unit change in Mathematics achievement for every one standard deviation unit change in democratic leadership style through teachers' job satisfaction and teachers' classroom management effectiveness. The total effect (-0.274) means that for every one standard deviation unit change in autocratic leadership style, there was a 0.274 unit change in Mathematics achievement via all presumed direct and indirect causal links.

The direct effect (-0.183) of laissez-faire leadership style on Mathematics achievement shows that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.183 unit change in Mathematics achievement controlling for the effect of other variables.. The indirect effect (-0.007) indicates that there was a 0.007 unit change in Mathematics achievement for every one standard deviation unit change in laissez-faire leadership style through principals' supervisory role, job satisfaction and teachers' classroom management effectiveness. The total effect (-0.190) means that for every one standard deviation unit change in laissez-faire leadership style, there was a 0.190 unit change in Mathematics achievement via all presumed direct and indirect causal links.

The direct effect (0.523) of transformational leadership style on Mathematics achievement shows that for every one standard deviation unit change in transformational leadership style, there was a 0.523 unit change in Mathematics achievement controlling for effect of other variables. The indirect effect (0.039) indicates that there was a 0.039 unit change in Mathematics achievement for every one standard deviation unit change in transformational leadership style through teachers' job satisfaction and classroom management. The total effect (0.562) means that for every one standard deviation unit change in transformational leadership style, there was a (0.562) unit change in Mathematics achievement via all presumed direct and indirect causal links.

There was no direct and indirect effect of principals' supervisory role on Mathematics achievement. This means that in the model, principals' supervisory role was not linked with students' achievement in Mathematics either directly or indirectly.

The direct effect (0.199) of teachers' job satisfaction on Mathematics achievement shows that for every one standard deviation unit change in teachers' job satisfaction, there was a 0.199 unit change in Mathematics achievement controlling for the effect of other variables. The indirect effect (0.071) indicates that there was a 0.071 unit change in Mathematics achievement for every one standard deviation unit change in teachers' job satisfaction through teachers' classroom management. The total effect (0.270) means that for every one standard deviation unit change in teachers' job satisfaction,

there was a 0.270 unit change in Mathematics achievement via all presumed direct and indirect causal links.

The direct effect (0.177) of teachers' classroom management effectiveness on Mathematics achievement shows that for every one standard deviation unit change in teachers' classroom management, there was a 0.177 unit change in Mathematics achievement controlling for the effect of other variables. There was no indirect effect of teachers' classroom management on Mathematics achievement. The total effect (0.177) means that for every one standard deviation unit change in teachers' classroom management, there was a (0.177) unit change in Mathematics achievement via all presumed direct and indirect causal links. The adjusted R^2 (0.422) means that only 42.2% of the variance in Mathematics achievement was accounted for by principals' gender, age, qualification, years of experience, autocratic leadership style, democratic leadership style, laissez-faire leadership style, transformational leadership style, supervisory role, teachers' job satisfaction and teachers' classroom management. The remaining percentage variance was as a result of other variables not included in the model.

4.1.5 Research question5: What was the relative importance of each independent variable on the Mathematics achievement?

From table4.4j, the direct effect, indirect effect and total effect of each independent variable on the criterion variable (achievement in Mathematics) are shown. From the table, transformational leadership style has the highest total effect or effect coefficient being (0.562); followed by democratic leadership style (-0.274); then job satisfaction with total effect of 0.270, followed by laissez-faire leadership style (-0.190); classroom management (0.177); principals' gender (0.088); principals' qualification (0.087); principals' age (0.082); autocratic leadership style (0.021) with principals' experience (0.008) being the least. It follows therefore, that in the model in which Mathematics achievement was the criterion variable, transformational leadership style was the most important, followed by democratic leadership style; job satisfaction; laissez-faire leadership style; classroom management; laissez-faire leadership style; principals' gender; principals' qualification; principals' age; autocratic leadership style with principals' experience being the least important.

4.2: Discussion

The results revealed that age and gender have only direct effect on principals' qualification. While age and qualification have direct effect on principals' years of experience, gender has no significant direct effect on principals' years of experience. This is not suprising because, being a male or a female does not add to one's experience but in the process of acquiring qualification, experiences are gained. It follows then, that principals' experience is majorly affected by their age and qualification. On the other hand, age and gender have indirect effect while qualification has no indirect effect on principals' years of experience.

Gender, age and qualification have no direct significant effect on autocratic leadership style but only indirect effect.The indirect effect is due to principals' years of experience which directly affect autocratic leadership. Principals' years of experience has direct effect on autocratic leadership style but has no indirect effect. This outcome might have been as a result of behaviour of many of the workers the principals' might have come across in the course of performing their duties which might have in a way, influenced them. The result agrees with the finding of Adeboyeje (2006) who stated that there was no significant relationship between the dimensions of principals' leadership behaviour and principals' qualification. It however differs from the findings of Nakpodia (2009) who concludes that there is a significant difference between the leadership styles of principals with degrees and professional educational qualifications and those without degrees and professional educational qualifications. The result also supports the findings of Karen (2002) who observes that principals' experience in their schools has significant effect on their leadership styles.

Principals 'gender, qualification and experience have neither direct nor indirect effect on democratic leadership style, while principals' age has direct but no indirect effect. The implication of this is that principals' age can affect their adoption of the democratic leadership style without any mediating factor. The reason for this might be that as one grows in age, there is the possibility of not wanting to make decision on matters that affect others in the same organisation without consulting them.This finding contradicts the findings of Gilbert, Collins and Brenner (1990) who concluded that age is not a significant factor in determining leadership effectiveness. The difference in the findings of this study and that of Gilbert et al may be as a result of the

number of variables combined in this study which are more than those in Gilbert et al. It supports the findings of Mitchell (2000) who reports that younger workers feel more comfortable exhibiting individualistic behaviour than the older workers. Generally speaking, as one grows in a job, there is a possibility of not wanting to make decision about what will affect the generality of the people without making consultation.

Principals' gender and age have only direct and no indirect effect on laissez-faire leadership style while principals' qualification and years of experience have neither direct nor indirect effects on laissez-faire leadership style. The result corroborates the findings of Oshagbemi (2004) and Adeboyeje (2006) who respectively observe that older and younger managers have distinct leadership styles and that there is a significant relationship between the dimensions of principals' leadership behaviour and principals' age.

While principals' gender has direct effect but no indirect effect on transformational leadership style, their age, qualification and experience have neither direct nor indirect effect. The finding disagrees with the findings of Marx (2007) who found that the effect of the leader's age on followers' ratings of transactional and/or transformational leadership style is significant, as clear differences emerged based on the age group of the leaders.The result however confirms the findings of Adeboyeje (2006) who found that there was no significant relationship between the dimensions of principals' leadership behaviour and principals' experience. It was also revealed that principals' gender, experience and laissez-faire leadership style have direct effect on principals' supervisory role, while gender, age, and qualification have indirect effect on principals' supervisory role.

The study also showed that while principals' gender, age, qualification and years of experience have only indirect effect on teachers' job satisfaction, autocratic leadership style, democratic, laissez-faire and transformational leadership styles have only direct effect on teachers' job satisfaction. This result supports the findings of Yamraj and Ross (2008) who concluded that there was a positive correlation between leadership style and the degree of job satisfaction by teachers. The findings however only agree partially with the findings of Ronit (2001) which revealed that Principals'

transformational leadership style affects teachers' satisfaction both directly and indirectly through their occupational perceptions.

From the study it can be seen that principals' gender, age, qualification, autocratic leadership style and laissez-faire leadership style have both direct and indirect effect on teachers' classroom management and their years of experience. Democratic leadership style and transformational leadership style have only indirect effect, teachers' job satisfaction has only direct effect while principals' supervisory role has neither direct nor indirect effect.

Results also revealed that while democratic leadership style, laissez-faire leadership style, transformational leadership style and teachers' job satisfaction have both direct and indirect effect on Mathematics achievement, teachers' classroom management has only direct effect while principals' gender, age, qualification, years of experience, autocratic leadership style, and supervisory role have only indirect effect. The results corroborate the findings of Damon, Paco and Jonah (2009) who found that there was a positive relationship between principals' experience and school performance, particularly for Mathematics test scores and student absenteeism. These results also agree with the findings of Rohaty (2012) who found that gender has no significant effect on Mathematics achievement, and the findings of Kythreotis, Pashiardis, and Kyriakides (2010) who conclude that the principal human leadership frame affects student achievement. It however disagrees with the findings of Sawati, Anwar, and Majoka (2011) who found that there was no significant effect of any particular style on schools' academic results. This disagreement may be as a result of the instruments used or the fact that the environments where the researches were conducted differ.

The findings also substantiate the findings of Randell and Joe (2002) who found that principals' behaviour and attributes significantly influence individual student's achievement. It corroborates the findings of Nwachukwu (2007) who asserts that teacher related sources of job satisfaction seem to have a greater impact on teaching performance. However, they did not agree with the findings of Chappelear and Ted (2012) who found that a statistically significant relationship exists between teachers' perceptions of principals' monitoring students' progress and student achievement. The results also corroborate the finding of Gregory, Eric and Steven (2013) who investigated on Measuring the impact of effective principals and

concluded that highly effective principals raise the achievement of a typical student in their schools by between two and seven months of learning in a single school year; while ineffective principals lower achievement by the same amount of time.

The results also support the findings of Roy (2003) who investigated and found that among other factors affecting students' achievement, job satisfaction is the most significant one. They also support the findings of Moosung (2006) that the difference in job satisfaction between two Faculties results in an educational gap such as student enrolment rates and achievement between the schools. It also agrees with the affirmation of Saravia-Shore (2008) in Mohd (2012) who affirms that teachers play the main role in ensuring that students perform better every year since they are in charge of the classroom and the curriculum. It corroborates the observation of Waxler (2011) who observes that there is a definite and direct correlation between classroom management and academic achievement. It also supports the finding of Durowoju and Onuka (2012) who found that teacher self-efficacy and teacher classroom management effectiveness individually significantly determined the academic achievement of the students in Economics.

The results showed that transformational leadership style is the most important variable among the variables that affect Mathematics achievement. The result contradicts the findings of Aaron (2010) who found that transformational leadership behaviours had a significant, direct and negative effect on students' achievement. The contraditory findings from Aaron may be as a result of the instruments used which are different from those used in this study or because of the different variables combined in the two studies. It could as well be as a result of school effect because Aaron made use of only one school while this study used one hundred and fifty schools. The result corroborates the findings of Hazlinah (2011) who found that there was a relationship between transformational leadership style and students' academic achievements. It also substantiates the findings of Ofobruku (2013) who found that amongst the various leadership styles used in the hospitality industry, transformational leadership is most effective for the industry. This result is not surprising because transformational leadership style is a leadership style that makes principals to motivate and arouse teachers' interest to achieve set goals.

CHAPTER 5

SUMMARY OF FINDINGS, IMPLICATIONS AND RECOMMENDATION, CONCLUSION AND SUGGESTION FOR FURTHER STUDIES

5.0 Introduction.

This chapter presents the summary of the findings in chapter four, their educational implications, conclusion and recommendation as well as suggestions for further studies.

5.1 Summary of findings

The findings of this study are summarized as follows:

- The most important variable among the eleven variables assumed to be predicting Mathematics achievement is transformational leadership style, followed by democratic leadership style; teachers' job satisfaction; laissez-faire leadership style; classroom management; principals' gender; principals' qualification; principals' age; autocratic leadership style while principals' experience is the least important.
- The pattern of the correlation in the observed data was found to be consistent with the new model (the discrepancy between original and reproduced correlation was minimal). The new model is therefore considered tenable in explaining the causal interaction among the selected variables (the principals' factors, teachers' job satisfaction, classroom management and Mathematics achievement).
- Principals' gender and age have only direct effect on principals' qualification.
- Out of the three variables linking with the principals' years of experience, only age has both direct and indirect effect on principals' years of experience.
- Out of the four variables linking with the autocratic leadership style of the principals, none has either direct or indirect effect on principals' autocratic leadership style but for principals' years of experience which has direct effect.

- Out of the four variables linking with the democratic leadership style of the principals, none has either direct or indirect effect on principals' democratic leadership style but for principals' age which has direct effect.
- Out of the four variables linking with the laissez-faire leadership style of the principals, gender and age have only direct effect on principals' laissez-faire leadership style. The remaining two have neither direct nor indirect effect.
- Out of the four variables linking with the transformational leadership style of the principals, none has both direct and indirect effect on principals' autocratic leadership style but for principals' gender which has direct effect.
- Out of the eight variables linking with the principals' supervisory role, only gender has both direct and indirect effect.
- Out of the nine variables linking with teachers' job satisfaction, none has either direct or indirect effect on teachers' job satisfaction, except for principals' qualification, democratic and laissez-faire leadership styles which have direct effect.
- Out of the ten variables linking with teachers' classroom management, only gender, age, qualification, autocratic leadership style and laissez-faire leadership style have both direct and indirect effect on teachers' classroom management. Principals' transformational leadership style, teachers' job satisfaction and classroom management however, have direct effect.
- Out of the eleven variables linking with students' achievement in Mathematics, only principals' democratic leadership style, laissez-faire leadership style, transformational leadership style and teachers' job satisfaction have both direct and indirect effect on teachers' classroom management. Teachers' classroom management however, has direct effect.

5.2 Educational Implications

The educational implications of this study basically affect all the major stakeholders in the study. These include; students, teachers, school heads and policy makers.

Students:

The study revealed that teachers' job satisfaction has both direct and indirect effects on students' achievement. The educational implication of this is that if students can make their teachers satisfied by joining others to recognise the teaching profession and allow

the impact of their teachers on them to bear good fruits or bring about positive changes, they too will be able to perform better in Mathematics. Classroom management also has direct effect on students' achievement in Mathematics. The implication of this also is that if the students can cooperate with their teachers to manage the classroom very well, it will positively affect their performance.

Teachers:

Teachers' job satisfaction has both direct and indirect effect on students' achievement, therefore, teachers need to make themselves happy on the job so as to be able to see the seed they have planted in the students germinate and bear good fruits. They also need to manage their classes very well as this also has positive direct effect on students' achievement.

School heads:

The study showed that principals' qualification has indirect effect on achievement in Mathematics. The implication of this is that if principals can improve themselves academically, it will improve the learning of the students through other means which have direct contact with the principals. All the leadership styles have either direct or indirect effect on students' achievement in Mathematics. The implication of this is that if the school heads can combine more than one leadership styles, it will help in their administration which in turn will improve the performance of the students. The principals'supervisory role has neither direct nor indirect effect on the students' achievement in Mathematics. This means that a majority of the principals have not been doing the work of supervision as they should and this gives both teachers and students free hand to do things as they like which in a way, might have a negative impact on teaching as well as students' achievement.

Policy makers:

The results of this study would encourage policy makers to make policies that will be favourable to teachers and give them job satisfaction. The results should also make them create condusive classroom settings which will allow teachers to manage the classroom effectively and thus effect positive changes in students' achievement in Mathematics.

5.3 Conclusion

Principals' factors influence the activities and effectiveness in the school set up. Teachers' job satisfaction and classroom management cannot be relegated in relation to students' academic achievement. The high success or failure rate in Mathematics arise from different factors, some of which have been investigated in this work. The hypothesised model was trimmed and the new model was found to be tenable in explaining the causal interaction among principals' factors, teachers' job satisfaction, classroom management and achievement in Mathematics with Principals' transformational leadership style and teachers' job satisfaction having the most effective causal influence on Mathematics achievement. Principals should therefore endeavour to see that transformational leadership style is mostly used; and that teachers are well satisfied within the school environment in order to enhance achievement in Mathematics. The study also revealed that five out of the eleven variables identified to have effect on achievement in Mathematics (democratic leadership style, laissez-faire leadership style, transformational leadership style, teachers' job satisfaction and classroom management) have direct effect on achievement in Mathematics. Others (principals' age, gender, qualification, experience, autocratic leadership style,) have only indirect effect and principals' supervisory role has neither direct nor indirect effect on Mathematics achievement, though other variables affect it.

5.4 Recommendations

Based on the above the following were recommended:

1. Principals should endeavour to make use of transformational leadership style more than they use other leadership styles. This is because this study shows that transformational leadership style is the most important variable that affects Mathematics achievement.

2. Principals' should not always stick to using democratic leadership style if they realise that it will delay actions that can engender students' learning and achievement.

3. Laissez-faire leadership style has both negative direct and indirect effects on Mathematics achievement and should therefore not be adopted or seldomly used.

4. Teachers should be well treated by both the school principals and the government as their job satisfaction positively affects students' achievement.

5. Teachers should be well prepared to manage the classroom very well because a good vehicle will not drive itself as a good lesson note will not impart knowledge without a good classroom manager called teacher.

5.5 Limitations of this Study

The following are the limitations of this work:

It was not possible for the researcher to make use of all the secondary schools in Nigeria, not even in South-western, Nigeria. The work was therefore limited to one hundred and fifty schools in this study.

The study could not make use of all the principals' factors affecting students' academic achievement in Mathematics. This is due to time frame and economic constraint.

5.6 Suggestions for further study

The following suggestions were made for further study.

- The study can be expanded to more than two states against what the researcher did.
- Other principals' factors that are not included in this study especially principals' area of specialisation (Sciences, Art or Social Sciences) can be included for future study.

1. Contributions to knowledge

This study has established that transformational leadership style promotes academic achievement. Principals' dynamism moves the school forward in terms of achievement. Teachers' effective classroom management engender positive learning and achievement. Generally, it has been established that the four leadership styles under this study (transformational, democratic, autocratic and laissez-faire) have direct effect on teachers' job satisfaction which in turn has direct effect on classroom management and this in turn have direct effect on students' achievement.

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APPENDIX I

MULTIFACTOR LEADERSHIP SCALE (MLS)

Dear Sir/Ma,

This rating scale is for research purpose and your sincerity in filling it will be of great help to the results of the study. The researcher will therefore appreciate it if you can respond to the rating scale.

Instruction: Tick appropriately from the following;

Bio data:

School:……

Gender: Male ☐ Female ☐

Age: 30-40yrs ☐ 41-50yrs ☐ 51-60yrs ☐

Years of experience: 10-15yrs ☐ 16-20yrs ☐ 21-25yrs ☐ 26-30yrs ☐

31-35yrs ☐

Qualifications: Grade II ☐ NCE ☐ First degree ☐ Masters ☐

PhD ☐

Judge how each statement below fits the behaviour of your principal by using the following rating scale:
0= Not at all, 1= Once in a while, 2= Sometimes, 3= Fairly often, 4= Frequently if not always.

SN	**Description of transformational leadership style**	**0**	**1**	**2**	**3**	**4**
1	Inspires followers to copy his/her behaviour.					
2	Talks enthusiastically about what needs to be done.					
3	Shares successes with the group as well as failure.					
4	Provides encouragement and support to staff for the accomplishment of difficult tasks.					
5	Has a clear vision of the future and builds a team in other to deliver the vision.					
6	Creates a context that maximizes human and organizational capabilities					
7	Sustains a context that maximizes human and organizational capabilities					
8	Aligns the staff with core values and a unified purpose					
9	Makes changes happen in himself					
10	Makes changes happen in others					
11	Makes changes happen in organisation					
12	Does not give up in the face of seemingly impossible objectives					
13	Involves and empower the team					
14	Promotes ideas for improvement					
15	Recognises what needs to be done and creates avenue for doing it					
	Description of democratic leadership style					
16	Listens to and thinks about ideas put forward by all subordinates.					
17	Uses mistakes as opportunity for learning and improvement.					
18	Seeks and encourages ways of looking at problems from different angles.					
19	Looks for and get others to look for causes of problems.					
20	Helps people to clarify and make the most of their ideas.					
21	Encourages staff to be apart of the decision making					
22	Keeps staff informed about everything that affects their work					
23	Shares decision making and problem solving responsibilities					
24	Gathers information from staff before making a decision					
25	Produces high quality and high quantity work for long periods of time					
26	Makes staff to receive trust from him/her					

27	Allows staff to establish goals					
28	Encourages staff to grow in the job					
29	Recognises and encourages achievement					
30	Encourages staff to be promoted					
	Description of autocratic leadership style					
31	Enforces corrective actions when mistakes are made.					
32	Attends mostly to mistakes and deviations.					
33	Places energy on maintaining order					
34	Arranges to know if something has gone wrong.					
35	Recognises what needs must be accomplished					
36	Retains much power as possible					
37	Retains much decision-making as possible					
38	Does not consult staff					
39	Does not allow staff to give any input					
40	Expects staff to obey order without any explanation					
41	Relies on threats and punishment to influence staff					
42	Does not trust staff					
43	Uses query to force staffs do what he wants					
44	Structures set of rewards or punishment					
45	Makes staff tense and fearful					
	Description of laissez-faire leadership style					
46	Avoids making decisions.					
47	Shows lack of interest in what goes on in the school.					
48	Avoids taking stand on issues.					
49	Does not emphasise results.					
50	Diverts attention from hard choices.					
51	Provides little or no direction					
52	Gives staff as much freedom as possible					
53	Gives all authority or power to staff					
54	Does not cross-check what staff does					
55	Allows staff to determine goals themselves					
56	Allows staff to make decisions by and for themselves					
57	Allows staff to resolve problems themselves					
58	Abdicates responsibilities					
59	Allows staff do as they please					
60	Does not have time for discussion with staff					

APPENDIX II

PRINCIPALS' SUPERVISORY ROLE RATING SCALE (PSRRS)

Dear Sir/Ma,

This rating scale is for research purpose and your sincerity in filling it will be of great help to the results of the study. The researcher will therefore appreciate it if you can painstakingly fill it.

Instruction: Tick appropriately from the following;

Bio data:

School:……

Gender: Male ☐ Female ☐

Age: 20-30yrs ☐ 31-40yrs ☐ 41-50yrs ☐ 51-60yrs ☐

Years of experience: 10-15yrs ☐ 16-20yrs ☐ 21-25yrs ☐ 26-30yrs ☐

31-35yrs ☐

Qualifications: Grade II ☐ NCE ☐ First degree ☐ Masters ☐ PhD ☐

Please tick the correct column in front of each of the items as it applies to you.

Rate the statements below as they fit the suprvisory role of your principal by using the following rating scale:
0= Not at all, 1= Once in a while, 2= Sometimes, 3= Fairly often, 4= Frequently if not always.

SN	Items	0	1	2	3	4
	The principal:					
1	Sees to the construction of classrooms in the school					
2	Monitors the movement of teachers in and outside the school					
3	Delegates vice principals to observe classroom teaching					
4	Observes teachers in the classroom					
5	Monitors the arrival of students and teachers to the school					
6	Sees to the number of times teachers excuse themselves from work					
7	Monitors the preparedness of the teachers for classroom teaching					
8	Sees to the quality of teaching of teachers					
9	Sees to the quality of lesson notes prepared by the teachers					
10	Sees to how regular lesson notes are submitted by the teachers.					
11	Monitors the regular attendance of students in the classroom					
12	Monitors the sitting arrangement of the students in the classroom					
13	Sees to the availability of materials for teaching					
14	Sees to conducive examination environment					
15	Sees to the quality of toilets in the school					
16	Sees to the dressing of students and teachers					
17	Sees to the discipline of erring students and teachers					
18	Monitors the health condition of both the students and the teachers					

APPENDIX III

TEACHER JOB SATISFACTION RATING SCALE (TJSRS)

Dear Sir/Ma,

This rating scale is for research purpose and your sincerity in filling it will be of great help to the results of the study. The researcher will therefore appreciate it if you can painstakingly fill it.

Instruction: Tick appropriately from the following;

Bio data:

School:……

Gender: Male ☐ Female ☐

Age: 20-30yrs ☐ 31-40yrs ☐ 41-50yrs ☐ 51-60yrs ☐

Years of experience: 10-15yrs ☐ 16-20yrs ☐ 21-25yrs ☐ 26-30yrs ☐

31-35yrs ☐

Qualifications: Grade II ☐ NCE ☐ First degree ☐ Masters ☐ PhD ☐

Please tick the correct column in front of each of the items as it applies to you.

0= Not at all, 1= Once in a while, 2= Sometimes, 3= Fairly often, 4= Frequently if not always.

SN	ITEMS	RESPONSES				
		0	1	2	3	4
1	I feel I am well paid for the work I do					
2	The teaching job is well recognised					
3	The principal has leadership conpetence					
4	I am satisfied with the benefits I receive					
5	When I do a good job, I receive recognition for it.					
6	The rules and regulation in teaching job are easy to abide with					
7	I have pleasant work mates					
8	The teaching job is meaningful to me					
9	There is no communication gap in the school					
10	The Principal is fair to all					
11	Those who do well on the job stand a fair chance of being promoted					
12	The benefits we receive are as good as most other					

	organization offer					
13	I do not feel that the work I do is appreciated.					
14	My efforts to do a good job are welcome by my superiors					
15	I find I do not have to work myself to the bone because of competence of the people I work with					
16	I like doing the things I do at work					
17	The goals of the school are well stated.					
18	Teaching job gives me respect					
19	People get ahead as fast in teaching job as they do in other places					
20	My superiors show interest in the feelings of subordinates					
21	The benefit package we have is equitable to what we do					
22	There are rewards for those who work here					
23	Teaching job has future gain					
24	Teaching job helps one to mold life					
25	I often feel happy that I know what is going on in the school					
26	I feel a sense of pride in doing my work					
27	I feel satisfied with my chances for salary increase					
28	There are no benefits we should have that we do not have					
29	I like my superiors					
30	I have too much paper work					
31	I do feel my efforts are rewarded the way they should					
32	I am satisfied with my chances for promotion					
33	There is no too much backbiting and fighting at work					
34	My job is enjoyable					
35	Work assignments are fully explained					

APPENDIX IV

PERCEIEVED TEACHERS' CLASSROOM MANAGEMENT SCALE (PTCMS)

Dear Students,

This rating scale is for research purpose and your sincerity in filling it will be of great help to the results of the study. The researcher will therefore appreciate it if you can painstakingly fill it. Thanks.

Instruction: Tick appropriately from the following;

Bio data:

School:……

Gender: Male ☐ Female ☐

Age: 10-15yrs ☐ 16-20yrs ☐ 21yrs+ ☐

Judge how each statement below fits your Mathematics teacher's behaviour in the classroom by using the following rating scale:
0= Not at all, 1= Once in a while, 2= Sometimes, 3= Fairly often, 4= Frequently if not always.

SN	Items	0	1	2	3	4
1	The teacher sets rules and regulations for the class at the first appearance in the classroom.					
2	The students raise hands before answering questions in his/her class					
3	The students submit their assignment as and when due to him/her					
4	The sitting arrangement in the class allows for the teacher's free movement in the class					
5	The teacher distributes questions without discrimination					
6	The students pay attention in the class					
7	Students in the class do not talk except the teacher allows them.					
8	Side discussion is not allowed in the class					
9	Students settle down in the classroom before teacher enters the classroom					

10	Students do not leave the class when the teacher is teaching					
11	Once the teacher enters the class, he/she does not allow interverence from outside					
12	Students do not eat food or shew gum while teaching is going on					
13	A student is not allowed to monopolise the class					
14	All the students are made to participate in the class					
15	Disrespectful bahaviour is not allowed in the class					
16	Students who get answer to a question are commended					
17	The sitting arrangement allows the teacher to observe all the students in the classroom					
18	Students are able to see the teacher without undue turning or movement					
19	Once the teacher gives rules in the class, he makes sure he enforces it					
20	The teacher monitors students in the class to avoid misbehaviour					
21	The teacher makes eye contact and gives a nonverbal signal to stop offensive behaviour					
22	He/she calls a student's name or give a short verbal instruction to stop a behaviour					
23	He/she does not talk to the chalkboard					
24	A student is not allowed to answer a question if he raises hand but is not called					
25	He or she supervises when he/she gives class work					

APPENDIX V
MATHEMATICS ACHIEVEMENT TEST (MAT)

SECTION A

Dear Students,

This Mathematics Achievement Test is for research purpose and your sincerity in answering it will be of great help to the results of the study. The researcher will therefore appreciate it if you can answer them based on your personal ability. Thanks.

School**:**……

AGE…… Time allowed: 30 minutes

SEX: MALE ☐ FEMALE ☐

SECTION B

Instruction: Answer all the questions

- Express 0.031 in standard form

(a) 3.1×10^{-2} (b) 3.1×10^{2} (c) 3.1×10^{-3} (d) 3.1×10^{3}

2. Write out the integer from 3.2753

   (a) 0.2753 (b) 3 (c) 3.2 (d) 3.2753

3. The integer of 7.23×10^{3} is

   (a) 7 (b) 0.23 (c) 3 (d) 10

4. Find the number whose logarithm is 0.3645

   (a) 23.15 (b) 231.5 (c) 2.315 (d) 2315

5. Simplify 2.7 x 4

   (a) 8.6 (b) 6.8 (c) 6.3 (d) 10.8

6. Use mathematical tables to evaluate 42.87 x 23.82 x 1.27 to 3 sig fig

   (a) 1296 (b) 1300 (c) 1290 (d) 1295

7. Which of the following numbers represent 2.3×10^{-2}

   (a) 2300 (b) 230 (c) 0.023 (d) 0.0023

8. When a circle is divided into two, the bigger part is called

   (a) Minor segment (b) special segment (c) Major segment (d) True segment

9. An arc of length 22cm subtends an angle of Q at the centre of the circle. What is the value of Q if the radius of the circle is 5cm? (Take $\pi = {}^{22}/_{7}$)

(a) 70^0 (b) 840^0C (c) 96^0 (d) 156^0

10 Find the radius of a circle in which an arc of length 44cm subtends angle 200^0 at the centre of the circle (Take $\pi = {}^{22}/_{7}$)

(a) 9.3cm (b) 12.6cm (c) 25.2cm (d) 38.4cm

- The arc of a circle 50cm long, subtend an angle of 75^0 at the centre of the circle. Find, correct to 3 significant figures, the radius of the circle (Take $\pi = {}^{22}/_{7}$)
  (a) 8.74cm (b) 38.2cm (c) 61.2cm (d) 76.4cm

- Find the radius of a circle which subtends an angle of 1200 at the centre of the circle and is of length 2.8cm. (Take $\pi = {}^{22}/_{7}$)
  (a) r = 1.34 (b) r = 1.32 (c) 1.33 (d) 1.35

  - A sector of a circle of radius of subtends angle 13.75^0 at the centre of the circle find the area of the sector (Take $\pi = 3.142$)

  (a) $16cm^2$ (b) $14cm^2$ (c) $13cm^2$ (d) $12cm^2$

  - Find the length of an arc, given the following: radius 3.5cm, $\theta = 72^0$ $\pi = {}^{22}/_{7}$)

  (a) 3.2cm (b) 3.4cm (c) 4.4cm (d) 3.6cm

  - Using $\pi = 3.142$, find the area of a sector that subtends at the centre with radius 20cm.

  (a) $314.2cm^2$ (b) $31.42cm^2$ (c) $3.142cm^2$ (d) $3142cm^2$

16. Solve the equation (x-3) (x+5) = 0

(a) x = -3 or 5 (b) x = 3 or -5 (c) x = -3 or -5 (d) x = 3 or 5

17. What must be added to $x^2 + 12x$ to make it a perfect square?

(a) 36 (b) 6 (c) 12 (d) 18

18. What appropriate method can be used to make t the subject of the formula $at^2 + bt + c = 0$

(a) Quadratic (b) factorization (c) completing the square (d) substitution

19. Find the number which when added to its square, makes 90

(a) 9 or -9 (b) -9 or 10 (c) 9 or 10 (d) 9 or -10

20. Find the numbers whose product is 45 and its difference is 4

(a) 9 and 5 or -5 and -9 (b) 9 and -5 or -9 and 5 (c) 5 and 4 or -5 and -4 (d) 10 and 6 or -6 and 10

21. Find the quadratic equation whose roots are x = 2 or x = -7

(a) $x^2+2x-7 = 0$ (b) $x^2-2x-7 = 0$ (c) $x^2-5x-7 = 0$ (d) $x^2+5x-14 = 0$

22. Use quadratic equation formula to solve $x^2 + 4x + 3 = 0$

(a) -1 or -3 (b) 1 or 3 (c) -4 or 3 (d) 2 or 4

23. Round off 167.345 to one decimal place

(a) 167.4 (b) 167.3 (c) 167.35 (d) 167.34

24. Round off 304.9 to two significant figures

(a) 305 (b) 310 (c) 300 (d) 304

25. What is the range of value of the length of a line segment 8.5 to one decimal place?

(a)± 0.5 (b)) ± 5 (c))± 0.05 (d))± 0.005

26. What is the percentage error of the capacity of a bucket 7.5 litre to one decimal place?

(a) 0.667% (b) 0.666% (c) 6.67% (d) 6.66%

27. Round off 3449 to the nearest thousand

(a) 3450 (b) 3000 (c) 4000 (d) 350028

28. Round off 9.63 to the nearest whole number

(a) 9 (b) 9.6 (c) 9.63 (d) 10

29. Round off 7579 to three significant figures

(a) 758 (b) 757 (c) 7580 (d) 7570

30. Round off 3.349 to one decimal place

(a) 3.3 (b) 3.4 (c) 3.34 (d) 3.35

31. In what quadrant is 185^0 ?

(a) 1^{st} (b) 2^{nd} (c) 3^{rd} (d) 4^{th}

32. Use tables to find the value of sin 315.8^0

(a) 0.6972 (b) -0.6972 (c) 1.6972 (b) -1.6972

33. Use tables to find the value of tan305^0

(a) -0.4286 (b) 1.4286 (c) -1.4286 (d) 0.4286

34. Use tables to find the value of Cos214.8^0

(a) -1.8211 (b) 1.8211 (c) 0.8211 (d) -0.8211

35. Find the values of θ lying between 0^0 and 180^0 if sin θ = 0.9646

(a) 74.7^0, 105.3^0 (b) 74.3^0, 105.7^0 (c) 75.7^0, 104.3^0 (d) 174.7^0, 05.3^0

36. Use tables to find sine 48^0

(a) - 0.7431 (b) 0.7431 (c) 7.431 (d) -7.431

37. Use tables to find tan 108^0

(a) -3.708 (b) 3.078 (c) 3.708 (d) -37.08

38. Find a, if A =125.40, b =2.4cm, c =5cm

(a) 6.68cm (b) 8.63cm (c) 5.68cm (d) 5.63cm

39. Calculate C if a =5cm, b =9cm and c =10cm

(a) 39.9^0 (b) 48.3^0 (c) 45.8^0 (d) 29.9^0

40. Find the value of Cos 115^0

(a) 0.4226 (b) 4.226 (c) -0.4226 (d) -4.226

APPENDIX VI

Triming of paths of the hypothesised model

Path coefficients	Value	Decision
P31	-0.227*	Retain
P32	0.162*	Retain
P41	-0.080	Delete
P42	0.546*	Retain
P43	0.203*	Retain
P51	0.052	Delete
P52	0.068	Delete
P53	0.041	Delete
P54	0.177*	Retain
P61	0.066	Retain
P62	0.430*	Retain
P63	0.127	Delete
P64	-0.125	Delete
P71	0.309*	Retain
P72	0.285*	Retain
P73	-0.078	Delete
P74	0.045	Delete
P81	0.170*	Retain
P82	0.157*	Retain
P83	0.048	Delete
P84	0.150	Delete
P91	-0.423*	Retain
P92	-0.137	Delete

P93	0.017	Delete
P94	0.242	Retain
P95	-0.174	Delete
P96	-0.145	Delete
P97	0.422*	Retain
P98	0.073	Delete
Pa1	-0.155*	Retain
Pa2	0.257*	Retain
Pa3	-0.253*	Retain
Pa4	0.016	Delete
Pa5	0.176*	Retain
Pa6	0.244*	Retain
Pa7	0.338*	Retain
Pa8	0.245	Retain
Pa9	0.014	Delete
Pb1	0.297*	Retain
Pb2	-0.239*	Retain
Pb3	0.483*	Retain
Pb4	0.021	Delete
Pb5	0.228	Retain
Pb6	-0.029	Delete
Pb7	-0.185*	Retain
Pb8	0.223*	Retain
Pb9	-0.100	Delete
Pba	0.401*	Retain
Pc1	0.014	Delete

Pc2	0.128	Delete
Pc3	0.007	Delete
Pc4	0.048	Delete
Pc5	0.046	Delete
Pc6	0.291*	Retain
Pc7	-0.183	Retain
Pc8	0.523*	Retain
Pc9	0.048	Delete
Pca	0.199*	Retain
Pcb	0.177*	Retain

APPENDIX VII

Discrepancies between original and reproduced correlations

Original Correlation	Reproduced Correlation	Difference
-.309	.220	-.529*
-.104	-.120	.016
-.027	-.024	-.003
-.168	-.168	.000
.309	.306	.003
.226	.216	.010
-.312	-.284	-.028
-.123	-.123	.000
.079	.124	-.045
.054	.054	.000
.159	.153	.006
.574	.575	-.001
.178	.178	.000
.292	.284	.008
.272	.311	-.039
.201	.248	-.047
.046	-.001	.047
.062	.073	-.011
.073	.101	-.028
.108	.141	-.033
.256	.289	-.033
.153	.106	.047
.116	.143	-.027
-.062	-.086	.024
.121	.078	.043
.095	.119	-.024
.005	.008	-.003
.385	.423	-.038
.143	.143	.000
.223	.194	.029
.139	.147	-.008
.159	.156	.003
.059	.105	-.046
.223	.179	.044
.104	.115	-.011
.152	.047	.105*
.148	.148	.000
-.123	-.199	.076*
.130	.177	-.047
.474	.487	-.013
.281	.183	.098*
-.040	-.083	.043
.205	.240	-.035

.328	.288	.040
.207	.159	.048
-.214	-.250	.036
.148	.142	.006
-.002	-.005	.003
-.179	-.146	-.033
-.040	-.038	-.002
.357	.231	.126*
.489	.446	.043
.556	.571	-.015
.023	.065	-.042
.231	.184	.047
.004	.008	-.004
.247	.318	-.071*
.374	.391	-.017
.402	.435	-.033

APPENDIX VIII
Equations for the determination of direct and indirect effects

Outcome	Determinants	Causal effects	
		Direct	Indirect
Qualification	Gender	P_{31}	-
	Age	P_{32}	-
Years of experience	Gender	-	$P_{31}P_{43}$
	Age	P_{42}	
	Qualification	P_{43}	
Autocratic leadership style	Gender	-	$P_{31}P_{43}P_{54}$
	Age	-	$P_{32}P_{43}P_{54} + P_{42}P_{54}$
	Qualification	-	$P_{43}P_{54}$
	Years of experience	P_{54}	-
Democratic leadership style	Gender	-	-
	Age	P_{62}	-
	Qualification	-	-
	Years of experience	-	-
Laissez-faire leadership style	Gender	P_{71}	-
	Age	P_{72}	-
	Qualification	-	-
	Years of experience	-	-
Transformational leadership style	Gender	P_{81}	-
	Age	-	-
	Qualification	-	-
	Years of experience	-	-
Principals' supervisory role	Gender	P_{91}	$P_{31}P_{43}P_{94} + P_{71}P_{97}$
	Age	-	$P_{42}P_{94} + P_{72}P_{97}$
	Qualification	-	$P_{43}P_{94}$
	Years of experience	P_{94}	-
	Autocratic	-	-
	Democratic	-	-
	Laissez-faire	P_{97}	-
	Transformational	-	-
Teachers' job satisfaction	Gender	P_{a1}	$P_{31}P_{43}P_{54} + P_{71}P_{a7} + P_{81}P_{a8}$
	Age	P_{a2}	$P_{32}P_{43}P_{54}P_{a5} + P_{42}P_{54}P_{a5} + P_{62}P_{a6} + P_{72}P_{a7}$
	Qualification	P_{a3}	$P_{43}P_{54}P_{a5}$
	Years of experience	-	$P_{54}P_{a5}$
	Autocratic	Pa5	-
	Democratic	Pa6	-
	Laissez-faire	Pa7	-
	Transformational	Pa8	-
	Supervisory role		

		-	-
Teachers' classroom management	Gender	P_{b1}	$P_{31}P_{43}P_{54}P_{b5} + P_{31}P_{b3} + P_{71}P_{a7}P_{ba} + P_{71}P_{b7} + P_{81}P_{b8}$
	Age	P_{b2}	$P_{32}P_{43}P_{54}P_{b5} + P_{62}P_{a6}P_{ba} + P_{72}P_{a7}P_{ba} + P_{72}P_{b7} + P_{42}P_{54}P_{b5}$
	Qualification	P_{b3}	$P_{43}P_{54}P_{b5}$
	Years of experience	-	
	Autocratic	P_{b5}	$P_{54}P_{b5}$
	Democratic	-	$P_{a5}P_{ba}$
	Laissez-faire	P_{b7}	$P_{a6}P_{ba}$
	Transformational	P_{a8}	$P_{a7}P_{ba}$
	Supervisory role		$P_{a8}P_{ba}$
	Job satisfaction	-	
		P_{ba}	-
Mathematics Achievement	Gender	-	$P_{31}P_{43}P_{54}P_{b5}P_{cb} + P_{31}P_{b3}P_{cb} + P_{71}P_{a7}P_{ba}P_{cb} + P_{71}P_{b7}P_{c7} + P_{71}P_{c7} + P_{81}P_{a8}P_{ba}P_{cb} + P_{81}P_{a8}P_{ca} + P_{81}P_{b8}P_{cb} + P_{b1}P_{cb}$
	Age	-	$P_{32}P_{43}P_{54}P_{a5}P_{ca} + P_{32}P_{43}P_{54}P_{a5}P_{ba}P_{cb} + P_{32}P_{43}P_{54}P_{b5}P_{cb} + P_{32}P_{b3}P_{cb} + P_{42}P_{54}P_{b5}P_{cb} + P_{42}P_{54}P_{a5}P_{ca} + P_{42}P_{54}P_{a5}P_{ba}P_{cb} + P_{62}P_{a6}P_{ba}P_{cb} + P_{62}P_{c6} + P_{72}P_{c7} + P_{72}P_{a7}P_{ca} + P_{72}P_{b7}P_{cb} + P_{72}P_{a7}P_{ba}P_{cb} + P_{b2}P_{cb}$
	Qualification	-	$P_{43}P_{54}P_{a5}P_{ca} + P_{43}P_{54}P_{a5}P_{ba}P_{cb} + P_{43}P_{54}P_{b5}P_{cb} + P_{b3}P_{cb}$
		-	
	Experience	-	$P_{54}P_{b5}P_{cb} + P_{54}P_{a5}P_{ba}P_{cb} + P_{54}P_{a5}P_{ca}$
	Autocratic	-	$P_{b5}P_{cb} + P_{a5}P_{ba}P_{cb} + P_{a5}P_{ca}$
	Democratic	P_{c6}	$P_{a6}P_{ba}P_{cb} + P_{a6}P_{ca}$
	Laissez-faire	P_{c7}	$P_{a7}P_{ba}P_{cb} + P_{a7}P_{ca} + P_{b7}P_{cb}$
	Transformational	P_{c8}	$P_{a8}P_{ba}P_{cb} + P_{a8}P_{ca}$
	Supervisory role	-	-
	Job satisfaction	P_{ca}	$P_{ba}P_{cb}$
	Classroom management	P_{cb}	
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