TRANSFORMATIONAL LEADERSHIP STYLE, TEACHER SELF-EFFICACY, SCHOOL ENVIRONMENT AND ICT INTEGRATION IN TEACHING AND LEARNING IN PUBLIC PRIMARY SCHOOLS IN NAIROBI COUNTY, KENYA

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A Research Thesis Submitted in Partial Fulfilment of the Requirement for The Award of The Degree of Doctor of Philosophy in Distance Education of The University of Nairobi

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DECLARATION

This research proposal is my original work and has not been presented for award of a degree in any other University.
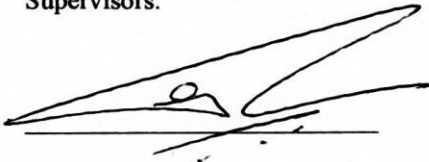
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DEDICATION

This work is dedicated to my family; my husband, Chris Gacicio, who has been my greatest support in all my endeavours and to my children Cynthia Ciru, Cyndie Kui and Christine Waithira who have made life a wonderful journey. I also dedicate this work to my mother, Margaret Macharia, for her dedicated support and prayers, and to my late dad, Mesheck Macharia, who rested just before witnessing this great achievement. My deepest love to them all.

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ABSTRACT

Despite trainings organized by the Kenyan government and other education partners to improve teachers' ability to use technology, acceptance has been poor. According to previous studies, integrating information, communication, and technology (ICT) into the syllabus in Kenyan schools is still a challenge. Headteachers' attitudes of ICT are one of the issues that arise during the process of incorporating ICT into the syllabus. In this context, the current study aims to find out how transformational leadership impacts Integration of ICT in learning and teaching in Nairobi County public primary schools, as well as the mediator and moderator effects of educators' self-efficacy on ICT and the school climate. More specifically, the study sought to determine the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools; determine the moderating influence of teachers self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools; and to examine the mediating influence of school environment on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools. Grounded on the pragmatic point of view, the research used a combination of mixed techniques, correlational, and cross-sectional survey approaches. The target population for this study comprised of 6150 teachers drawn from public primary schools in Nairobi County. The study was conducted in a sample of the public primary schools in the eleven sub-counties of Nairobi County. The study used simple random selection from the target population. Teachers completed a standardized questionnaire, while school heads were interviewed in detail. Teachers' ICT integration resources were also assessed using an observation schedule. The researchers used both inferential and descriptive statistics. Data analysis was done qualitatively and quantitatively where quantitative data was presented through tables and figures and qualitative data was transcribed and written in various themes responding to the objectives of the study so as to support the qualitative data. Inferential analysis was done to establish the hypothesized relationships. Hypothesis was tested through the tests of Singularity, Normality, Multicollinearity, Heteroscedasticity and Autocorrection. Ethical issues will be addressed through consent and confidentiality. Findings indicate that ICT integration is significantly influenced by transformational leadership styles (β = .207, t = 3.623, p=.000<.05). It was also found that school setting has a notable impact on ICT integration (β = .282, t = 4.993, p=.000<.05). teacher self-efficacy was further found to have a significant influence on the ICT integration in teaching and learning (β = .534, t = 10.616, P=.000<.05). The study further established that the association between transformative leadership and ICT integration is significantly moderated by teacher ICT self-efficacy (F (2, 282) = 58.721, p-value < 0.001). School environment was also found to have a significant mediating effect on the relationship between transformation leadership style and ICT integration (β_2 = 0.232, t = 3.726, p-value < 0.001). The study draws the conclusion that ICT integration is significantly influenced by transformational leadership style in public primary schools in Kenya. In Kenyan public primary schools, both school environment and teacher efficacy in technology are also significant indirect predictors of ICT integration, with both exhibiting a moderating and mediating effect respectively, on the relationship between transformational leadership style and ICT integration. Accordingly, the study suggests that head teachers embrace a transformational style of leadership and provide support, inspiration, and motivation to their teachers in order to help them train and improve their teaching practice, particularly in their use of ICT in the classroom.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Every country in the world is striving to improve its economic situation. Kenya is working towards realising its Vision 2030 objectives on fast-tracking the country's transformation into a speedily middle-income industrializing nation by 2030. In this vision, Education plays a critical role in realization of this goal. This Education needs to be enhanced by using new technologies to deliver much needed services, everywhere, all the time to a large and growing target audience among them school children, families and nation at large. The fuel of education is information sent from those who have it and delivered to those who need it. Information technology cannot therefore be seen purely from a technical point of view, but as an element of the learning process in and between all the learning areas. The Government of Kenya identifies with these facts and in its Sessional Paper number 14 of 2012 states in part that "The Government recognizes that an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy by 2030. Against this background, the Government shall make education the natural platform for equipping the nation with ICT skills in order to create dynamic and sustainable economic growth."

The demand for a well-educated workforce has driven many countries to reengineer their education systems. An education system has to be suited to the demands of the technological age so that a competitive edge can be maintained. Such demand for a technology savvy workforce is reflected in Alvin Toffler's declaration (Rosenberg, 2011: 3), that "the illiterate of the 21st century will not be those, who cannot read and write but those who cannot learn, unlearn, and relearn."

The efficient use of ICT's extensive range of facilities brings up unprecedented prospects for energizing learning and instruction in our schools, as well as enhancing students' coursework achievement across the curriculum. Moreover, because the use of ICT grows increasingly successful and pervasive, the nature of the syllabus itself is likely to be questioned. Kenya is currently undergoing a curriculum overhaul that focuses on cultivating each child's ability. Digital literacy, which is embedded in every learning area, lies at the heart of the competencies it covers (Ministry of Education (MoE), 2016). Furthermore, the government's commitment to provide electronic technology to all grade one kids in Kenyan primary schools is another example of how quickly ICT is transforming the process of learning and teaching. Teachers are at the centre of this teaching and learning process.

Their skills in using ICT provide the potential for access to lifelong learning opportunities that can empower them to develop their own unique intellectual capacity and operate as effective members of a digital society and transfer the same to the learners. By embracing digital environment in education teachers enhance efficiency and also provide better learning results as well as make education adaptive to the individual learner. It is fun to learn with computers and skills such as collaboration, critical evaluation, receiving feedback, planning and organisation are easily and effectively learned.

The digital age has not simply changed the nature of resources and information; it has transformed several basic social and economic enterprises. Contemporary society—the settings where we live, work, and learn—has likewise changed dramatically. Both the amount of information and access to it has grown exponentially; a significant potential for using varied resources in numerous ways for instruction and learning has emerged (Hill, J.R 2011).

It is important to note that the use of technology in teaching and learning is not and will never be, Transformational on its own. According to Brannigan (2010), leadership is one of several

critical components in the successful ICT integrations in Education. Many studies have shown that school leadership plays an increasingly important role in leading change, providing vision and objectives, as well as professional development initiatives in using ICT to bring about pedagogical changes Schiller (2015). Otto and Albion (2016) state that the quality of school leadership can be assessed by the ability of the head teacher to create a school environment that fosters staff and pupil productivity and creativity. They add that transformational leaders are value driven and committed to the creation of effective learning environments. As such, school environment is also a critical medium for ICT integration in teaching and learning (Riffel & Levin, 2017). Like school leadership, the integration of ICT in learning and teaching relies on teachers' ability to integrate technology into the curriculum and use it to improve learner learning. Teachers are therefore the enablers and the key to whether technology is used appropriately and effectively or not. It is imperative therefore that the teachers keep themselves abreast with technology as a means to delivering education. Teachers' efficacy in use of technology is therefore critical in the 21st Century, which advocates for ICTs' use in learning and teaching.

Against this backdrop, this study provides insights into transformational leadership style as a key factor that influences the integration of ICT in the process of learning and teaching in Nairobi County's public primary schools. It explored the relationship between teachers' self-efficacy in technology and school environment as moderating and mediating variables respectively in the linkage between transformational style of leadership and integration of ICT in the process of learning and teaching.

1.1.1 ICT Integration in Teaching and Learning

In the recent times, ICT integration has become a very integral part of almost every aspect of life. It has become a must have in education and training world over. Information communication and technology integration has been defined as the use of ICT to introduce, reinforce, supplement and extend skills (Otto & Albion, 2016). ICT integration in teaching and learning by the teachers therefore refers to them accepting and using technology in education. The indicators in this include knowledge of instructional technology, level of teacher-to-teacher collaboration as well as teacher to learner collaboration, access to instructional materials, e-pedagogies and teachers' innovations (Riffel & Levin, 2017). Measurement will be through the tools, instructional materials, and resources available to the teachers, communities of practice available to them, different pedagogies of ICT and types of innovation teachers are exposed to.

Self-efficacy in ICT has become more important in the training and implementation of educators who can effectively use instructional technology to improve learner outcomes. By enhancing teachers' tech self-efficacy, they may be able to increase both their technology acceptance and their use of technology indirectly. As a result, more instructors will participate in virtual classrooms because they will be increasingly comfortable with ICTs (Holden & Rada, 2011). Farah (2011) found that opportunities for professional development are crucial for instructors who want to use technology in their classrooms. This implies increasing awareness of and access to instructional technology tools and resources, as well as more focused and specialised teacher training on the subject. Increased teacher involvement with an emphasis on instructional technology, as well as possibilities for classroom observation and demos, would help to promote technology adoption (Schiller, 2017).

Teachers, in my opinion, like to work in groups. They benefit a lot from discussing their achievements as well as the problems they confront while carrying out their responsibilities.

Teachers would be able to exchange, debate, and examine strategies to integrate instructional technology into their instructional practice as a result of enhanced teacher cooperation with an emphasis on instructional technology. This aligns with Duncan's (2010) perspective, in which he emphasized the need to engage teachers and harness ict in order to increase teacher capability. He also emphasized the advantages of online peer learning, which would allow teachers to engage with their peers as well as connect with experts from all around the world. The Kenya Institute of Curriculum Development's (KICD) Elimika course is one such venue where instructors can engage.

Teachers may relate better to other educators as well as provide important assistance to their counterparts to help encourage effective use of instructional technology because they are in the trenches teaching students. These approaches are in line with one of Georgia's technological goals, which emphasizes the need to improve teachers' knowledge of technology productively in order to improve learner outcomes (Georgia Department of Education, 2013).

In spite of the progress made in deployment of technology in teaching and learning in Kenya, the uptake by the teachers in the ICT integrations has been low. The integration of ICT in learning and teaching is affected by the teacher efficacy. The enrolment of teachers to the Elimika course has also been low even with the infrastructure available to them and incentives availed to them on completion of the course. This has been hampered by how teachers perceive themselves in regards to use of technology.

1.1.2 School Leadership

By managing teacher morale and capabilities, and the school setting, school leadership is essential in improving school outcomes. The school principal must practice inclusive leadership, which entails collaborating with others (Bush, 2015). The head teacher has a responsibility to create chances for this team to participate to the school's climate, culture, and vision and teachers play a part in determining the head teacher's style of leadership. The head teacher, as a leader, has the ability to impact the employee satisfaction of the teachers who work for him or her. The way a leader utilizes position, makes decisions, and interacts with people is defined by their styles of leadership or attributes.

Style of leadership is an inherent, comparatively continuing aspect of our personality which motivates us and controls our orientation generally when practicing leadership, a thought advanced further by Kunwar (2011). Evans (2014) observes that head teachers with collaborative and consultative leadership styles achieved more success in realizing the teaching staff's greater morale. Directive leadership style is appropriate in the circumstances where compared to followers, the leader is more competent. However, in instances where the followers are more knowledgeable and competent, then the preferable leadership style is participative.

It is expected that the headteacher is the principal agent implementing, embodying and articulating the schools' ethics and mission. The choice of style of leadership is driven by the certainty that the styles of leadership influence the performance and satisfaction of subordinates (Mutula, 2016). School heads comprise dynamic leaders who inspire their immediate subordinates, that is classroom teachers who are in the school administration system.

In this regard, all School leaders have an important place in influencing the teachers' use of the technologies that improve teaching and learning. Appropriate use of ICT can catalyze the shift from teacher-centred pedagogy to a more effective learner-centred pedagogy (Gakuu and Kidombo, 2016; Omwenga, 2014). This study seeks to find out the influence of the School Leadership on teaching and learning in Primary schools with a general objective of identifying their current role in schools as well as their influence on the teacher's self-efficacy in use of technology in the classroom. The attitudes of the school leaders in supporting the process of integration is also influential to teachers' use of ICT (Schiller, 2013). Mumtaz (2010) identifies some inhibiting factors in ICT integration into the curriculum; among them being availability of ICT infrastructure, lack of financial support and insufficient knowledge possessed by leaders. It can thus be deduced that both the teachers and leaders have key roles in successful teaching and learning.

Kenya has invested numerous resources in ICT infrastructure in both secondary and primary schools. The government in a bid to intensify use of technology in education embarked on the digital literacy program (DLP) where it set out to provide electronic devices in all public primary schools in Kenya on a one-to-one basis for all grade one learners in 2017. Digitization of educational materials through the Kenya Institute of Curriculum Development (KICD) and The National and Innovation Centre (NI3C) has also been realised. The e-content being developed for schools at primary and secondary levels is expected to increase access and improve the quality of education in the country (Ndiritu, Kidombo & Gakuu, 2012). While this is a laudable initiative, the required penetration in schools both in breadth and depth is yet to be realized.

Acquisition of a limited number of computers initially in the country by schools for management purposes appears, to have created the conditions necessary to introduce, albeit gradually, ICT integration in teaching and learning (Keiyoro, 2011; Gikonyo 2012). It could be argued, therefore, that once management adopts ICT in its practices, it diffuses and spreads to other institutional members and they become interested in its use.

1.1.3 Transformational Leadership Style and ICT Integration in Teaching and Learning

Full spectrum leadership contains one non transactional laissez-faire leadership characteristic, three transactional leadership characteristics, and five transformative leadership traits, in its present form. Transformational leadership is a leadership style in which the leader motivates employees to go above and beyond their job responsibilities. A leader who is transforming, according to Burns (1978), elevates followers' awareness of the value and importance of specific outcomes and methods for obtaining them; encourages followers to grow as individuals for the team's sake; On Maslow's (1954) needs hierarchy, it promotes the adherents' level of need from concerns at lower level regarding security and safety to wants at levels which are higher for self-actualization and accomplishment (Bass, 2008). On the other hand, a change agent is competent of exceeding expectations (Bass, 1985) by elevating followers' awareness regarding the significance of accomplishing desired outcome and the means of attaining them; inspiring adherents to shelf their personal wishes in the interest of greater cause, organization, or team; and continuing to develop collaborators' needs to elevated amounts in areas like affiliation, autonomy, and achievement, that may be boons to larger cause, organization, or the team.

Transformational leadership comprises 4 major elements (Bass, 1985): *Idealized influence,* which refers to the level of respect trust and admiration that leaders get from their followers. This includes idealized attributes (qualities that the followers identify in the leader as exceptional and that induce respect and pride) and idealized behaviors (specific behaviors that are highly regarded and valued by the followers). This is in major part what other authors called charisma; *inspirational motivation* – refers to the capacity of the leader to inspire those around him and to look at the future in an optimistic way. This raises both enthusiasm about what people are working on and confidence regarding the future achievements; *intellectual stimulation* – refers to the capability of the leaders to arouse followers to think outside the box, to challenge their assumptions and to come up with new ideas or solutions for the problems they face. In other words, transformational leaders encourage creative thinking and nurture a open minded environment; and *individual consideration* – is seen when leaders understand the differences (in needs) between followers and adapt their behavior accordingly. Transformational leaders are excellent coaches or mentors and constantly try to encourage personal development of their followers.

Transformational leadership has the favorable impact on the school environment of all the styles of leadership studied. This owes to the goal of the school leader being to equip teachers as collaborators, because both the school principal and the instructors share a common vision. Transformational leadership (Kouzes, 2009) in the school environment refers to the qualities of leadership those school principals who can guide the school to a different level at the pivot of school reform. Employees rely on one another and collaborate as a team. While technical infrastructure is crucial, effective ICT adoption requires ICT administration even more. One of the most significant components of a head teacher's responsibility is to create a good and supportive environment. Furthermore, they feel that one of the criteria used to gauge school achievement is the atmosphere between and among teachers (National Association of

Secondary School Head Teachers, 2001). As a result, it is proposed that head teachers adopt a transformative leadership approach. This leadership style is seen to be beneficial in fostering a goal-focused school environment.

1.1.4 Teachers Self Efficacy in Technology

The efficacy of teachers is best addressed in regard to their competencies and confidence in the process of delivering the curriculum. Competencies in this regard entails teachers' ability in effectively delivering the curriculum as well as their competencies in the same. Confidence on the other hand is viewed in terms of past experience, planning and organisation as well as the school culture. Teachers' self-efficacy is pegged on Bandura's (1994) theory of self-efficacy. Bandura (1994) explained that self-efficacy refers to one's beliefs in one's capabilities to organize and execute the courses of action required to produce a given outcome. Further, perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives.

Teachers must accept the use of ICT to increase their efficacy as a result of the introduction of technology in teaching and learning. Teachers may find it difficult to incorporate technology into their job due to the mobility of technology. Several explanations for this underuse of technology have been discovered in previous research, including a lack of money, an inadequate training, philosophical opinions about tech, and an insufficient time to explore with technological devices (Wang *et al.,* 2014; Compeau & Higgins, 1995; Littrell *et al.,* 2015; Kellenberger & Hendricks, 2013; Teo, 2009). Many scholars also attribute underutilization of technology to instructors' lack of confidence in their ability to integrate such materials into their lessons.

Several elements have been found in extant research that may influence instructors' decisions to incorporate ICT into the classwork. One of these factors is self-efficacy (Wang, Ertmer, & Newby, 2014; Compeau & Higgins, 1995; Teo, 2009; Littrell et al., 2015; Kellenberger & Hendricks, 2013). As a result, instructors' digital tech effectiveness becomes extremely important in ICT usage in the process of learning and teaching. Teachers' self-efficacy in regard to technology is influenced by several factors that include personal, behavioral, and environmental factors. Many teachers are aware of the technology that is available to them in the process of teaching and learning, yet for various reasons, teachers are not capitalizing on the opportunity to integrate such resources into their classrooms.

Insufficient time to explore technological instruments, lack of training, insufficient resources, and philosophical principles regarding technology, have been quoted as among the reasons teachers have not taken up the utilization of ICT in the process of learning and teaching (Wang, Ertmer, & Newby, 2014; Compeau & Higgins, 1995; Littrell, et al., 2015; Kellenberger & Hendricks, 2013; Teo, 2009). Research also shows that teachers are technophobic in taking up technology. Kellenberger, & Hendricks, (2013) attribute this to teachers' lack of confidence in their ability to integrate such materials into their courses. The Kenyan situation is not different inspite the fact that infrastructure has been made available in schools for ICT integration in Teaching and learning.

1.1.5 School Environment and ICT Integration

Next to home, the most imperative experience in a child's process of development is school. When the child joins the school environment, they are offered new opportunities with regard to cognitive development and socialization. These occasions are offered in diverse measures at school and could have a direct effect on learners' affective and cognitive development (Kellenberger, & Hendricks, 2013). The school presents the liveliest institutional

environment that ought to keep pace with a society's changing needs. It ought to also develop in every individual the powers, knowledge, skills, interest, attitudes, ideals and habits, whereby they will find their rightful position in the societal order and use that place to shape them and the society towards both the nobler and higher ends (Wehlage *et al.,* 2016). The accomplishment of such goals presuppose a school environment that is proper.

The school is a social-psychological system that is, teachers and school head teachers practicing teaching and administration in a school establish psychologically and socially interacting components and through these interactions, school obtains a land of a diverse atmosphere or diverse personality. The administration of the school ought to work towards improving the school environment, for a better school output from may be anticipated. School is that education agency from which various society members expect in dissimilar ways (Sweeney, 2016). Any country's government is always concerned in determining how effective its investment is used in school education. Administrators in the education sector look from a resource view point. They are interested in ensuring that the resources that are available are utilized effectively. A parent anticipates that their child is given good education. Learners are concerned about whether the schools are in places where learning is enjoyable.

School environment was defined by Lindelow (2015) as the emotional attachment an individual obtained from a school system's experiences. More explicitly, environment was the combination of belief, expectations and norms describing the social system of the school from its members' perception. Neil (1987) defined school environment as a combination of eight variables: Clear school mission, safe and well-ordered learning environment, expectation for success, classroom interaction, high morale, effective instructional leadership, monitoring of learner progress and positive home school relationship.

Four aspects have been pointed out as having a significant role to play in influencing ICT skills' use in teaching and learning opportunities in school climates (Seyal, 2016). These include ICT resource availability, ICT skill training, general teaching methodologies and school leadership. Ndiritu et al. (2009) stresses that ICT integration's success in learning and teaching varies from class to class, place to place and curriculum to curriculum and contingent on how it is applied.

1.1.6 Use of Digital Technology among Teachers in Kenya

Kenya has realized the importance of embracing technology in learning and has made tremendous steps towards integrating it in education. The government of Kenya is devoted to the utilization of ICT which includes digital information technologies, and other resources to enhance access to learning for all Kenyans as indicated in its strategic plan (MoE, 2016). The government has developed a national policy that led to the development of National ICT strategy for education and training (2016). This strategy outlines the implementation of use of ICT in teaching and learning process. It further reinforces the government desire to use ICT to facilitate education.

Consequently, there has been continuous deployment of ICT infrastructure to schools and learning institutions. Some of the initiatives along this line include the NEPAD e-schools (2015); the e-schools initiative; the multi-media lab project (TELEVIC); the ESP-ICT Computer for schools project (2010 -2012); the Accelerating 21st Century Education (ACE) project (2010-2012); Tafakari Project in TTCs; the Badiliko Project (British Council) and the Holistic Model project (2011-2012). The most recent of these initiatives is the Digital Literacy Program (DLP) where learning devices have been deployed in all the primary schools in Kenya for the standard one pupils. This deployment is coordinated by ICT authority and is one of the flagship projects of the Government of Kenya.

In Kenya, a variety of ICT projects and initiatives focusing on e-resources are underway, with the goal of increasing ICT adoption in public primary schools across the country, not just in Nairobi County. The DLP, which was launched by the Kenyan government in 2013, is one of the most important of them. The program aims to integrate the use of digital media in students' learning in all public elementary schools. As of October 2018, 75,000 teachers from public primary schools had been educated under the initiative in preparation for the program's deployment (GoK, 2013). Nairobi City County was chosen as the study's location as it is a multicultural area with students and teachers from a variety of cultural and social backgrounds.

1.2 Statement of the Problem

ICT is seen as a game changer in many organisation and Institutions. Covid-19 specifically overemphasized this reality. The use of ICT in teaching and learning has been associated with a plethora of beneficial outcomes, which includes improvements in both learner achievement and teacher productivity (Youssef & Dahmani, 2020). ICT use in teaching and learning has been particularly linked with enhanced learning by making learning less reliant on differing teacher quality and by making leaning available beyond the school (Rivkin *et al.,* 2021). It has also been argued that ICT use can help learners exploit enormous possibilities for acquiring information for schooling purposes as well as increase learning through communication (Hanushek, 2019). ICT can further help enhance teachers' instructive practice and therefore help learners in their process of learning. Teachers' confidence and competence in utilizing ICT skills is therefore a crucial aspect in making learning fruitful (Downes *et al.,* 2021).

Conversely, a number of studies have identified the school head teacher as a critical and pivotal person for establishing and maintaining school environments compatible with learner-

centered approaches to teaching and learning with ICT (Afshari *et al.,* 2017). Transformational leadership skills are particularly sufficient to bring about constant improvement needed in schools (Alteneiji, 2019). The head teacher as a transformational leader, specifically, can impact multiple areas of the school setting such as ICT integration (Flanagan & Jacobsen, 2019). It appears from the foregoing that school leadership, teacher efficacy in ICT, and school environment all interact to influence ICT integration in teaching and learning.

However, despite the achievements in the integration of ICT thus far in Kenyan schools, coupled with efforts made in ensuring that ICT is utilized among schools in Kenya, there have been reports of low uptake of ICTs in teaching and learning among teachers. For instance, Mwadulo and Odoyo (2020) point out that very few schools in Kenya have sufficient ICT tools for teachers and students, with public primary schools with computers, the student-computer ratio being 250:1. A handful of teachers are successful in successfully integrating ICT into topic instruction in a way that promotes conceptual knowledge and stimulates greater reasoning abilities (Mutinda, 2020). Furthermore, a lot of instructors' express dissatisfaction with ICT integration in topic teaching, claiming that their position has been planned and established by school administrators, and that they lack functional independence (Khochen & Radford, 2020). Even though the government is providing a national plan, ICT policy, and funding plan for ICT use in schools, important school leaders must extract and apply the relevant information, which includes the deployment of digital devices in all Kenyan primary schools under the banner of the DLP (Muia, 2021). In spite of the road maps by the Kenyan government to integrate ICT-based instruction and curriculum in schools, many Kenyan schools are not properly incorporating ICT in syllabus and administration as planned.

According to earlier studies (Njathi *et al.,* 2018; Mureithi & Mwangi, 2019; Mutinda, 2020; Muia, 2021), integrating ICT into the syllabus in the classroom is still a challenge. School leaders' opinions of ICT as well as teacher competence are two issues that arise during the process of ICT Implementation into the syllabus. Furthermore, existing research on ICT implementation in education has a limited perspective, focusing on among others, influence of principals' perception of computers on their use in administration of public secondary schools (Njathi *et al.,* 2018); influence of ICT on academic performance of public preschool learners (Mureithi & Mwangi, 2019); teacher competency in the use of information communication and technology and student academic achievement (Mutinda, 2020); and the integration of ICT in teaching and learning in public primary schools (Muia, 2021).

The current study aims to look into how integrating ICT in the process of learning and teaching is predicted by transformational style of leadership among Nairobi County's public primary schools, and how both school environment and teacher ICT self-efficacy moderate and mediate the association.

1.3 Purpose of the Study

The study's purpose is to investigate how transformational leadership style predicts ICT integration in teaching and learning in public primary schools in Nairobi County and the mediating and moderating roles of teachers' self-efficacy on technology and school environment respectively.

1.4 Objectives of the Study

The study will be guided by the following specific objectives;

    i.   To establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools

   ii.   To assess the extent to which school environment influences integration ICT in teaching and learning in public primary schools

  iii.   To establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools

  iv.   To examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools

   v.   To examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools

1.5 Hypothesis of the Study

The following null hypotheses were tested:

$H_{01:}$ Transformational leadership style does not have a significant influence on the ICT integration in teaching and learning.

$H_{02:}$ School environment does not have a significant influence on integration ICT in teaching and learning in public primary schools.

$H_{03:}$ Teachers self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning.

H$_{04}$: Teachers self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning.

H$_{05}$: School environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning.

1.6 Research Questions of the Study

i. To what extent does transformational leadership style influence ICT integration in teaching and learning in public primary schools?

ii. To what extent does the school environment influence integration ICT in teaching and learning in public primary schools?

iii. To what extent does teacher efficacy in ICT influences integration ICT in teaching and learning in public primary schools?

iv. What is the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools?

v. What is the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools?

1.7 Significance of the Study

This study explores the concept of transformational leadership and shows how schools, Ministry of Education and education stakeholders may utilize this concept to expand ICT's utilization in learning and teaching in Kenyan schools. Findings from the study brings out factors that hinder the ICT integration in teaching and learning especially those hedged on teachers' self-efficacy and school environment in regard to technology. The results may benefit the afore-mentioned in that it suggests modalities to put in place to increase the uptake of teachers' use of technology in teaching and learning.

Ways of improving head teachers' leadership and teachers' efficacy in regard to integration of technology in teaching and learning are also presented in the study. Headteachers of primary schools will thus find the findings resourceful since they often encounter the need to transform the school from low performance to acceptable performance or from acceptable performance to high performance. The headteacher will particularly appraise and re-examine their own style of leadership and therefore where necessary make adjustment. The head teachers will further be equipped with knowledge on how to enhance self-efficacy of teachers in the use of ICT for teaching.

The County Director of Education and TSC may utilize the information to determine approaches of enhancing the efficacy of teacher in the utilization of ICT for teaching among primary school teachers as well as help improve learning outcomes. The study findings further add to the Kenyan body of knowledge in the present subject matters. As such, scholars researching on related topics will also find resourceful as a reference material.

1.8 Delimitation of the Study

The research will confine itself to the influence of transformational leadership style and not the entire school leadership of the teachers. There are various online courses that can be studied but this study delimits to Elimika online course. The study will also delimit itself to the headteachers and teachers of Primary schools in Nairobi County. Headteachers will be sampled owing to their positions as the schools' chief executives and that the subject matter in the study is their leadership style. The study will include teachers to establish their perceptions of the styles of leadership of their headteachers instead of self-reporting by the headteachers. The study will further restrict itself to only the transformational leadership style.

1.9 Limitations of the Study

The study sought to investigate how transformational leadership style predicts ICT integration in teaching and learning in public primary schools in Nairobi County and the mediating and moderating roles of teachers' self-efficacy on technology and school environment respectively. Whereas the study objectives were adequately met, a number of limitations were confronted. Key among these was in the participants, as the study assumed that head teachers' data was representative of the entire school's perspective. It is not known whether Boards of management would provide similar information.

The study further focused on public primary schools in Nairobi City County, Kenya. The results may therefore not be generalizable to other institutions and counties such as secondary schools, tertiary institutions and universities due to their differences in characteristics. Despite the above limitations, the study's quality was not compromised. The researcher confirms that the limitations faced did not affect the results the research output, design and subsequent research thesis development.

1.10 Assumptions of the Study

The study assumes that every public primary school's head teacher applies a specific style of leadership. Tools that will be used to assess teacher self-efficacy, ICT integration in teaching and learning and leadership styles will be reliable and valid to yield the reliable information. The study also assumes that the participants will give responses that are accurate and honest.

1.11 Definition of Terms Used in the Study

Digital Technologies: The use of digital resources to effectively find, analyse, create, communicate, and use information in a digital context. This encompasses the use of web 2.0 tools, digital media tools, programming tools and software applications.

Elimika online course: This is an internet-based training portal for teachers and education stakeholders. It is managed by KICD to offer online courses including the Competence-based Curriculum. In this study, the Elimika online course is used as a case study on how teachers utilize the same to build their competencies in ICT.

Information Communication and Technology (ICT): They are various sets of technological resources and tools utilized to manage, communicate, store, create, and to disseminate information. They include computers, printers, photocopiers, projectors, smart phones, smart boards among others.

School Environment: In the present study, school climate means an amalgamation of various variables: safe and well-organized environment for learning with good infrastructure, anticipation for success through accessibility of instructional materials, good class interaction between the teachers and the learners, effective instructional leadership with good support from the head teacher and positive home school relationship with interaction between parents and teachers in monitoring the learners' progress

Teaching and learning: A complex synthesis of teacher behaviours that impact learner learning and, ultimately, learner achievement. Indicators to this effect include lesson completion and learner learning outcomes.

1.12 Organization of the Study

The study is organised in the following manner; Chapter one includes Introduction, background to the problem which explains all the variables, the research problem, the objectives, purpose of the study, research questions, the study's significance, hypothesis, assumptions, delimitations of the study, definition of terms and the study's limitations. Chapter two contains reviewed literature on every variable, it also highlights the theories that inform this study, conceptual model, gaps in the literature as well a summary of the literature review. Chapter three that focuses on the target population, research design, sampling design, piloting of instruments, data collection, reliability and validity, and techniques of data analysis. Chapter four is on analysis of data that responds to the research questions. Finally, Chapter five will give a summary of the findings, discuss these findings in light of the literature reviewed and finally make recommendations.

<center>**CHAPTER TWO**</center>

<center>**LITERATURE REVIEW**</center>

2.1 Introduction

In this chapter, the empirical, theoretical and conceptual literature relating to the problem warranting the study are reviewed. In the empirical literature, previous scholarly body of work pertaining to the study objectives are reviewed while the theoretical literature pertaining to the models and theories supporting the study are explored. The conceptual framework on the other hand presents a diagrammatic illustration of the variables underpinning the study.

2.2 Transformational Leadership Style and ICT integration

Success of any institution is pegged on the leadership. Continuous success and prosperity of any institution is directed by the ever-changing situations that impact on leadership. School leaders should take cognizance of this aspect. In the world that we live in today, school leaders' roles have changed from practicing teachers with added responsibilities to full-time professional managers of human, financial and other resources accountable for their results (Bolam *et al.,* 2010). This has meant that more and more tasks have been added to the job description: instructional leadership, staff evaluation, budget management, performance assessment, accountability, and community relations, to name some of the most prominent ones. In light of the foregoing, this section reviews the concept of transformational leadership style, hailed as the most effective in school management in general and ICT integration in particular.

Transformational leaders are proactive, raise awareness levels of followers and help the followers to achieve high performance outcomes. This has been affirmed by Bass (1990). Transformational leaders pay particular attention to each individual's needs for achievement and growth. Hamidifar (2009) found that employees are more satisfied with transformational

<center></center>

leadership than any other style, and that this type of leadership was not being exercised by the managers. The study concluded that transformational leadership led to better satisfied employees. It was thus the present study's interest to find out the extent to which headteachers adopt transformational leadership and how the same interrelates with teacher efficacy in ICT, school environment and ICT integration.

As is the case in the private sector from the foregoing study, transformational leadership is among the leadership styles available to public school leadership. In this regard, Nguni, Sleegers, and Denessen (2016) also studied the effects of transformational leadership on teachers' job satisfaction, organizational commitment, and organizational citizenship in schools in Tanzania. They observed that the leadership style was distinguished by the different ways' leaders motivate their followers and appeal to the emotions and values of their followers. The teachers rated their head teachers particularly high on the transformational leadership traits of charismatic leadership, individualized consideration, and intellectual stimulation. This implies that transformational leadership as practices by school heads fairs favorably among a majority of teachers in Tanzania.

Transformational leadership style is still a relatively new concept to many. In contrast to Nguni *et al.* (2016) study in Tanzania, the adoption of transformational leadership style has been found to be relatively low among head teachers in Kenya. A study by Nthuni (2012) on leadership style factors that influence motivation of pre-school teachers in public pre-schools in Embu North District, revealed that there was need to adopt a transformational leadership style in order to enhance motivation of pre-school teachers in public pre-schools and improve their working environment by involving them in decision making and in policy formulation in their schools.

There is thus need for teachers to be trained and properly inducted on the transformational leadership style in order to properly manage both human and material resources. The greatest transformational leadership theory criticism is that the four tenets comprising the theory (individualized consideration, idealized influence, intellectual stimulation and inspirational motivation) are not adequately characteristic to enable an expressive distinction of its theoretical suppositions from other leadership theories' (Northouse, 2011). The theory of transformational leadership has further criticized for being too exclusive and for positioning an unequal emphasis on leadership's "heroic" aspects at the cost of the followers' concerns (Ibid, p. 193). In such criticism, implicit is the view that leaders that are transformational somehow gifted with special behaviours that followers do not have a way of accessing; subsequently, the destinies of followers are inevitably hinged on the dominant leaders' ambitions.

2.3 ICT Integration in Teaching and Learning and Teachers' Self-efficacy in Technology

Good performance in a class is dependent on among other factors, the teacher's ability to deliver learning. It is directed by the teachers' comfort and confidence in handling the learning aspects in their class. It has everything to do with their self-efficacy. Teachers' efficacy refers to teachers' confidence in their ability to promote learners' learning (Hoy, 2010). Bandura (1977) defines efficacy as an intellectual activity by which one forges one's beliefs about his or her ability to achieve a certain level of accomplishment. Bandura (2016) further says that self-efficacy is grounded in the theoretical framework of social cognitive theory emphasizing the evolvement and exercise of human agency - that people can exercise some influence over what they do. In this conception, it is implied that people are self-organizing, proactive, self-regulating, and self-reflecting. From this perspective, self-efficacy

affects one's goals and behaviours and is influenced by one's actions and conditions in the environment.

A teacher with high self-efficacy therefore tends to exhibit greater levels of enthusiasm. They are more open to new ideas, more willing to try a variety of methods to better meet the needs of their learners, and more devoted to teaching. Because they tend to be less judgmental of learners, they work longer with a learner who is struggling. These views are further collaborated by Jerald (2007) where in his review of research highlights some teacher behaviours found to be related to a teacher's sense of self-efficacy. The findings suggest that teachers with a stronger sense of self-efficacy tend to exhibit greater levels of planning and organization; are more open to new ideas and are more willing to experiment with new methods to better meet the needs of their learners; are more persistent and resilient when things do not go smoothly; are less critical of learners when they make errors; and are less inclined to refer a difficult learner to special education.

With the advent of technology in teaching and learning, it is imperative that the teachers embrace the use of ICT to boost their efficacy. It is evident that teachers have not embraced technology. Previous studies have identified several reasons for this underutilized of technology including but not limited to lack of resources, lack of training, philosophical beliefs about technology, and lack of time to experiment with technology tools (Compeau & Higgins, 1995; Kellenberger & Hendricks, 2013; Littrell, et al., 2015; Teo, 2009; Wang, Ertmer, & Newby, 2014). Further, many researchers attribute underutilized technology to teachers' lack of self-efficacy in incorporating such resources into their classrooms (Kellenberger, & Hendricks, 2013). Previous studies have identified several factors that may contribute in teachers' decisions to integrate technology into their classrooms. Self-efficacy is one of those factors (Compeau & Higgins, 1995; Kellenberger & Hendricks; Littrell, et al.,

2015; Teo, 2009; Wang, Ertmer, & Newby, 2014). Therefore, teachers efficacy in digital technology becomes very crucial in the ICT integration in Teaching and learning.

The concept of teachers' self-efficacy is pegged on Bandura's (1994) theory of self-efficacy. Bandura (2016) explained that self-efficacy refers to one's beliefs in one's capabilities to organize and execute the courses of action required to produce a given outcome. Further, perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes (Bandura, 1994). It can be inferred from the theory that self-efficacy beliefs determine how people feel, think, motivate themselves and behave.

Self-efficacy can be viewed simply as what an individual believes he or she can accomplish using his or her skills. They focus on 'how' tasks are achieved, not 'what' is achieved. Competencies are abilities or attributes, described in terms of behaviour, key to effective and/or highly effective performance within a particular job. Mastery goals represent a focus on the development of competence, and performance goals represent a concern for demonstrating competence (Pintrich, 2010; Elliot, 2015). The concept of competence was originally developed by McClelland and referenced performance capabilities that differentiated effective from ineffective managers operating within a specific environment yielding empirical results (McClelland, 2014). Since then, the idea of competencies has generally and rather simply devolved into a list of desirable skills and traits along a business construct, usually grounded on management, expert, or professional criteria and assessed by observable performance or interviews (Boyatzis, 1982; Hogan & Warrenfeltz, 2013; McClelland, 2014; Spencer & Spencer, 1993). As such, teacher competencies in the present

study context can be conceptualized as desirable skills and traits in the use of ICT in teaching.

Accordingly, teacher competence has been empirically found to influence the adoption of ICT in teaching, albeit in developed economies. In qualitative multiple case-study research on teachers' competence and confidence level regarding the use of ICT in teaching practiced conducted in five European countries, Peralta and Costa (2014) found that technical competence influenced Italian teacher's use of ICT in teaching. However, the teachers cited pedagogical and didactic competences as significant factors if effective and efficient educational interventions are likely to be implemented. In Syria, for example, teachers' lack of technological competences has been cited as the main barrier (Gobbo & Girardi, 2011). In Australian research, Newhouse (2011) found that many teachers lacked the knowledge and skills to use computers and were not enthusiastic about the changes and integration of supplementary learning associated with bringing computers into their teaching practices. As such, based on the study findings, teacher competencies may be considered as a significant determinant of the uptake of ICT for teaching.

Teacher ICT competence has however been reported as low in the country. A study by Ayere et al, (2010) on E-learning in secondary schools in Kenya for instance reported that a number of teachers in secondary schools had not received any training in ICT use during their formative years at teacher training institutions before joining the profession. 55% of the sampled teachers stated that they did not receive any ICT training at all. However, 51% of the teachers had taken self-initiative to undertake ICT training during the last three years they had been employed. The findings are indicative of a considerably low competence of teacher in the utilization of ICT among teachers, but also the self-initiative by a majority of teachers to undertake training in order to improve their competences in ICT.

This is consistent with a report by the Ministry of Higher education, Science and Technology (MoE, 2016) on secondary school teachers' adoption and use of ICT which indicated that the number of teachers skilled in ICT in secondary schools was low. The study revealed that out of the number available, few had ICT training effective in adoption and use of the technology in the classroom. Out of 232 teachers in the sample, majority (57%) were reported to have trained at certificate level on basic computer skills, 73% were reported to have acquired ICT training through in-service courses and 43% were trained by private computer college. As such, in tandem with the study findings by Ayere *et al.* (2010), it is inferred that a considerable number of teachers are taking the initiative to train in the use of ICT, in preparation for the adoption of the same in teaching.

The level of training of majority of the teachers is far from being satisfactory due to lack of exposure during formative training in initial teacher training institutions. The findings are further consistent with a study by Mingaine (2013) that carried out in Meru County involved a sample of 315 respondents and investigated the skill challenges in ICT integration in public secondary schools. The study which employed a descriptive survey design found that, there is limited supply of qualified ICT teachers and that majority of secondary school teachers in Meru County were not competent to facilitate use of ICT in schools.

The association between teacher competencies in ICT and the influence thereof can further be pronounced by juxtaposing schools that teach ICT and those that do not. Accordingly, a study by Ayere et al (2010) compared e-learning in NEPAD and non-NEPAD schools that were offering computer studies and found that teachers in NEPAD schools integrated ICT in the learning in all subjects, whereas little or no integration took place in the non-NEPAD schools. This finding could be explained by the fact that more teachers from NEPAD schools were computer literate (60%) as compared to their non-NEPAD counterparts (31%). At the same time, NEPAD schools had more ICT graduate teachers (53%) than the non-NEPAD schools

(33%) (Ayere e*t al.,* 2010). These figures cannot be taken to be representative of the situation in the entire country, though, because the study included just a few selected schools all of which were already utilizing computers. There is a need to establish the situation in other parts of the country.

Teachers' motivation towards their efficacy is hedged on their self-worth which is directly linked to their perception on who they are. The theory on Self-worth asserts that a person's ability to achieve is directly linked to their perceptions of themselves. Martin Covington, the pioneer in the psychology field of self-worth and self-efficacy, states that most people will go to extraordinary lengths to "protect their sense of worth or self-value," even if it infringes on the ultimate outcome of their achievement (Covington, 1984). Recent work on teacher motivation within the framework of expectancy-value theory (Richardson & Watt, 2006; Watt & Richardson, 2007) provides evidence for links between teachers' motivation and their engagement, commitment and persistence in teaching and their inclination to become involved in professional development. From the foregoing, there is considerable agreement that teachers' motivation and scepticism about affecting learners is associated with enthusiasm, job commitment, and instructional behaviour.

Attitudes are based on concerns and beliefs and play a key role in determining ICT integrations among the teachers. According to Hord and colleagues (1998), concerns can be described as the feelings, thoughts, and reactions individuals develop in regard to an innovation that is relevant to their job in this case adopting technology in Teaching and learning (Hord *et al.,* 1998). Teachers' efficacy could also be looked at as the teacher ability to promote learning (Hoy, 2010). As such, teachers' level of confidence about ability to promote learning can depend on past experiences or on the school culture. This is only possible if the teacher is confident in transferring knowledge to the learners.

Teacher confidence levels have been shown to increase with training, exposure to specific situations, knowledge, and utilization of interventions. According to Soodak and Podell (1996), the confidence that one has in the outcomes of his or her behavior helps to determine one's actions. A growing number of studies have been conducted on teachers' confidence in their use of computers, either for personal work or in their teaching practice. Several studies (Lynch, 2013; Macmillan, Timmons and Liu, 2011; Sandholtz, Ringstaff and Dwyer, 2012) reported that teachers were reluctant to reveal their level of computer knowledge to learners and were unwilling to use computers in regular teaching practice until they felt comfortable and competent in using the technology. Teachers with more computer experience had greater confidence in their ability to use computers effectively (Galloway, 2013; Nash and Moroz, 2015). This means that efforts to enhance teacher efficacy must take into account whether low teacher efficacy is due to teachers' self-confidence levels or a sense of futility regarding the impact of their work.

2.4 School Environment and ICT integration

ICT integration in teaching and learning is well enabled by the situations in which it is applied. Well laid out infrastructure and a conducive learning environment ensures that ICT implementation is well entrenched. Thus, a conducive school environment is crucial for successful implementation of ICT in teaching and learning. Freiberg and Stein (1999) refer to school environment as the core of the school; the value of a school that brings about a wholesome learning place, where pupils' and parents' dreams and ambitions are tended, and teachers motivated to function at their best, where everybody is respected and feel attached to the school. School environment is defined by Hoy and Miskel (2001) as a blend of beliefs, values and attitudes of pupils and staff members, head teachers and parents, level of independence, styles of leadership and job satisfaction.

From the above definitions, school environment may be perceived as a term used to portray the atmosphere of the school which is mainly influenced by the head teacher and dictates how pupils and teachers perceive their school and affects their values and attitudes toward school and job respectively.

Accordingly, researchers of school environment, for example Hoy and Sabo (1998) observe that a positive school environment is related to the effectiveness of whole school. This is to say that there is a connection between positive school environment and school effectiveness. In addition to that, Litwin's (1968) study reveals that it is possible to create noticeable climates within a short period of time by varying leadership styles. The implication of this is that leadership styles dictate organisational climate. However, most authors on school environment are of the opinion that the perceptions of students and the school community are important components of creating a good climate where teachers can teach and pupils can learn and parents can be involved in the education of their children.

In view of the importance of school environment and its influence on learning outcomes, Anderson (2014) conducted a comprehensive review of research studies in the area of school climate and provided a summary of the variables that appeared to be related to climate. Derived from Tagiuri 's taxonomy, Anderson categorized ecology variables as those that include the physical and material variables in the school that are external to participants, such as building characteristics (cleanliness, lighting, and equipment), school size, and classroom size. Variables that represent characteristics of individuals in the school, such as teacher characteristics (number of years teaching), satisfaction, teacher morale, student body characteristics (demographic information), and student morale are referred to as milieu variables. Anderson describes social system variables as comprised of patterns or rules (formal and informal) of operating and interacting in the school. Examples of social system

variables include administrative organization, instructional programming, ability grouping, administrator-teacher rapport, teacher shared decision making, communication, teacher-student relationships, student shared decision making, opportunity for student participation, and community school relationships. The last dimension that Tagiuri included in his definition of climate are culture variables. Culture variables reflect norms, belief systems, and values of various groups within the school such as teacher commitment, peer norms, cooperative emphasis, expectations, degree of consistency, consensus, and clear goals (Anderson, 2014). As such school environment is manifested in a variety of aspects within the school, which an be broadly categorize into ecology variables, characteristics of individuals, student body characteristics, social system variables and culture variables.

The various identified attributes that go into defining school climate have been found in empirical literature to influence learning outcomes, ICT integration in teaching and learning being one. Sherman and Howard (2019) reviewed studies that examined school climate and concluded that how schools are run is directly related to the level of behavioral disruptions and therefore school performance. For example, schools in which administration and faculty lack communication have lower teacher morale and higher student disorder, and schools where rules and reward structures are unclear, and where there are vague consequences (lowering of grades due to misbehaviours), experience more disorder.

In addition, schools in which students do not believe they belong and feel uncared for by school personnel experience higher levels of disorder. Sherman and Howard (2019) outlined additional school climate factors that contribute to unsafe schools. Schools that ignore misconduct, schools in which teachers and administrators have disagreement about or do not know the rules, and schools where students do not believe in the rules are examples of an unsafe school.

On the other hand, factors such as high expectations among school staff, students, and parents for student achievement, orderly school and classroom environments, high morale among school staff and students, positive treatment of students, active engagement of students, and positive social relationships among students positively impact school climate (Sherman & Howard, 2019). As such, different teacher-, administration- and learner-specific attributes exhibit different effects on the school climate.

Whereas the foregoing attributes were found to more or less affect school climate differently and independently, studies have also found that the factors interact to influence both school climate and learning outcomes. Griffith (2016) employed the descriptive design to examine how individual- and school-level perceptions of school climate interact with one another in relation to student performance using a sample of elementary school students and found that "group or school-level climate moderated within-school relations of climate to student self-reported academic performance" (p. 360). Despite testing a younger sample of students and using self-reported academic performance as opposed to school-provided GPAs and test scores, the findings provide support for the hypothesis that positive aggregate perceptions of school climate will be significantly associated with a stronger relationship between students' individual perceptions of climate and their academic and behavioral performance.

For technology to be seamlessly integrated in teaching and learning, it is important that teachers are well versed with technology to the extent that they have confidence to use it in the classroom for purposes of teaching and learning. Holden and Rada (2011) suggested that by increasing teachers' technology self-efficacy, they might directly increase their acceptance of technology and also indirectly increase their usage of technology. Furthermore, Brown, Holcomb and Lima (2010) asserted that —technology self-efficacy has come to play a crucial role in the preparation and implementation of educators who can successfully use educational

technology to enhance learner learning. In her study, Farah (2011), gathered that exposure to technology as well as interest in using it would help boost the teachers' self-efficacy in technology; and that constant use of the same would give them the confidence they require in its usage. It is implied from the study findings that professional development opportunities, more targeted and specialized teacher training on instructional technology and increased knowledge of and access to instructional technology tools and resources are key to teachers adopting use of technology.

Through increased teacher collaboration with a focus on instructional technology, teachers would have the opportunity to share, discuss, and explore ways to integrate instructional technology in their instructional practice. This agrees with Duncan's (2010) view where he identified the need to connect teachers and leverage technology to enable us to build the capacity of teachers. He also discussed the benefit of online learning communities which would create opportunities for teachers to collaborate with peers, as well as reach out to experts all over the world. These ideas are consistent with one of the goals presented in Georgia's technology plan (Georgia Department of Education, 2013), which states the need to increase teachers' proficiency to use technology effectively in order to enhance learner learning. This is of the implication that because teachers are in the trenches teaching learners, they can easily relate to other teachers and provide significant support to their colleagues to help promote effective uses of instructional technology.

Different categories have been used by researchers and educators to classify factors that influence teacher use of ICT in teaching. Sherry and Gibson (2012) claims that technological, individual, organizational and institutional factors should be considered when examining ICT adoption and integration. Rogers identified five technological characteristics or attributes that influence the decision to adopt an innovation namely Relative Advantage, Compatibility, Simplicity, Triability and Observability (Rogers, 2013). Stockdill and Morehouse (2012) also

identified user characteristics, content characteristics, technological considerations, and organizational capacity as factors influencing ICT adoption and integration into teaching. Balanskat, Blamire & Kefalla (2012) identified the factors as teacher-level, school-level and system-level. Neyland (2011) identified factors such as institutional support, as well as micro factors such as teacher capability influencing the use of online learning in high schools in Sidney. It can be deduced therefore, that a multiplicity of factors influences the integration of ICT into teaching and learning. For effective ICT integration therefore, pertinent school-specific and teacher-specific factors ought to be aligned.

For the full benefit of ICT's integration in learning and teaching to be realized, it is eminent that the teachers themselves are proficient in ICT use, and therefore ready for its integration in both teaching and learning. A study done by Lau and Sim (2008) in Malaysia on exploring the extent of ICT adoption among secondary school teachers in Malaysia showed that despite the apparent benefits of the use of ICT for educational purpose, the potential of learning is deprived as many teachers are still not fully ICT literate and do not use it in their teaching. Studies on teacher's readiness for ICT suggest that there is still a long way to go before schools in developing countries are able to take full advantage of the opportunities provided by 21st century technology (So and Paula, 2016). Gobbo and Girardi (2011), Ritz (2012), and Sang, Valcke, Braak and Tondeur (2013) all indicate that teachers' ICT literacy levels influenced how learners used ICT in schools. It follows then from the findings, that effective integration of ICT in teaching and learning presupposes teacher efficacy in teaching and learning. As established from the foregoing findings however, teacher readiness as a precursor to integration of ICT in teaching and learning is largely not achieved.

2.5 Theoretical Framework

The present study is anchored on two theories underpinning the main study variables including, self-efficacy, leadership styles and ICT integration. The theories include the Transformational Leadership Theory and Situational Theory.

2.5.1 Transformational Leadership Theory

Transformational leadership theory has captured the interest of many researchers in the field of organizational leadership over the past three decades. This theory was developed by Burns (1978) and later enhanced by Bass and Avolio (1994) and others. The major premise of the transformational leadership theory is the leader's ability to motivate the follower to accomplish more than what the follower planned to accomplish (Krishnan, 2005). Transformational leadership has four components: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985). Burns postulated that transformational leaders inspire followers to accomplish more by concentrating on the follower's values and helping the follower align these values with the values of the organization. Furthermore, Burns identified transformational leadership as a relationship in which the leader and the follower motivated each other to higher levels which resulted in value system congruence between the leader and the follower (Krishnan, 2005).

Transformational leadership has been associated with the personal outcomes of the follower as well as organizational outcomes (Krishnan, 2005). Research has shown that transformational leadership impacts follower satisfaction and commitment to the organization. Research has also shown that transformational leadership impacts employee commitment to organizational change and organizational conditions. Due to its impact on personal and organizational outcomes, transformational leadership is needed in all organizations (Bass & Avolio, 1994).

This theory is of pertinence to this research as it underpins the independent variable, transformation leadership style and its influence on ICT integration as the organizational outcome. It helps explain how head teachers as ICT leaders leverage their managerial and leadership skills to enhance the ICT integration in teaching and learning among their schools.

2.5.2 Situational Theory

Proposed by Hoy and Miskel (2001), situational leadership proposes two basic hypotheses: leadership traits and characteristics of the situation combine to produce leader behavior and effectiveness; situational factors have direct effect on effectiveness. Referring to the school situation, these scholars explain further that the level of efficacy, motivation and ability of both teachers and students influence ICT integration. Also, the socioeconomic status of pupils in a school relates to the pupils' achievement on standardized tests.

Hoy and Miskel (2001) uphold the fact that it is likely that the situational characteristics of a school have greater influence than a leader's behaviour on leadership effectiveness. Thus, it is concluded that it is possible for one type of leader to be effective in one set of circumstances and under another set of circumstances, a different type of leader is effective. In the present study, the theory underpins the school environment theory, as it explains how the various constituents of teacher ICT self-efficacy and school environment interact to either enhance or derail the school leadership's effort among public primary schools in integrating ICT in teaching and learning.

2.6 Conceptual Framework

The conceptual framework illustrated in Figure 2.1 demonstrates how head teachers as ICT leaders leverage their managerial and leadership skills to influence ICT integration in teaching and learning among their schools in line with the transformational leadership theory. The framework also demonstrates how the various constituents of teacher efficacy in ICT and school environment interact to either enhance or derail the school leadership's effort among public primary schools in integrating ICT in teaching and learning in line with the situational leadership theory.

Teacher Efficacy in ICT
H_{04}
- Teachers Confidence
- Enhanced teachers Competencies
- Teacher motivation
- Change in teachers Attitude

Moderating Variable

H_{03}

Dependent Variable

Transformational Leadership Style
- Idealized influence attributed
- Idealized influence behaviour
- Inspirational motivation
- Intellectual stimulation
- Individual consideration

Independent Variable

H_{01}

H_{02}

ICT Integration in teaching and learning
- Knowledge of instructional technology
- Access to instructional materials through ICT
- Existence of teacher-to-teacher collaboration in the learning process
- Learner centred approach in learning process
- Use of E-pedagogies
- Teachers' innovations in teaching using ICT

School Environment
- Availability of a School mission
- Good infrastructure
- Accessibility of instructional materials
- Good class interaction between the teachers and the learners
- Good support from the head teacher
- Good interaction between parents and teachers in monitoring the learners' 'progress

H_{05}

Mediating Variable

Figure 2.1: Conceptual Framework of the Study

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The conceptual framework in Figure 2.1 illustrates a direct linkage between transformational leadership style, the independent variable and the dependent variable that is ICT Integration in teaching and learning. The framework also depicts two indirect linkages, that is mediation by school environment between transformational leadership style ICT Integration in teaching and learning; and moderation by teacher efficacy in ICT on the association between transformational leadership style ICT Integration in teaching and learning.

Teacher self-efficacy components are the moderating variables in this study. The study sought to find out how each of these components which include ICT training, Professional development programmes, competencies, motivation, attitudes and confidence moderating the relationship between transformational leadership, the independent variable and the ICT integration in teaching and learning which is the dependent variable. Transformational leadership was measured by inspirational motivation, idealized influence attributed, idealized influence behaviour, intellectual stimulation and individualized consideration.

School environment was the mediating variable indicated by school mission, good infrastructure, accessibility of instructional materials, good class interaction between the teachers and the learners, good support from the head teacher, good interaction between parents and teachers in monitoring the learners progress, effective instructional leadership. ICT integration on the other hand is the dependent variable indicated by resources available to the teacher, access to instructional materials through ICT, existence of teacher-to-teacher collaboration in the learning process, learner centred approach in learning process, different pedagogies of ICT and teachers' innovations in teaching using ICT and knowledge of instructional technology.

2.7 Gaps Reviewed in the Literature

This section tabulates pertinent research gap as extracted from the foregoing empirical literature.

Table 2.1: Research Gaps

Author	Focus	Findings	Knowledge gap	Present Study
Transformational Leadership and ICT Adoption				
Flanagan and Jacobsen (2019)	Technology leadership for the twenty- first century principal	The head teacher as a transformational leader, specifically, can impact multiple areas of the school setting such as ICT integration	Focused on principals' technology leadership, without linkage to ICT integration, teacher self-efficacy and school environment	Set to study how the Transformational leadership style influences the ICT integration in the context of public primary schools setting
Nguni, Sleegers, and Denessen (2016)	Effects of Transformational Leadership on Teachers' Job satisfaction	Leadership style was distinguished by the different ways leaders motivate their followers and appeal to the emotions and values of their followers.	Failed to study leadership styles in the context of ICT integration	Seeks to establish how the Transformational leadership styles influence the ICT integration
Teacher Efficacy and ICT integration in Teaching and Learning				
Khochen and Radford (2020)	Attitudes of teachers and headteachers towards inclusion in ICT-based curriculum in Lebanon	A number of teachers report that they do not feel comfortable with the ICT integration in subject teaching, since their role was predetermined and designed by educational authorities and teachers feel that they face a lack of professional autonomy	Only explored teacher competence, leaving out how the same may moderate the relationship between school leadership and ICT integration	Focuses on how teacher efficacy in terms of confidence in ICT moderates the relationship between school leadership and ICT integration
Peralta and Costa (2007)	Teachers' competence level in the use of ICT	Pedagogical and didactic competences are significant	The study adopted a linear approach and failed to	Explores how teacher competency in teaching

	in five European countries	factors for effective ICT integration in teaching	show how teacher competency may moderate the relationship between school leadership and ICT integration	may moderate the relationship between school leadership and ICT integration
School Environment and ICT integration in Teaching and Learning				
Sherman and Howard (2019)	Relationship between school climate and school performance	How schools are run is directly related to the level of behavioural disruptions and therefore school performance	School climate was the independent variable and school performance the dependent variable. Failed to show other factors that affect school performance.	Explores how school environment moderates the relationship between transformational leadership and ICT integration
Griffith (2016)	How individual- and school-level perceptions of school climate interact with one another in relation to student performance using a sample of elementary school students	Group or school-level climate moderated within-school relations of climate to student self-reported academic performance	Focused on the direct association between school climate and student performance; focused elementary school students, which may be contextually different from public primary school	Explores how school environment moderates the relationship between transformational leadership and ICT integration in public primary schools

Author (2022)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research techniques that was employed in this research. The chapter presents the design of the research, the population targeted, the sample procedures of sampling, instruments of data collection, instruments' reliability and validity, procedures of data collection as well techniques of analysing data.

3.2 Philosophical Orientation

In order to conduct a research study scientifically and systematically, it is essential to determine the philosophical paradigm necessary in shaping the methods and approaches required for research activities (Ary *et al.,* 2010). Bryman (2012) define a paradigm as a cluster of opinions on some specific philosophical assumption researchers ought to follow with a view to create useful knowledge. According to McNabb (2008) a research paradigm is a set of fundamental approaches and rules to problem solving whereby questions are asked by researchers about what phenomenon to examine, the research method to be employed, and how to interpret results. Saunders *et al.* (2012) assert that the research philosophy concerns the nature and development of knowledge and contains important assumptions with regard to the way in which researchers view the world. According Saunders *et al.,* (2012) the main research philosophies that underpin research in social sciences: positivism, interpretivism and Pragmatism.

This study was approached from a pragmatism point of view. According to Ashley and Orenstein (2013), pragmatism is a philosophical movement that includes those who claim that an ideology or proposition is true if it works satisfactorily, that the meaning of a proposition is to be found in the practical consequences of accepting it and that

unpractical ideas are to be rejected. As such, a proposition ought not to be judged by the approach in executing the same, but by the results and functionality (Collis & Hussey, 2009). The pragmatism point of view is flexible, taking on either a deductive or inductive research approach; objective or subjective ontology; value-free or biased axiology and either qualitative and/or quantitative research strategy (Ary *et al.,* 2010).

The pragmatism point of view is justified as it helped in understanding how the relatively novel use if ICT in teaching and learning in Kenyan public primary schools is supported by the divergent leadership styles adopted by headteachers, teacher self-efficacy in the same as well as the extent to which school environment supports its adoption. This owes to ICT being dynamic, and therefore attracting divergent approaches in terms of headteachers' leadership styles with no definite one-size-fits-all approach to assure its desirable integration. This point of view was also deemed best in underpinning the present study as it allowed for flexibility in approach including the collection of different data types, use of various data collection methods as well as data analysis techniques.

3.3 Research Design

Johnson and Onwuegbuzie (2004) describe a research design as a plan that describes how, when and where data are to be collected and analysed. The study adopted a mix of cross-sectional survey, correlational and mixed methods designs. The study used a cross-sectional survey design since the object of the study is to document the situation as it is at the present time. The survey involved field visits to sampled schools so as to get first hand observation data and views from respondents. The observation included observing the resources used by the teachers in integrating ICT in the teaching learning process and how they do it.

According to Kombo and Tromp (2006), a cross-sectional survey entails gathering of data at one point in time to make deductions concerning a population of interest. This collected data only once. Cross-sectional surveys can thus be contrasted with panel surveys, for which the individual respondents are followed over time. A mixed methods design was also used in the study to factor in both quantitative and qualitative data and techniques. Quantitative methods were used in sampling, data collection and analysis in order to assess the hypothesized relationships among the study variables. Qualitative methods on the other hand, particularly content analysis was also employed in the study as interview schedules were used that provided qualitative data hence mixed methods design.

3.4 Target Population

The target population for this study comprised of public primary schools' teachers drawn from Nairobi County. The study targeted teachers from the 205 public primary schools in Nairobi County (Kenya National Examination Council (KNEC), 2019). The study drew its respondents from the population of 205 head teachers and 6150 teachers in Nairobi County. Only head teachers and teachers were reached owing to the nature of the study objectives which only required their input. While head teachers were crucial in examining the head teachers' leadership roles in the implementation of ICT in primary school administration, teacher responses were required to determine the moderating role of teacher self-efficacy on the ICT integration in teaching and learning.

3.5 Sample Size and Sampling Procedure

A sample refers to a population's proportion chosen for analysis and observation (Kumar, 2011). By observation of a sample's characteristics, certain inferences can be made concerning the population's features provided that the sample represents the whole population (Mertens, 2010). Sampling denotes obtaining the universe's or a population's portion as representing that population (Best, 1981). The study was conducted in a sample of the public primary schools in the eleven sub-counties of Nairobi County namely; Embakasi, Makadara, Kamukunji, Starehe, Njiru, Kasarani, Westlands, Langata, Mathare, Kibra and Dagoretti. The sample population was 205 head teachers from 205 Public Primary Schools in Nairobi County with 6150 teachers.

Owing to the anticipated large number of respondents that included 6150 teachers and 205 head teachers, the study employed a combination of two formulae. For teachers the study used the Fisher, Byrne and White (1983) formula for determining sample sizes in large populations; while for head teachers, the study referred to Mugenda and Mugenda (2003) who proposes a 30% proportion in extremely small population sizes and 10% for larger populations. The 10% proportion will be used in the present study giving a sample of 21 head teachers. The Fisher et al. (1983) formula is as shown below:

$$n = \frac{N}{1 + (N * e^2)}$$

Where;
N= population size
e= Tolerance at desired level of confidence, take 0.05 at 95% confidence level
n= sample size.

For teachers, the sample size will be arrived at as follows:
n=6150/(1+(6150*0.05*0.05))
n=375.57
As such, the study was to reach a total of 376 teachers

The following sampling frame (Table 3.1) was developed in this regard.

Table 3.1 Sampling Frame

	Population	Percentage of Population	Sample
Head teachers	205	5.5%	21
Teachers	6150	94.5%	376
Total	6355	100.0%	397

A combination of cluster sampling and random sampling procedures was employed in the study. Whereas the sub counties formed the clusters random sampling was used to reach the head teachers from 21 primary schools in Nairobi County. The 11 sub-counties formed the cluster from where the sample size (376) of teachers were drawn. These teachers were distributed across the schools as illustrated in Table 3.2.

Table 3.2 Sample Distribution

Sub-county	Population	% Proportion	Sample
Westlands	28	13.7	51
Langata	10	4.9	18
Makandara	27	13.2	50
Mathare	9	4.4	17
Njiru	20	9.8	37
Starehe	20	9.8	37
Embakassi	20	9.8	37
Kibra	9	4.4	17
Dagoretti	19	9.3	35
Kamukunji	17	8.3	31
Kasarani	26	12.7	48
Total	**205**	**100**	**376**

3.6 Data Collection Instruments

The instruments used for data collection were structured questionnaires for teachers. The head teachers were taken through an in-depth interview using an interview guide. An observation checklist was used to assess resources used by the teacher for ICT integration in teaching and learning.

3.6.1 Structured Questionnaires

The structured questionnaires comprised of closed ended questionnaires through Likert scales (Appendix II). Different sets of questionnaires were developed for the teachers. The questionnaires were structured according to the study objectives. Section A covered demographic information, followed by section B which covered the ICT integration in teaching and learning while part C focused on transformational leadership style. The study adopted the Multifactor Leadership Questionnaire (MLQ) Form 6S-Mind Garden by Rowold (2005) which contextualized to measure the transformational leadership style.

3.6.2 Key Informant Interviews

The study made use of in-depth interviews to gain insight into possible areas not explored in the structured questionnaires (Appendix III). To this end, the key informant interviews were administered to the head teachers. The questions were developed based on the study objectives. Items from Multifactor Leadership Questionnaire (MLQ) Form 6S-Mind Garden by Rowold (2005) were used to measure transformational leadership style.

3.6.3 Observation Guide

The study further employed the use of observation guide where key observable features pertinent to the study variables were observed and complimented findings from the questionnaires and interviews. This included the availability and accessibility of computers in the schools as well as proficiency of teachers in their usage. Further the study employed a class observation schedule where teaching were observed to establish use of technology in class and how that was being implemented.

3.7 Piloting

In order to check for both validity and reliability of the study, testing of the research Instruments was done on pilot sample picked from the target population. The instruments were piloted among thirty-eight (38) teachers drawn from twenty (20) public primary schools within the nearby Kiambu County. As with the main study, a combination of cluster sampling and random sampling procedures was employed in the pilot study, with the Sub-counties in Kiambu Count forming the clusters. This is in tandem with Mertens (2010) who recommends a 10% pilot from the established sample size. The responses were to confirm if the meaning of the questions applies to all respondents in the same way according to Mertens (2010. These pilot schools did not take part in the study. This exercise enhanced the usability of the instruments as it clarified items before deployment to the target respondents.

3.7.1 Reliability of the Instrument

Reliability refers to the accuracy and precision of a measurement procedure (Collis & Hussey, 2009). It measures the degree to which a research instrument gives consistent results. The authors states that reliability is concerned with estimates of the degree to which a measurement is free of random or unstable error (Collis & Hussey, 2009). Errors likely to affect reliability are interviewer/interviewee fatigue, bias from the interviewer and inaccuracy of the instrument in use, inaccuracy in scoring by the researcher and finally, unexplained errors whose source cannot be determined. In this regard, prior to the main study, a pilot test was conducted across twenty (20) schools for purposes of pre-testing the questionnaire for reliability and in order to check for errors. Cronbach alpha, which assesses internal consistency, was utilized to assess the instrument's measure of internal reliability.

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Equation (Cronbach, 1951).

When the score if high, the generated scale is more reliable. Nunally (1978) proposed a threshold of 0.7 as an acceptable level of reliability and it was therefore deemed sufficient for this study. The findings of the study indicated that the items had relatively high internal consistency as all items had Cronbach alpha levels above 0.7, including ICT integration (.814); transformational leadership style (.981); teacher self-efficacy in technology (.928); and school environment (.896). The set of the items used to measure each of the variables were closely related as a group hence the instruments admissible.

3.7.2 Validity of the Instrument

This section introduces the validity with which to assess if the study adequately assesses what it was projected to assess. It also sought to establish how accurate the results of the research, were hence measure the extent at which the research instruments gave consistent results. Kothari (2004) defines validity as the extent that an indicator correctly gauges a measure, a straight determination on how well the indicator fulfils its purpose. According to McNabb (2010) the following conceptions of validity are considered: content-related validity; internal validity; criterion-related validity and construct related validity. If a study records high validity levels, it implies that it results in outcomes that are parallel to real characteristics, properties and variations in the social or physical world. Therefore, high reliability is among the indicators of a valid measurement (Saunders et al., 2012).

For the present study, face, construct, content and discriminant validity tests were employed. Whereas face validity tests whether the constructs appear like they gauge what they are required to gauge, content validity measures whether a measure is illustrative of all attributes of the construct. Construct validity denotes the extent to which a test actually measures what it is meant to, while discriminant validity is employed to demonstrate that there is no association between measures that ought not be associated (Saunders et al., 2012).

To check for both face and content validity, expert opinion was sought with a view to enhance face and content validity of the data collection instruments. To check for discriminant validity, the chi-square difference test was carried out. To check for construct validity, the study carried out the confirmatory factor analysis (CFA) to ascertain that the different sets of statements actually measure the respective variables. Changes were then effected where necessary. This was undertaken in five key steps; pretest to determine suitability for factor analysis, preliminary analysis, factor rotation, factor extraction, and factor interpretation. Both reliability and validity tests will be carried out at the pilot study level prior to the main data collection exercise.

3.8 Data Collection Procedure

Once the thesis proposal was approved by the university, the researcher wrote to National Commission of Science, Technology and Innovation (NACOSTI) through the university requesting for permission to collect data from the Nairobi County. With NACOSTI's consent the researcher went further to seek permission from MOE to access the Primary schools in the County. With their permission, the researcher then sought permission from the Sub-County Education Directors to allow access to schools within the sub-county.

The entry to the school was through the head teacher who allowed access to the teachers and observation of the facilities within the school.

3.9 Data Analysis

Both qualitative and quantitative data was produced in the study. Before data analysis, the data was then subjected to a series of data management practices as hereby elaborated.

3.9.1 Data Preparation for Analysis

After gathering of data, the returned research instruments were edited for comprehensiveness, coded and entered into the statistical package for social sciences (SPSS) version 26. The study then screened the data to check for sample size, homoscedasticity, normality assumptions, linearity and errors' independence. Screening further covered detection of outliers as well as multicollinearity. As a pillar for arriving at statistical results and inferences, the study tested for compliance with multivariate analysis' statistical assumptions. This guaranteed the accuracy of data, consistency, uniformity of entry, arrangement and completion to simplify tabulation and coding. With entry of data, the collected data was stored and captured. Inferential and descriptive analysis were then carried out.

3.9.2 Descriptive Statistics

Descriptive Statistics involved the use of frequencies in their absolute and relative forms (percentage) of the quantitative data, specifically the demographic information. Mean and standard deviations were also used as measures of central tendencies and dispersion respectively. The purpose of conducting descriptive statistics was to reduce, summarize data and analyse items and constructs. This provided insights into the characteristics of the samples. Descriptive statistics provided a basis for inferential statistics using correlation and multiple regressions.

3.9.3 Inferential Statistics

Inferential analysis was done to assess the hypothesized relationships. Both correlation and regression analyses then carried out to assess the strength and direction of the relationships between the specified variables as well as the statistical significance. To this end, various statistics were extracted and interpreted with respect to the various models.

Linear multiple regression analysis was specifically preferred as it contained a model goodness of fit to show the percent of organizational performance being attributed to the conceptualized study variables; analysis of variance to determine the model suitability to study the relationship; as well as regression coefficients with a view to determine degree and respective significance of the association between the study variables and therefore hypothesis testing.

The linear multiple regression model was:

$$Y = \alpha + \beta X + \varepsilon \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ I}$$

Whereby:

Y = ICT integration
α is the y-intercept or model coefficient;
β are the coefficients of the independent variables;
X = Transformational leadership style
ε is the error term established from heteroskedasticity test;
The moderated regression models are as shown below:

$$Y = \alpha + \beta_i (X_1 * Mo) + \beta_i (X_2 * Me)\ \varepsilon \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{II}$$

Whereby:

Y = ICT integration
α is the y-intercept or model coefficient;
β_i are the coefficients of the independent variables;
X_1 = Transformational leadership style

X_2 = Teacher efficacy (Moderator)

X_3 = School environment (Mediator)

ε = the error term established from heteroscedasticity test;

3.9.4 Operationalization of Study Variables

The variables in this study were operationalized to enable quantitative measurement. The variables were operationalized in line with the objectives of the study. They have been illustrated in Table 3.2 and 3.3 which helped draw the instruments.

Table 3.3 Operational Definition of Variables

Hypothesis	Measurement Scale	Statistical Model	Main tools of analysis
Transformational leadership style does not have a significant influence on the ICT integration in teaching and learning	5-point Likert scale structured questionnaire	$Y = \alpha + \beta_1 X_1 + \varepsilon$ where: Y= ICT Integration α =constant β_1=Coefficient of X_1 X_1 = Transformational leadership ε =Error term	Regression and Correlation Analysis
School environment does not have a significant on integration ICT in teaching and learning in public primary schools	5-point Likert scale structured questionnaire	$Y = \alpha + \beta_2 X_2 + \varepsilon$ where: Y= ICT Integration α =constant β_2=Coefficient of X_2 X_2 = School environment ε =Error term	Regression and Correlation Analysis
Teachers' self-efficacy in technology does not have a significant influence on integration ICT in teaching and learning in public primary schools	5-point Likert scale structured questionnaire	$Y = \alpha + \beta_3 X_3 + \varepsilon$ where: Y= ICT Integration α =constant β_3=Coefficient of X_3 X_3 = Teacher self-efficacy in technology B_3=Coefficient of X_3 ε =Error term	Regression and Correlation Analysis
Teachers' self-efficacy in technology does not have a significant moderating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning	5-point Likert scale structured questionnaire	$Y = \alpha + \beta_1 X_1 + \beta_3 Mo + (\beta_4 X_1 * Mo) + \varepsilon$ where: Y= ICT Integration α =constant β= Beta Coefficient X_1 = Transformational leadership Mo = Teacher self-efficacy in technology ε =Error term	Regression and Correlation Analysis
School environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning	5-point Likert scale structured questionnaire	$Y = \alpha + \beta_1 X_1 + \beta Me + \varepsilon$ where: Y= ICT Integration α =constant β=Beta Coefficients X_1 = Transformational leadership Me= School environment ε =Error term	Regression and Correlation Analysis

3.2 Operationalization of Variable Table

Objective	Concept/Variable	Indicators	Tools
Establish the extent to which Transformational leadership style influences ICT integration in teaching and learning in public primary schools	Leadership	• Idealized influence attributed • Idealized influence behaviour • Inspirational motivation • Intellectual stimulation • Individual consideration	5-point Likert scale structured questionnaire
Assess the extent to which School environment influences ICT integration in teaching and learning in public primary schools	School environment	• Availability of a School mission • Good infrastructure • Accessibility of instructional materials • Good class interaction between the teachers and the learners • Good support from the head teacher • Good interaction between parents and teachers in monitoring the learners progress	5-point Likert scale structured questionnaire
Establish the extent to which teacher-efficacy in technology influences integration ICT in teaching and learning in public primary schools	Teacher self-efficacy in technology	• Teachers Confidence • Enhanced teachers Competencies • Teacher motivation • Change in teachers Attitude	5-point Likert scale structured questionnaire

Examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools	School Environment	• Availability of a School mission • Good infrastructure • Accessibility of instructional materials • Good class interaction between the teachers and the learners • Good support from the head teacher • Good interaction between parents and teachers in monitoring the learners progress	5-point Likert scale structured questionnaire
Examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools	Teachers' self-efficacy in technology	• Teachers Confidence • Enhanced teachers Competencies • Teacher motivation • Change in teachers Attitude	5-point Likert scale structured questionnaire Record analysis interviews

3.10 Diagnostic Test

In order to confirm whether the data collection instruments are reliable and valid and whether the set questions are aimed at addressing the set objectives, diagnostic tests were carried out prior to data analysis. Diagnostic tests included tests of normality, test for multi-collinearity, test of heteroscedasticity, autocorrelation test as well as singularity Test.

3.10.1 Tests of Normality

The study conducted both Kurtosis and Skewness to assess data normality, particularly the distribution's peakedness and symmetry. In order to confirm a normal spread, the values for kurtosis and asymmetry between -2 and +2 were deemed acceptable (Ary et al., 2010).

3.10.2 Test for Multi-collinearity

Multi-collinearity refers to a measure evaluating if the factor variables are correlated highly. It is recorded when more than one model predictors are correlated highly resulting in unstable and unreliable regression coefficients' estimates therefore leading to strange outcomes when endeavoring to assess how well individual factor variables make up n comprehension of the outcome variable. The implications of multi-collinearity include increased estimates' standard error, implying lowered reliability and misleading outcomes. The multi-collinearity test was carried out to assess if the variables of interest are correlated highly with each other. The variance inflation factor (VIF) was utilized to assess the level of association among the constructs as well as to estimate the level at which the coefficient variance is inflated owing to linear reliance with other factors. As a best practice, VIF of more than 10 indicates multi-collinearity (McNabb, 2010). The study deemed the model multi-collinearity-free.

3.10.3 Test of Heteroscedasticity

Homoscedasticity assumes that there is constant variance of the errors. Violations of homoscedasticity (Heteroscedasticity) make it difficult to gauge the true standard deviation of the forecast errors, usually resulting in confidence intervals that are too wide or too narrow. In particular, if the variance of the errors is increasing over time, confidence intervals for out-of-sample predictions will tend to be unrealistically narrow

(Collis & Hussey, 2009). They continue to say that one of the assumptions of the classical linear regression model is that there is no Heteroscedasticity. Breaking this assumption means that the Gauss–Markov theorem does not apply, meaning that OLS estimators are not the Best Linear Unbiased Estimators (BLUE) and their variance is not the lowest of all other unbiased estimators, (Gujarati and Porter, 2009). A plot of residuals versus predicted values was used to check for the convergence (Solutions, 2020).

3.10.4 Autocorrelation Test

Autocorrelation refers to the correlation of a time series with its own past and future values. Autocorrelation complicates the application of statistical tests by reducing the number of independent observations. Three tools for assessing the autocorrelation of a time series are; the time series plot, the lagged scatter plot and the autocorrelation function (Collis & Hussey, 2009). The study used Durbin Watson measure to check on the existence of autocorrelation. Durbin Watson varies between 0 and 4 such that if d=2 then there is no problem of autocorrelation, if d<2 then there is positive/persistent autocorrelation and if d>2 then there exists a negative autocorrelation.

3.10.5 Singularity Test

The study carried out a singularity matrix test with a view to ensure that the independent variables are indeed independent and different from each other and hence it was possible to perform inferential analyses (McNabb, 2010). A matrix was deemed singular if its determinant is 0. The study ascertained Singularity since the inter-variable correlations were less than 0.7 for Transformational Leadership Style, Teacher Self Efficacy in Technology and School Environment.

3.11 Ethical Considerations

The researcher conformed to the code of informed and voluntary consent, where only willing participants to part in the study. Informed consent was grounded on the information concerning the study purpose, researcher's identification and any benefits from the study (McNabb, 2010). The researcher communicated the above to the respondents before the start of the study. To avoid plagiarism, all work cited from other scholars was acknowledged. Prior to collecting data, the researcher applied for a research permit with the National Commission for Science, Technology and Innovation (NACOSTI).

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter presents the analysis of data and presentation of findings. Both qualitative and quantitative analysis on transformational leadership style and its relationship with ICT integration in the teaching learning process were applied. It flows from the analysis of the response rate, reliability, descriptive statistics, normality, diagnostics, correlation, regression and test of hypothesis. The purpose of this study was to investigate how transformational leadership style predicts ICT integration in teaching and learning in public primary schools in Nairobi County and the mediating and moderating roles of teachers' self-efficacy on technology and school environment respectively. The Instruments used in the study were structured questionnaires for teachers, in-depth interview guide for head teachers and an observation checklist to assess resources used by the teacher for ICT integration.

The present chapter is structured into three major sections. The first section covers the demographic information, response rate, assessments for validity and reliability and the diagnostic test outcomes whereby the assumption tests were carried out, including normality tests, linearity, homoscedasticity and multicollinearity. The second section presents the descriptive analysis of transformational leadership style, school environment, teacher efficacy in technology and integration of ICT in teaching and learning. Both inferential and descriptive statistics were carried out in elucidating the hypothesis test outcomes.

The discussions were informed by earlier study findings and involved an interpretation of positioning of results within the context of transformational leadership style, school environment, teacher efficacy in technology and integration of ICT in teaching and learning. The arguments revolved around the study outcomes and were ordered as per the objectives of the research. The third section in addition covers the results of the hypothesis test, whereby a number of regression analyses are carried out with a view to test every stated hypothesis. Results in every section are interpreted and presented as an indicator of the study variables.

Descriptive analysis involved the utilization of such data as percentages and frequencies to show items' manifestation in both proportional and absolute terms. The study also utilized mean scores to depict the degree at which and rating of various constructs' landscapes across the respondent institutions.

The standard values of deviation on the one hand, were computed to show responses' variability in relation to the mean scores established, while on the other hand, inferential analysis comprised of Pearson's correlations used to depict the linear associations' strength, direction and degree of between the outcome and predictor constructs and multiple regression analysis to show both the degree of variation in the outcome construct with unit variations in the moderating, mediator and predictor variables and their significance, resulting in tests of hypothesis.

4.2 Response Rate

As demonstrated in Table 4.1, a total of 376 questionnaires were delivered to teachers in the 11 sub-counties of Nairobi County. Out of this, the total respondents realized were 312, presenting a response rate of 82.98%. Besides recruiting research assistants to aid in data collection, the high response rate can also be attributed to COVID-19 shifting many

teachers online hence easier to fill online questionnaires. At the same time out of the 21 interviews and infrastructure observations scheduled to be conducted with the selected primary school head teachers, only 13 were successful recording a return rate of 61.9%. This return was affected by the covid-19 pandemic that required schools to close abruptly in March 2020. This also affected the observation of the infrastructure in schools that was to be carried out during the interviews. This was inferred as excellent, in tandem with Creswell (2013) who classified a 50% return rate as suitable for analysis; a 60% rate of as acceptable and a 70% and above response rate as outstanding. Similarly, Rea and Parker (1997) deem a 50-60% return rate as satisfactory and a 70% return rate as outstanding. Further in agreement, Njeru, (2013) proposes that a 60% return rate represents the study population.

Table 4.1: Response Rate

Respondents	Targeted	Frequency	Percent (%)
Teachers	376	312	82.98
Head teachers	21	13	61.90

Source: Survey Data (2020)

4.3 Diagnostic Tests

Prior to data analysis, carried out various diagnostic tests were carried out with a view to check for data quality and eliminate any errors in preparation for both descriptive and inferential analyses. Preliminary tests would thus assure both the quality of output and correctness of the type of analysis to be used. Diagnostic tests were also done to ensure the assumptions of the classical linear regression model are not violated. To this end, data diagnostics included: tests for reliability and validity, analysis of missing values, outliers, normality, multi-collinearity as well as homogeneity of variances.

4.3.1 Reliability Test Results

A pilot study was conducted involving 29 participants from 20 schools between July 13th and August 22nd, 2019. The respondents were selected from schools not within the original sample. Statistical analysis was carried out to ascertain the reliability and validity of the data collection instruments using SPSS version 25. Standardized interview schedules were used to gather primary information from selected primary School head teachers. The relevance of the content used in the interview schedule as well as the general observation and lesson observation tools was assessed by officers from Kenya Institute of Curriculum Development (KICD) and Ministry of Education (MOE). The supervisors of this thesis also reviewed the instruments for relevance. Their recommendations were used to review and correct the instruments. The reliability results were as demonstrated in Table 4.2.

Table 4.2: Reliability Test Results

Construct	Variable	No. of Items	Cronbach's Alpha	Cronbach's Alpha (standardized items)	Remarks
ICT Integration	Dependent	10	.814	.816	Accepted
Transformational Leadership Style	Independent	30	.981	.981	Accepted
Teacher Self-Efficacy in Technology	Mediating	10	.928	.928	Accepted
School Environment	Moderating	16	.896	.904	Accepted

A limit of 0.7 was taken in the study as an indicative of reliability. Subsequently, for all the variables, the alpha coefficients were greater than 0.70, ranging from the least at .816 and the highest at .981. With all items registered a Cronbach alpha, $\alpha > 0.7$ the items were deemed as high internally consistent and that the set of the items used to measure each of the variables are closely related as a group.

The results led to the deduction that the instruments of data collection taken in the study had an excellent coefficient of reliability and were therefore suitable for the study. The feedback from the pilot study and comments of the supervisors were implemented on the research tool. The tools were fine-tuned for the full study. The results are consistent with the 0.7 yardstick established by Cronbach (1951) demonstrating that all the gauges employed in the formulating the questionnaire items were reliable. The results were further in line with Nunnally (1978) who proposed a 0.7 alpha coefficient as the reliability threshold. The results further depicted a greater coefficient in relation to Davis (1964) who proposed a 0.5 cut-off reliability coefficient.

4.3.2 Instrument Validity

According to Kothari (2003), validity is "the degree to which the test actually measures what it purports to measure", a direct check on how well the measure fulfils its function. In the present study, face, construct and content validity tests were employed. To check for both face and content validity, expert opinion was sought with a view to enhance face and content validity of the data collection instruments. The objective was to examine the number of variables that are related to the study. Confirmatory Factor Analysis (CFA) was done for all the study variables for investigation of their relationship. Items with a factor loading of 0.4 and above were retained for further analysis. CFA is also employed to stipulate the hypothesized factors that ought to be included for testing the validity of relations among a set of variables through factor loadings on the data (McNabb, 2008). The following statistical outputs were generated from factor analysis: Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlets Test of sphericity, total variance explained and rotated component matrix.

4.3.2.1 Factor Analysis for Transformational Leadership Style

Factor analysis was done for the items being used to measure transformational leadership style. As demonstrated in Table 4.3, the study established a KMO test statistics of 0.96 for the variable, Transformational Leadership Style. According to Kaiser (1974) KMO values that are statistically greater than 0.5 are adequate. In this study then, the value of 0.96 indicates that there was sampling adequacy. Bartlett's Test of Sphericity produced a P value of 0.000 indicating that the constructs in the dataset are significantly correlated. Since the p-values were less than 0.05, this also indicates that the items are related and had sampling adequacy and hence could be used for further analysis (Ajibola, 2019).

Table 4.3: Bartlett's and KMO Test: Transformational Leadership Style

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.96
Bartlett's Test of Sphericity	Approx. Chi-Square	2613.54
	Df	66
	Sig.	0.000

Source: Survey Data (2020)

The Principal Component Analysis (PCA) method was used to ascertain the initial set of constructs making up the study variables. A total of 12 components were established as Table 4.4 shows. Out of the 12 components, 65.362 variation proportion were expounded by 1 component. The study used the Kaiser's criterion to seek variables equal to 1 or greater than 1 Eigen values. As such, from the combined data set, a maximum of 1 component was extracted based on the total variance.

Table 4.4: Total Variance: Transformational Leadership Style

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.843	65.362	65.362	7.843	65.362	65.362
2	.669	5.573	70.934			
3	.540	4.497	75.431			
4	.516	4.297	79.728			
5	.448	3.730	83.458			
6	.383	3.188	86.646			
7	.342	2.852	89.499			
8	.288	2.400	91.898			
9	.269	2.242	94.140			
10	.252	2.103	96.243			
11	.236	1.969	98.212			
12	.215	1.788	100.000			

Method of Extraction: PCA.

Source: Survey Data (2020)

As observed by Nunny and Berstein (1994), the Kaiser criterion presents a weakness in its propensity to exaggerate the amount of factors. To address this weakness, a scree plot was proposed by Stevens (2002) to assess the number of statements to be maintained. The eigenvalues are graphed on a scree plot against the number of component and a point of inflexion is displayed on the curve. This is then used to determine the number of components to be extracted. The components in a scree plot before this, point to the amount of factors to maintain while after the point of inflexion, the components show that smaller and smaller amounts account for each consecutive factor hence ought not to be maintained.

The plot according to Norusis (2003), most often illustrates a distinctive discontinuity between the large factors at the vertical slope and the other factors at the steady trailing off, which forms at the base. Norusis (2003) notes that one should only use factors before the beginning of the scree. In the present findings, only the first component come before

the point of inflexion at the scree plot in Figure 4.1. As such, only one (1) descriptors were considered adequate in the combined data set.
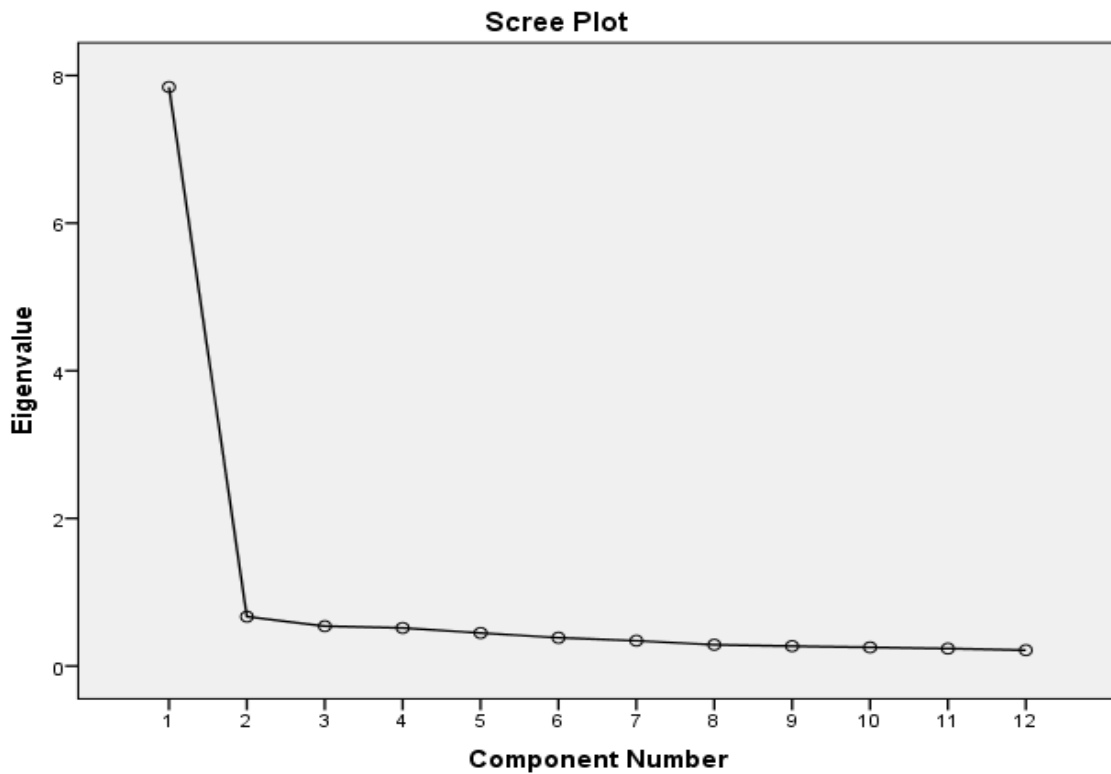
Figure 4.1: Scree Plot: Transformational Leadership Style
Source: Survey Data (2020)

As Table 4.5 shows, a total of 12 items were established loaded in a 1-component structure determined from an Oblimin method with Kaiser Normalization rotation. Oblimin method was preferred owing to an anticipated correlation among the items making up the component. The factor loadings were 0.740 for the lowest and 0.858 for the highest. No r squared values (communalities) below 0.4 were observed and therefore all factors were retained.

Table 4.5 Component Matrix: Transformational Leadership Style

	Component 1
Head teacher helps others find meaning in their work	.858
Head teacher provides us with new ways of looking at puzzling things	.834
Head teacher gets us to rethink ideas that they had never questioned before	.834
Head teacher lets us know how he/she thinks we are doing.	.823
Those the head teacher interacts with have complete faith in him or her	.823
Head teacher helps us develop ourselves	.823
Head teacher makes people they interact with feel good to be around him/her	.821
Head teacher provides appealing images about what we can do	.798
Head teacher enables those he/she interacts with to think about old problems in new ways	.776
Head teacher gives personal attention to those who seem rejected	.761
Head teachers expresses with a few simple words what we could and should do	.750
Those the head teacher interacts with are proud to be associated with him or her	.740
Composite Mean	0.803

Method of Extraction: PCA.

a. 1 components extracted.

4.3.2.2 Factor Analysis for Teacher Self-Efficacy in Technology

Factor analysis was done for the items being used to measure teacher self-efficacy in technology. As demonstrated in Table 4.6, the study established a KMO test statistics of 0.96 for the variable, teacher efficacy in technology, indicating sampling adequacy in accordance with Kaiser (1974). Bartlett's Test of Sphericity produced a P value of 0.000 indicating that the constructs in the dataset are significantly correlated. Since the p-values were less than 0.05, this also indicates that the items are related and had sampling adequacy and hence could be used for further analysis (Ajibola, 2019).

Table 4.6: Bartlett's and KMO Test: Teacher Self-Efficacy in Technology

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.90
Bartlett's Test of Sphericity	Approx. Chi-Square	1061.14
	Df	21.00
	Sig.	0.000

Source: Survey Data (2020)

The PCA technique was also used to confirm the primary solution. This method was further considered desirable since it permitted the dataset reduction to a more controllable size at the same time maintaining a lot of the original information. A total of seven (7) components were established as Table 4.7 shows. Out of the seven (7), 62.673 variation proportion were expounded by 1 component. The study used the Kaiser's criterion to seek variables equal to 1 or greater than 1 Eigen values. As such, from the combined data set, a maximum of 1 component was extracted based on the total variance.

Table 4.7: Total Variance: Teacher Self-Efficacy in Technology

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.387	62.673	62.673	4.387	62.673	62.673
2	.724	10.345	73.019			
3	.537	7.666	80.684			
4	.410	5.864	86.548			
5	.383	5.478	92.026			
6	.285	4.067	96.093			
7	.274	3.907	100.000			

Method of Extraction: PCA.

Source: Survey Data (2020)

As demonstrated in Table 4.2, only the first 1 component comes before the point of inflexion at the scree plot. As such, only 1 descriptor was considered adequate in the combined data set.
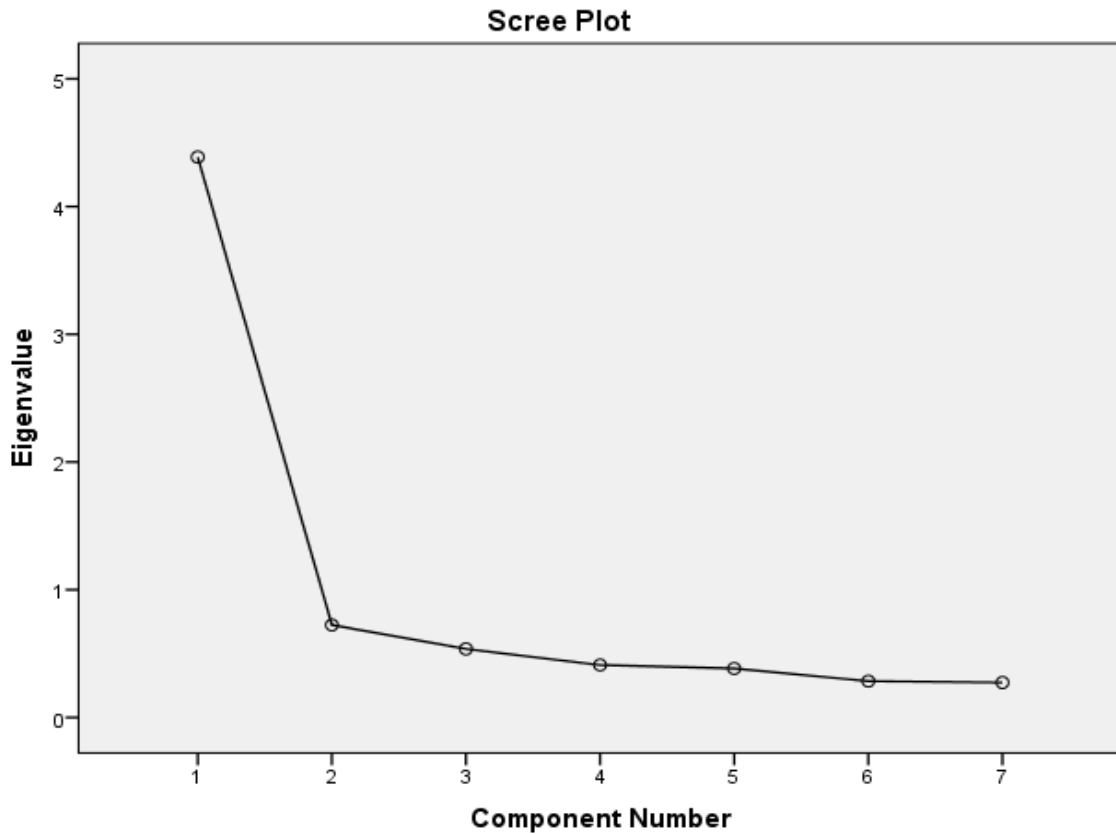
Figure 4.2: Scree Plot: Teacher Self-Efficacy in Technology
Source: Survey Data (2020)

Further, as Table 4.8 shows, a total of 7 items were established loaded in a 1-component structure determined from an Oblimin method with Kaiser Normalization rotation. Oblimin method was also preferred owing to an anticipated correlation among the items making up the components. The factor loadings were 0.708 for the lowest and 0.845 for the highest. No r squared values (communalities) below 0.4 were observed and therefore all factors were retained.

Table 4.8 Component Matrix: Teacher Self-Efficacy in Technology

	Component 1
To what extent can you integrate technology across the curriculum?	.845
How capable are you of determining why, when, and how to use technology in education?	.836
How well prepared are you to evaluate software to support teaching and learning?	.836
How competent do you perceive yourself to select and use various media to support teaching and learning?	.804
Frequency of using the technology in class	.763
Participate in social networks	.743
Did you incorporate technology to enhance teaching and learning in the lessons you taught today	.708
Composite Mean	0.791

Method of Extraction: PCA.

a. 1 components extracted.

4.3.2.3 Factor Analysis for School Environment

Factor analysis was done for the items being used to measure school environment. As demonstrated in Table 4.9, the study established a KMO test statistics of 0.96 for the variable, school environment, indicating sampling adequacy in accordance with Kaiser (1974). Bartlett's Test of Sphericity produced a P value of 0.000 indicating that the constructs in the dataset are significantly correlated. Since the p-values were less than 0.05, this also indicates that the items are related and had sampling adequacy and hence could be used for further analysis (Ajibola, 2019).

Table 4.9: Bartlett's and KMO Test: School Environment

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.90
Bartlett's Test of Sphericity	Approx. Chi-Square	1936.58
	Df	120.00
	Sig.	0.000

Source: Survey Data (2020)

The PCA method was also used to confirm the primary solution. This method was further considered desirable since it permitted the dataset reduction to a more controllable size at the same time maintaining a lot of the original information. A total of 16 components were established as Table 4.10 shows. Out of the 16, 57.659 variation proportion were expounded by 3 components, while 13 components explained 42.341 percent of the variations. The study used the Kaiser's criterion to seek variables equal to 1 or greater than 1 eigenvalue. A total of 40.897 percent of the variations were accounted by component 1, while 9.627 variation proportion were expounded by component 2 and component 3 accounted for 7.135 percent of the variations. As such, from the combined data set, a maximum of 3 components were extracted based on the total variance.

Table 4.10: Total Variance: School Environment

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.544	40.897	40.897	6.544	40.897	40.897
2	1.540	9.627	50.524	1.540	9.627	50.524
3	1.142	7.135	57.659	1.142	7.135	57.659
4	.988	6.174	63.833			
5	.885	5.532	69.365			
6	.816	5.100	74.465			
7	.638	3.987	78.453			
8	.551	3.444	81.896			
9	.500	3.123	85.019			
10	.425	2.656	87.675			
11	.418	2.614	90.289			
12	.386	2.411	92.700			
13	.328	2.053	94.753			
14	.315	1.966	96.718			
15	.281	1.758	98.476			
16	.244	1.524	100.000			

Method of Extraction: PCA.
Source: Survey Data (2020)

As demonstrated in Table 4.3, only the first 1 component comes before the point of inflexion at the scree plot. As such, only 1 descriptor was considered adequate in the combined data set.
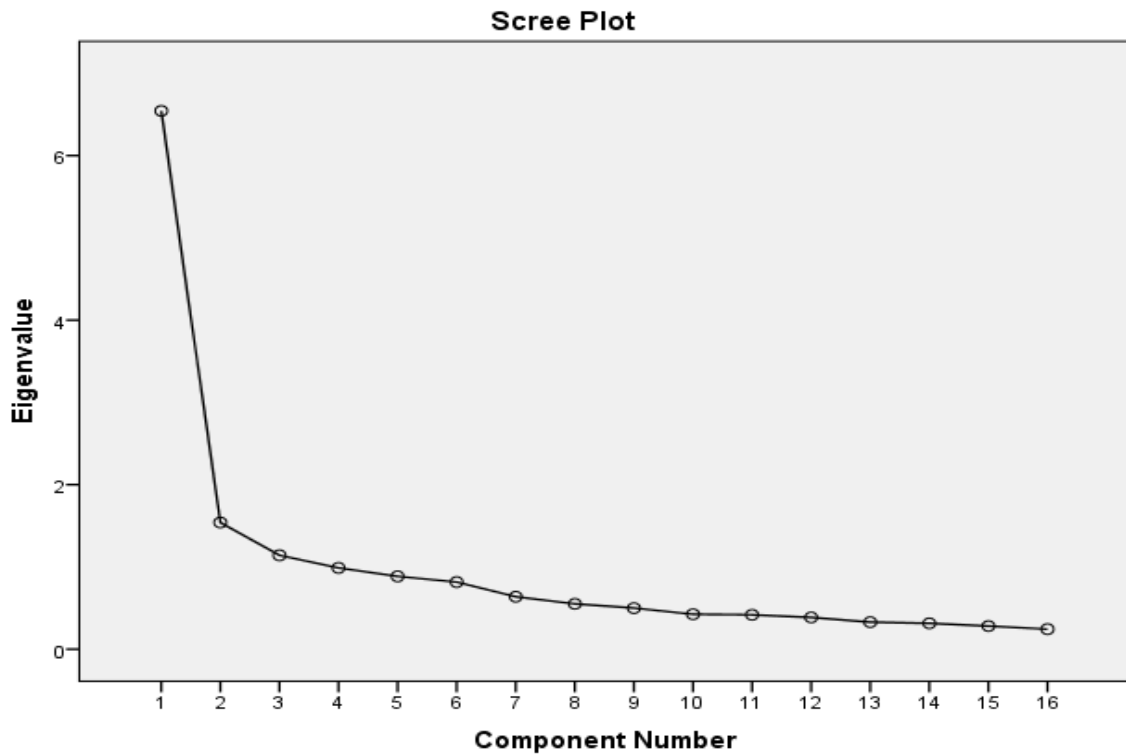
Figure 4.3: Scree Plot: School Environment
Source: Survey Data (2020)

As Table 4.11 shows, a total of 7 items were established loaded in a 1-component structure determined from an Oblimin method with Kaiser Normalization rotation. Oblimin method was further preferred owing to an anticipated correlation among the items making up the components. The factor loadings were 0.469 for the lowest and 0.771 for the highest. The item "My school provides learners with the textbooks and learning materials" had a r squared values (communalities) below 0.4 at 0.394. This factor dropped in further analysis.

Table 4.11 Component Matrix: School Environment

	Component		
	1	2	3
Our school has a mission	.641		
The mission of our school is known to all students	.591		
My school buildings are in good condition	.670		
Our class size has enough furniture for everyone	.487		
There are free interactions between the teachers and learners		-.448	
In my school, teachers want learners to contribute their thoughts in class		-.581	
In my school, teachers expect learners to be well behaved in school		-.565	
My school provides learners with the textbooks and learning materials	.585		
Our library has up-to-date instructional materials			.612
In my school, teachers make learning interesting using technology and involving the learners in the learning process	.568		
In my school, teachers inform learners about their progress in their class and involves their parents in the learning process			.675
The Board of Management is supportive to the learning process			.775
The parents, guardians and sponsors relate well with the teachers and pupils	.670		
The head teacher supports teachers' initiatives and encourages them	.731		
In my school, the administration involves teachers in making decisions	.716		
The head teacher motivates teachers to keep performing well		.400	
Composite Mean	0.629	-0.299	0.687

Method of Extraction: PCA.
a. 3 components extracted.
Source: Survey Data (2020)

4.3.2.4 Factor Analysis for ICT Integration

Factor analysis was done for the items being used to measure ICT integration. As demonstrated in Table 4.12, the study established a KMO test statistics of 0.96 for the variable, ICT integration, indicating sampling adequacy in accordance with Kaiser (1974). Bartlett's Test of Sphericity produced a P value of 0.000 indicating that the constructs in the dataset are significantly correlated. Since the p-values were less than 0.05, this also indicates that the items are related and had sampling adequacy and hence could be used for further analysis (Ajibola, 2019).

Table 4.12: Bartlett's and KMO Test: ICT integration

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.93
Bartlett's Test of Sphericity	Approx. Chi-Square	3233.11
	Df	153.00
	Sig.	0.000

Source: Survey Data (2020)

The PCA method was also used to confirm the primary solution. This method was further considered desirable since it permitted the dataset reduction to a more controllable size at the same time maintaining a lot of the original information. A total of 18 components were established as Table 4.13 shows. Out of the 18, 61.939 variation proportion were expounded by 2 components, while 16 components explained 38.061 percent of the variations. The study used the Kaiser's criterion to seek variables equal to 1 or greater than 1 eigenvalue. A total of 52.006 percent of the variations were accounted by component 1, while 9.933 variation proportion were expounded by component 2. As such, from the combined data set, a maximum of 2 components were extracted based on the total variance.

Table 4.13: Total Variance: ICT integration

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.361	52.006	52.006	9.361	52.006	52.006	5.915	32.862	32.862
2	1.788	9.933	61.939	1.788	9.933	61.939	5.234	29.077	61.939
3	.887	4.926	66.865						
4	.786	4.365	71.230						
5	.717	3.981	75.211						
6	.642	3.564	78.775						
7	.573	3.181	81.956						
8	.508	2.824	84.779						
9	.436	2.424	87.204						
10	.368	2.046	89.250						
11	.331	1.839	91.089						
12	.308	1.712	92.801						
13	.286	1.587	94.388						
14	.278	1.543	95.931						
15	.249	1.381	97.312						
16	.181	1.007	98.319						
17	.174	.966	99.285						
18	.129	.715	100.000						

Method of Extraction: PCA.

As demonstrated in Table 4.4, only the first 2 components come before the point of inflexion at the scree plot. As such, only 2 descriptors were considered adequate in the combined data set.
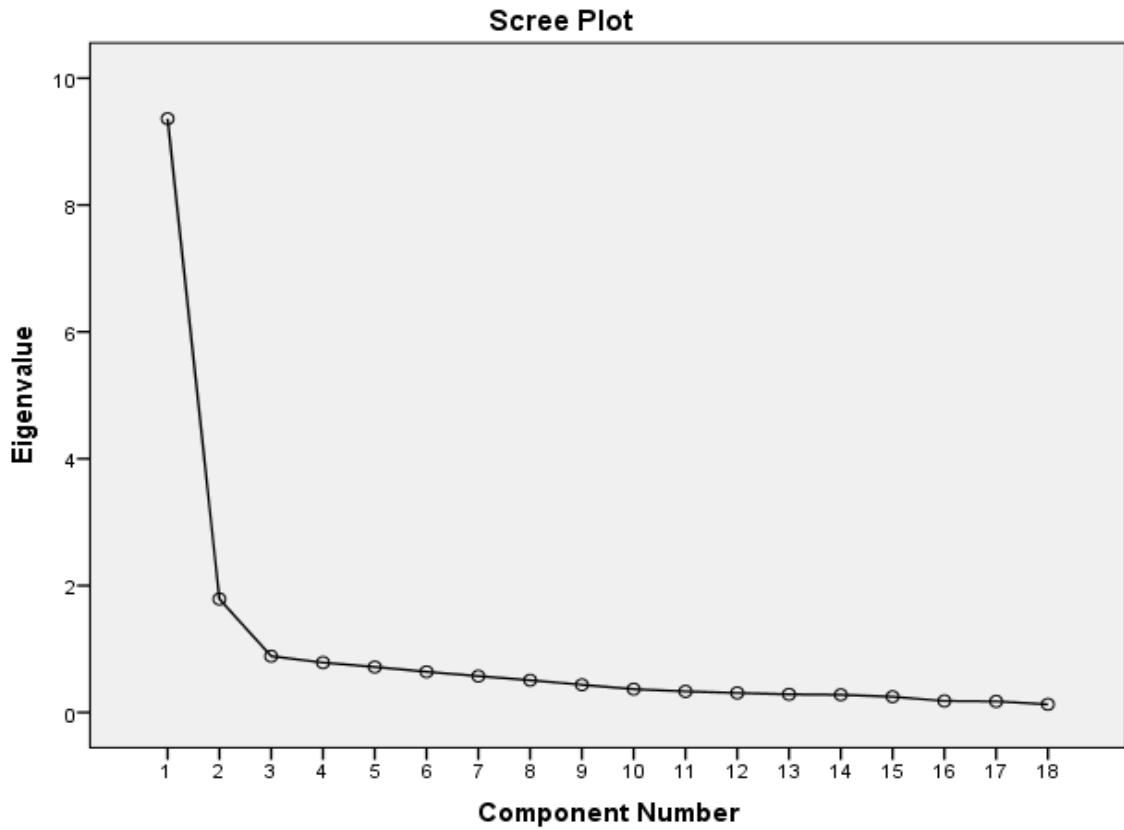
Figure 4.4: Scree Plot: ICT Integration
Source: Survey Data (2020)

As Table 4.15 shows, a total of 7 items were established loaded in a 1-component structure determined from an Oblimin method with Kaiser Normalization rotation. Oblimin method was further preferred owing to an anticipated correlation among the items making up the components. The factor loadings were 0.606 for the lowest and 0.783 for the highest. No r squared values (communalities) below 0.4 were observed and therefore all factors were retained.

Table 4.15: Component Matrix: ICT Integration

	*Component 1	2
Delivering an ICT integrated lesson	.783	
Share online notes with other teachers	.778	
Designing technology driven projects	.765	
Class management through technology	.762	
Use ICT in monitoring learners' academic progress	.748	
Participate in online team teaching	.739	
Use ICT in giving assignments	.727	
Research for class activities using ICT	.723	.421
Conduct online discussions with learners	.711	
Belong to knowledge information organisation	.707	
Engage in online chat discussions with learners	.706	-.505
ICT is readily available for use in class	.698	
Belong to a teacher's community of practice	.689	
Technology available anytime you need it	.682	.432
Access further capacity building programs online	.655	
Sourcing for additional material to teach	.639	.491
Able to keep and manage learners' records	.608	
Allow learners to reach out through social media	.606	-.416
Composite Mean	0.707	0.085

Method of Extraction: PCA.
a. 2 components extracted.

4.3.3 Analysis of Missing Values

The study carried out the Missing Value Analysis (MVA) in order to assess any pattern of missing data and the corresponding missing values magnitude. The analysis was carried out missing values pattern and to substitute them in the data. The succeeding computation of univariate statistics demonstrated in Appendix VI indicated no missing values.

4.3.4 Test for Outliers

An outlier is expressed as a point of data which distances itself from the model while the rest do fall within the range and seems distant from the remaining data (Collis & Hussey, 2009). The identification of outliers can lead to the discovery of truly unexpected knowledge in the analysis of statistics. However, these points can have a negative effect on the regression equation, skewness and kurtosis of the data. Therefore, outlier detection is important for effective modelling to present the accuracy of results.

The data was analyzed to detect the presence of multivariate outliers following the guidelines by Ary et al. (2010) and Collis and Hussey (2009). The multivariate outliers were detected using Mahalanobis distance (D^2). A case is found to be an outlier if the probability associated with its (D^2) is 0.001 or less (Collis and Hussey (2009). In this study, no outlier was detected as all statements had probabilities associated with their (D^2) as above 0.001. The SPSS output to this effect is illustrated in Appendix III.

4.3.5 Normality

Spread of normality was observed explicitly by visual examination of plots and graphs as well as statistically through numerical tests especially by examining kurtosis and skewness and the Shapiro-Wilk test. According to Collis and Hussey (2009), Shapiro-Wilk test is more suitable for small sizes of less than 50 but can also handle sample sizes as large as two thousand while for above two thousand sample sizes, Kolmogorov-Smirnov is used. Values greater than 0.05 are utilized to show normality significance in Shapiro-Wilk test (Collis & Hussey, 2009; Ary *et al.,* 2010). As such, in the present research study, normality of distributions was assessed through the Shapiro-Wilk test.

Table 4.16: Test for Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ICT Integration	.048	197	.200[*]	.988	197	.099
Transformational Leadership Style	.074	197	.011	.978	197	.104
Teacher Self-Efficacy in Technology	.071	197	.017	.989	197	.141
School Environment	.043	197	.200[*]	.990	197	.168

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction
Source: Survey Data (2020)

The results presented in Table 4.16 indicated that data were normally distributed for all scales since all Shapiro-wilk statistics had Statistical significance values above the acceptable threshold of 0.05 (Tashakkori & Teddlie, 2008). A normality test formally tests if the population the sample represents is normally-distributed. The null hypothesis states that the population is normally distributed, against the alternative hypothesis that it is not normally-distributed. If the test p-value is less than the predefined significance level, you can reject the null hypothesis and conclude the data are not from a population with a normal distribution. If the p-value is greater than the predefined significance level, you cannot reject the null hypothesis. The null hypothesis that the data are normally distributed was therefore accepted, hence the conclusion that the data is normally distributed.

The study conducted both Kurtosis and Skewness to assess data normality, particularly the distribution's peakedness and symmetry. In order to confirm a normal spread, the values for kurtosis and asymmetry between -2 and +2 were deemed acceptable (Ary et al., 2010). The values of skewness and kurtosis observed were as shown in Table 4.17.

Table 4.17: Skewness and Kurtosis

Variable	Skewness	Kurtosis
ICT Integration	0.27	-0.196
Transformation Leadership	-0.168	-0.666
Teacher Self Efficacy in Technology	-0.024	-0.144
School Environment	0.095	-0.443

4.3.6 Multi-collinearity

The VIF values were utilized to assess the level of association among the constructs as well as to estimate the level at which the coefficient variance is inflated owing to linear reliance with other factors. VIF values greater than 10 would indicate probability of a problem with multi-collinearity and consequently they are poorly estimated (Newbert,

2008). The VIF values obtained for the Transformational Leadership Style, Teacher Self Efficacy in Technology and School Environment, were 1.227, 1.221 and 1.408 respectively as shown in Table 4.18. It is considered that the model did not suffer multi-collinearity.

Table 4.18: Multi-collinearity Test

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	.614	.260		2.364	.019		
	Transformational Leadership Style	.078	.052	.084	1.511	.132	.815	1.227
	Teacher Self-Efficacy in Technology	.501	.056	.496	8.957	.000	.819	1.221
	School Environment	.058	.079	.043	.731	.465	.710	1.408

a. Dependent Variable: ICT Integration

4.3.7 Heteroscedasticity

To check for both independent of errors and linearity, a P-P residual plot was produced. The resulting P-P Plots ware as shown in Figure 4.5. Visibly, there are no drastic variations from the normal line (Solutions, 2020). The residual data points also coalesce along the line of best fit. This indicates linearity and that that the model does not suffer heteroscedasticity.
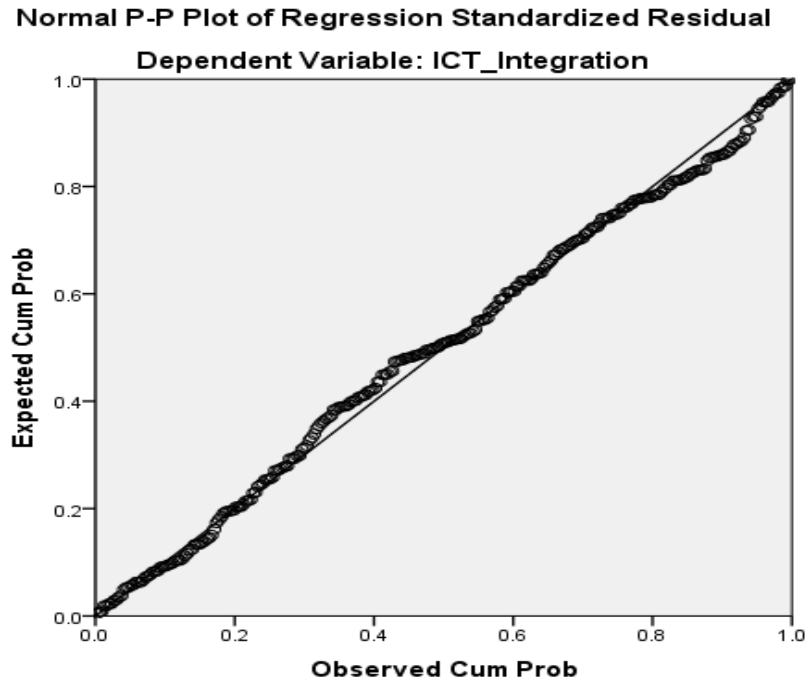
Figure 4.5: P-P Plot

4.3.8 Autocorrelation

The data collected was cross-sectional or a snapshot in time. There was therefore no expectation of autocorrelation.

4.3.9 Singularity

Singularity analysis was done to ascertain that, independent variables are indeed independent and different from each other and hence it will be possible to perform inferential analyses (Newbert, 2008). Singularity would be ascertained if the correlation between the variables is less than +/- 0.7 (Abrams, 1999). As shown in Table the inter-variable correlations were less than 0.7 for Transformational Leadership Style, Teacher Self Efficacy in Technology and School Environment.

4.4 Demographic Information

This part covers both the participant institutions' demographics including participation by gender respondents', highest education level attained, number of years utilizing ICT and respondent age,.

4.4.1 Response Rate by Gender

As demonstrated in Table 4.19, the respondents by gender from the questionnaires to the teachers were distributed into 61.9% female and 34.6% male. The question was not mandatory and thus 3.5% did not indicate their gender. The ratio of 2:1 between male and female teachers with a random selection of respondents would be an indicator that a majority of the primary school teachers are female. This finding may be ascribed to that fact that there are more female teachers in Nairobi probably due to the fact they accompany their spouses who are based in the city. This finding could further back up the possibility that most female teachers are posted to the county to be with their families.

Table 4.19: Respondent Gender

Gender	Frequency	Percent
Female	193	61.9
Male	108	34.6
N/A	11	3.5
Total	312	100.0

4.4.2 Response Rate by Age

The respondents were requested to indicate their age against the respective categories. The teachers 30 years or below account for 18.9%, those between 31 and 35 years of age account for 25%, those between 36 and 45 years of age account for 26.9%, those aged between 46 and 55 years' account for 21.5% while there is 3.8% of teachers aged above 55 years and 3.8% who did not declare their age. Table 4.20 shows the distribution of teachers by their ages.

It can be deduced from the foregoing finding that respondents by age was largely distributed and symmetrical, with a majority belonging to the 36-45 years' category. As such, age in the study area can be deemed largely youthful. Accordingly, it would be expected that owing to their youthful ages, most of the participants would be adequately versed and competent in the integration of ICT in their teaching practice.

Table 4.20: Age of Respondents

Age	Frequency	Percent
30 years or less	59	18.9
31-35 years	78	25.0
36-45 years	84	26.9
46-55 years	67	21.5
More than 55 years	12	3.8
Total	312	100.0

4.4.3 Respondents by Highest Level of Education

The respondents were requested to indicate their highest level of education, results of which are presented in Table 4.21. A simple majority of 46.5% have a Diploma while 37.2% possess an undergraduate degree with 11.5% holding a postgraduate degree (masters or doctoral degree). A 4.8% of the respondents did not declare their highest level of education. This indicates a simple majority of teachers have attained degrees with a combined 48.7% compared to 46.5% with a diploma level of education. Though under graduate, masters and doctoral degrees are not a prerequisite for Primary school teachers, the findings indicate that a simple majority of them have gone ahead to acquire these degrees. This can be attributed to the availability of these programs to the teachers offered in flexible times such as during the school holidays and in the evenings thus taking advantage of the opportunity to further their education.

As with the largely youthful age, it would also be expected that owing to their high levels of education, most of the participants would be adequately versed and competent in the integration of ICT in their teaching practice.

Table 4.21: Highest Education Level Attained

Education Level	Frequency	Percent
Diploma	145	46.5
Postgraduate	36	11.5
Undergraduate	116	37.2
Total	312	100.0

4.4.4 Respondents by Number of Years in the Use of ICT

The data indicates that a majority of the teachers (44.2%) have used ICT for less than 5 years, 31.7% have used ICT for 6 to 9 years while 19.9% have used ICT for over 10 years. This indicates that collectively, a majority of 51.6% have a combined experience of ICT use of over 6 years. This is significant given the need to have more teachers able to manage a digital age learning environment. This could be as a result of the exposure by the teachers to technology that is rampant in the County. Most services in Nairobi are accessed through technology for example government services accessed through e-citizen. Table 4.22 illustrates teachers experience in the use of ICT.

Table 4.22: Number of Years of Use of ICTs

Number of Years	Frequency	Percent
0-5 years	138	44.2
6-9 years	99	31.7
Over 10 years	62	19.9
Total	312	100.0

4.5 Association between Demographic Variables

The study ought to assess the association between the various demographic variables with a view to further develop the respondents' demographic profiles. To this end, the study carried out cross tabulations between Respondent Gender and highest education level attained as well as between respondent age and highest level of education accomplished. As demonstrated in Table 4.23, Respondent Genders was cross tabulated against the highest education level attained. From Table 4.23, findings indicate that within Respondent Genders, a majority of female respondents (46.1%) had achieved a diploma, followed by 38.3% having achieved the level of undergraduate degree. Accordingly, within the highest education level achieved, 77.8% of respondents with a post-graduate degree were female while 63.8% of respondents with an undergraduate degree were female respondents. Further, 61.4% of respondents with a diploma were female respondents.

Findings in Table 4.23 also indicate that within Respondent Genders, a majority of male respondents (51.9%) had achieved a diploma, then 38.9% having achieved the level of undergraduate degree. Accordingly, within the highest education level attained, 22.2% of respondents with a post-graduate degree were female while 36.2% of respondents with an undergraduate degree were female participants. Further, 38.6% of respondents with a diploma were female respondents. It can be inferred from the findings, that more female respondents affirmed to the high levels of education attained, as compared to the male respondents. This can partly be attributed to the majority of respondents reached being female, as well an assumption that more female teachers seek out higher levels of education and career development compared to their male counterparts.

Table 4.23 Cross Tabulation between Gender and Highest Education Level

| | | | Highest Education Level Attained: | | | |
			Diploma	Postgraduate	Undergraduate	Total
Respondent Gender	Female	Count	2	89	28	74	193
		Expected Count	9.3	89.7	22.3	71.8	193.0
		% within Respondent Gender	1.0%	46.1%	14.5%	38.3%	100.0%
		% within Highest Education Level Attained:	13.3%	61.4%	77.8%	63.8%	61.9%
		% of Total	0.6%	28.5%	9.0%	23.7%	61.9%
	Male	Count	2	56	8	42	108
		Expected Count	5.2	50.2	12.5	40.2	108.0
		% within Respondent Gender	1.9%	51.9%	7.4%	38.9%	100.0%
		% within Highest Education Level Attained:	13.3%	38.6%	22.2%	36.2%	34.6%
		% of Total	0.6%	17.9%	2.6%	13.5%	34.6%
	N/A	Count	11	0	0	0	11
		Expected Count	.5	5.1	1.3	4.1	11.0
		% within Respondent Gender	100.0%	0.0%	0.0%	0.0%	100.0%
		% within Highest Education Level Attained:	73.3%	0.0%	0.0%	0.0%	3.5%
		% of Total	3.5%	0.0%	0.0%	0.0%	3.5%
Total		Count	15	145	36	116	312
		Expected Count	15.0	145.0	36.0	116.0	312.0
		% within Respondent Gender	4.8%	46.5%	11.5%	37.2%	100.0%

% within Highest Education Level Attained:	100.0 %	100.0%	100.0%	100.0%	100.0 %
% of Total	4.8%	46.5%	11.5%	37.2%	100.0 %

As demonstrated in Table 4.24, age of the respondents was cross tabulated against the highest education level attained. From Table 4.24, findings indicate that within age of the respondents, most of the participants aged 30 years or less, 69.5% had reached a diploma level of education, followed by 27.1% having reached the level of an undergraduate degree while only 1.7% had a post-graduate degree. Accordingly, within the highest education level attained, 28.3% of respondents with a diploma aged 30 years or less while 13.8% of respondents with an undergraduate degree were respondents aged 30 years or less. Further, only 2.8% of the respondents with a post-graduate degree aged 30 years or less.

Also from Table 4.24, findings indicate that within age of the respondents, most of the participants aged between 31-35 years, 46.2% had reached a diploma, then 42.3% having reached the level of an undergraduate degree while only 7.7% had a post-graduate degree. Accordingly, within the highest education level attained, 28.4% of respondents with an undergraduate degree aged between 31-35 years while 24.8% of respondents with a diploma were respondents aged between 31-35 years. Further, only 16.7% of the participants with a post-graduate degree aged between 31-35 years.

Further as demonstrated in Table 4.24, findings indicate that within age of the respondents, most of the participants aged between 36-45 years (45.2%) had reached an undergraduate degree, followed by 33.3% having attained a diploma level while 21.4% had a post-graduate degree. Accordingly, within the highest education level reached,

50.0% of respondents with a post-graduate degree aged between 36-45 years while 32.8% of respondents with an undergraduate degree were respondents aged between 36-45 years. Further, only 19.3% of the respondents with a diploma aged between 36-45 years.

Further, results presented in Table 4.24 show that within age of the respondents, most of the participants aged between 46-55 years (47.8%) had reached the level of diploma, then 37.3% having reached the level of an undergraduate degree while 14.9% had a post-graduate degree. Accordingly, within the highest education level attained, 27.8% of respondents with a post-graduate degree aged between 46-55 years while 22.1% of respondents with a diploma were respondents aged between 46-55 years. Further, only 21.6% of the respondents with an undergraduate degree aged between 46-55 years.

Results in Table 4.24 further show that within age of the respondents, most of the participants aged more than 55 years (66.7%) had reached the level of diploma, then 25.0% had reached the level of undergraduate degree while 8.3% had a post-graduate degree. Accordingly, within the highest education level attained, only 5.5% of respondents with a diploma aged more than 55 years while 2.8% of respondents with a post-graduate degree were respondents aged more than 55 years. Further, only 2.6% of the respondents with an undergraduate degree aged more than 55 years.

It is inferred from the outcomes, that more respondents aged between 36-45 years affirmed to the high levels of education attained, as compared to respondents in other age categories. This can be attributed to the majority of respondents in the 36-45 age category being in the prime of their teaching careers having worked as a teacher for an adequate length of time and now seeking career growth and development hence enrolling in higher levels of education.

Table 4.24: Cross Tabulation between Age and Highest Education Level

| | | Highest Education Level Attained: | | | |
		Diploma	Postgraduate	Undergraduate	Total
What is your age?	Count	11	0	0	1	12
	Expected Count	.6	5.6	1.4	4.5	12.0
	% within What is your age?	91.7%	0.0%	0.0%	8.3%	100.0%
	% within Highest Education Level Attained:	73.3%	0.0%	0.0%	0.9%	3.8%
	% of Total	3.5%	0.0%	0.0%	0.3%	3.8%
30 years or less	Count	1	41	1	16	59
	Expected Count	2.8	27.4	6.8	21.9	59.0
	% within What is your age?	1.7%	69.5%	1.7%	27.1%	100.0%
	% within Highest Education Level Attained:	6.7%	28.3%	2.8%	13.8%	18.9%
	% of Total	0.3%	13.1%	0.3%	5.1%	18.9%
31-35 years	Count	3	36	6	33	78
	Expected Count	3.8	36.3	9.0	29.0	78.0
	% within What is your age?	3.8%	46.2%	7.7%	42.3%	100.0%
	% within Highest Education Level Attained:	20.0%	24.8%	16.7%	28.4%	25.0%
	% of Total	1.0%	11.5%	1.9%	10.6%	25.0%
36-45 years	Count	0	28	18	38	84
	Expected Count	4.0	39.0	9.7	31.2	84.0

	% within What is your age?	0.0%	33.3%	21.4%	45.2%	100.0%
	% within Highest Education Level Attained:	0.0%	19.3%	50.0%	32.8%	26.9%
	% of Total	0.0%	9.0%	5.8%	12.2%	26.9%
46-55 years	Count	0	32	10	25	67
	Expected Count	3.2	31.1	7.7	24.9	67.0
	% within What is your age?	0.0%	47.8%	14.9%	37.3%	100.0%
	% within Highest Education Level Attained:	0.0%	22.1%	27.8%	21.6%	21.5%
	% of Total	0.0%	10.3%	3.2%	8.0%	21.5%
More than 55 years	Count	0	8	1	3	12
	Expected Count	.6	5.6	1.4	4.5	12.0
	% within What is your age?	0.0%	66.7%	8.3%	25.0%	100.0%
	% within Highest Education Level Attained:	0.0%	5.5%	2.8%	2.6%	3.8%
	% of Total	0.0%	2.6%	0.3%	1.0%	3.8%
Total	Count	15	145	36	116	312
	Expected Count	15.0	145.0	36.0	116.0	312.0
	% within What is your age?	4.8%	46.5%	11.5%	37.2%	100.0%

% within Highest Education Level Attained:	100.0%	100.0%	100.0%	100.0%	100.0%
% of Total	4.8%	46.5%	11.5%	37.2%	100.0%

4.6 Descriptive Statistics

This section provides a descriptive account of the variables explored in the study, with a view to illustrate their status and extent of application in the study areas. Accordingly, descriptive statistics including means, standard deviations, variance, skewness and kurtosis were computed along a 5-point Likert scale. Mean scores of 2.4 or less are taken to indicate low affirmation, while mean scores of between 2.5 and 3.4 imply moderate affirmation and mean scores of between 3.5 and 5.0 imply high affirmation. Descriptive analysis was based on the results emanating from the factor analysis.

4.6.1 Transformational Leadership Style

The study sought to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools. To this end, transformational leadership style was measured on the basis of 12 items and on the Likert scale: 1 - Not at all 2 - Once in a while 3 = Sometimes 4 = Fairly often 5 = Frequently. Mean scores of 2.4 or less are taken to indicate low frequency, while mean scores of between 2.5 and 3.4 imply moderate frequency. Mean scores of between 3.5 and 5.0 imply high frequency. The descriptive statistics are portrayed on Table 4.25. Transformational Leadership Style had a mean of 3.3814 (N=297).

Table 4.25: Transformational Leadership Style

Statistics	N		Mean	Med.	Mod.	Std. Dev.	Var.	Skew	Kurt.	Percentiles		
	Val.	Mis.								25	50	75
Head teacher makes people they interact with feel good to be around him/her	294	18	3.56	4.00	4	1.062	1.127	-.455	-.267	3.00	4.00	4.00
Those the head teacher interacts with have complete faith in him or her	293	19	3.52	4.00	4	1.032	1.066	-.286	-.680	3.00	4.00	4.00
Those the head teacher interacts with are proud to be associated with him or her	292	20	3.45	4.00	4	1.134	1.286	-.406	-.613	3.00	4.00	4.00
Head teachers expresses with a few simple words what we could and should do	295	17	3.38	3.00	3	1.071	1.148	-.185	-.620	3.00	3.00	4.00
Head teacher provides appealing images about what we can do	293	19	3.39	4.00	4	1.043	1.087	-.368	-.457	3.00	4.00	4.00
Head teacher helps others	293	19	3.49	4.00	4	1.065	1.134	-.303	-.656	3.00	4.00	4.00

	Val.	Mis.	Mean	Med.	Mod.	Std. Dev.	Var.	Skew.	Kurt.			
find meaning in their work												
Head teacher enables those he/she interacts with to think about old problems in new ways	296	16	3.27	3.00	3	1.090	1.188	-.142	-.590	3.00	3.00	4.00
Head teacher provides us with new ways of looking at puzzling things	293	19	3.26	3.00	3	1.061	1.126	-.108	-.718	2.00	3.00	4.00
Head teacher gets us to rethink ideas that they had never questioned before	296	16	3.32	3.00	3	1.056	1.115	-.105	-.715	3.00	3.00	4.00
Head teacher helps us develop ourselves	293	19	3.38	4.00	4	1.115	1.244	-.276	-.756	3.00	4.00	4.00
Head teacher lets us know how he/she thinks we are doing	295	17	3.33	3.00	4	1.083	1.173	-.223	-.675	3.00	3.00	4.00
Head teacher gives personal attention to those who seem rejected	295	17	3.24	3.00	3	1.130	1.277	-.150	-.731	2.00	3.00	4.00
Composite	294	18	3.383	4	3.583	1.079	1.165	-0.251	-0.623	3	4	4

Val., Valid; Mis., Missing, Med., Median; Mod., Mode; Std. Dev., Standard Deviation; Var., Variance; Skew., Skewness; Kurt., Kurtosis

As demonstrated in Table 4.25, most of the participants indicate that frequently, head teacher makes people they interact with feel good to be around him/her (3.56); and that those the head teacher interacts with have complete faith in him or her (3.52). A majority however indicated that only moderately do head teacher helps others find meaning in their work (3.49); those the head teacher interacts with are proud to be associated with him or her (3.45); head teachers express with a few simple words what we could and should do (3.38); and that head teacher helps us develop ourselves (3.38). Both skewness and kurtosis were within the acceptable threshold, recorded below 1.0 for all the statements posed.

The head teachers were further probed in interviews to describe their roles in the implementation of ICT in their respective schools, where it emerged that most head teachers play supportive, supervisory and advisory roles with respect to the use and integration of ICT in teaching, installations, as well as provision of a conducive environment, safety and security of ICT infrastructure and solutions to challenges arising in the course of the implementation of teaching with the use of ICT. Interviewees for instance noted as quoted:

"Am always encouraging teachers to use ICT in teaching…… Every class is allocated time for the same" (Interview with Head teacher 1).

"Monitoring and ensuring that the subject contents are incorporated" (Interview with Head teacher 3)

"My role is to ensure that there is electricity in school, the gargets are in order and report any challenges" (Interview with Head teacher 6

"I have tried to push our director for the installation of Wi-Fi which he has done" (Interview with Head teacher 12).

It is inferred from the outcomes that in a majority of the schools reached, headteachers practice the transformational leadership style to a moderate extent. This is exhibited in a

majority of the headteachers' ability to make people they interact with feel proud, good and have complete faith in him or her which is indicative of transformational leadership style. Head teachers were also found to help others find meaning in their work, expresses with a few simple words what we could and should do and help teachers develop themselves. This is in tandem with Hamidifar (2009) who established that as compared to any other style, staffs are more content with transformational leadership. The empirical study also that the managers did not practice this leadership type. It was concluded in the study that staffs were better satisfied by transformational leadership.

The findings however contrast Kibue (2008) whose study on transformational leadership style on public secondary schools in Kirinyaga County revealed that majority of head teachers and teachers did not understand nor use the transformational leadership style in schools. The discrepancy cam however be attributed to both the 12-year time lag between the two studies, within which there has been continued career development and advancement in school leadership and management; and contextual difference between the two studies, as the present study focused on public primary schools in Nairobi County, Kenya.

4.6.2 Teacher Self Efficacy in Technology

The study sought to establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools; and examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools. To this end, teacher self-efficacy in technology was measured on the basis of 7 indicator items and on the Likert scale: 'No extent' as 1; 'Little extent' as 2; 'Moderate extent' as 3; 'Great extent' as 4; 'Very great extent as 5.

The descriptive statistics are portrayed on Table 4.26. Teacher Self Efficacy in Technology had a mean of 3.0127(N=288).

Table 4.26: Teacher Self Efficacy in Technology

Statistics	N		Mean	Med.	Mod.	Std. Dev.	Var.	Skew	Kurt.	Percentiles		
	Val.	Mis.								25	50	75
How competent do you perceive yourself to select and use various media to support teaching and learning?	286	26	3.15	3.00	3	.884	.781	.131	-.121	3.00	3.00	4.00
How well prepared are you to evaluate software to support teaching and learning?	287	25	3.01	3.00	3	1.021	1.042	.012	-.474	2.00	3.00	4.00
To what extent can you integrate technology across the curriculum?	285	27	3.10	3.00	3	.972	.944	-.066	-.233	3.00	3.00	4.00
How capable are you of determining why, when, and how to use technology in education?	287	25	3.17	3.00	3	.946	.895	-.066	-.235	3.00	3.00	4.00
Did you incorporate technology to enhance teaching and learning in	287	25	2.77	3.00	3	1.100	1.211	.015	-.706	2.00	3.00	4.00

	Val.	Mis.	Mean	Med.	Mod.	Std. Dev.	Var.	Skew.	Kurt.			
the lessons you taught today												
Frequency of using the technology in class	279	33	2.81	3.00	3	1.002	1.003	.129	-.347	2.00	3.00	3.00
Participate in social networks	280	32	3.10	3.00	3	1.099	1.209	-.004	-.665	2.00	3.00	4.00
Composite	284	28	3.016	3	3	1.003	1.012	0.022	-0.397	2	3	4

Val., Valid; Mis., Missing, Med., Median; Mod., Mode; Std. Dev., Standard Deviation; Var., Variance; Skew., Skewness; Kurt., Kurtosis

Results presented in Table 4.26 indicate that most of the participants perceive themselves as moderately competent in using various media to support teaching and learning (3.15); moderately prepared to evaluate software to support teaching and learning (3.01); moderately integrate technology across the curriculum (3.10); and are moderately capable of determining why, when, and how to use technology in education (3.17). A majority (2.81) further used technology in class only moderately. Both skewness and kurtosis were within the acceptable threshold, recorded below 1.0 for all the statements posed, implying that the data are normally distributed. The findings are of the implication that a majority of the respondent teachers reached exhibit only moderate levels of self-efficacy in using technology in their teaching profession. This was manifested in the teachers' moderate competences in selecting and using various media to support teaching and learning, in the evaluation of software to support teaching and learning, ability to integrate technology across the curriculum as well as the moderate capability to determine why, when, and how to use technology in education.

Participants were further prompted to establish the use of technology with reference to various computer-based applications that aid in the teaching practice. Responses were given on a Yes/No basis the results were as shown in Table 4.27.

Table 4.27: Computer-Based Applications Aiding in the Teaching Practice

	N				
	Valid	Missing	N/A	No	Yes
Before e-learning programme being introduced, had you ever used a computer in your school?	312	0	13.1	13.1	73.7
Have you been trained for the computer application programme?	312	0	15.1	13.8	71.2
Microsoft Word	312	0	5.8	8.0	86.2
Microsoft Excel	312	0	11.5	9.6	78.8
Power Point	312	0	12.5	13.5	74.0
World Wide Web / email	312	0	14.7	31.4	53.8
Microsoft Access / Database	312	0	14.7	37.2	48.1
Desktop publishing	312	0	17.3	46.8	35.9
Web design	312	0	19.2	60.3	20.5
Information skills / (Research)	312	0	16.7	44.6	38.8
Programming skills	312	0	18.9	54.8	26.3
Composite	312	0	14.5	30.282	55.2

On the question on the number of days trained in the computer applications above a significant majority indicated they had been trained for more than 10 days (45.2 percent). A few at 7.7 per cent had been trained for 4 days, 6.4 percent for 3 days and another 4.5 percent for 2 days. A noteworthy 10.9 per cent did not indicate the number of days they had been trained. Still another 25.3 per cent indicated having attended trained for other varied period of days (a majority of these a month and above). This implies that the

majority of teachers have taken significantly long durations in training in computer applications which would be good in raising capacity for ICT integration.

Head teachers were further asked in interviews held to describe teachers' ICT competency in their respective schools, to which most of the interviewees affirmed that most of the teachers are averagely competent while others observed that some teachers still needed training. Some of the responses are as hereby quoted:

"Some teachers are well conversant with ICT while some are still learning more about ICT" (Interview with Head teacher 2).

"Average… We need more enhanced infrastructure" (Interview with Head teacher 4).

"The teachers need more training on how to use ICT" (Interview with Head teacher 13).

"Half of the staff are ICT compliant while others still need training" (Interview with Head teacher 17).

The study probed to find out the number of teachers that are computer literate in the respective schools and how many were trained. In this regard, it was established in the study that across most schools, a majority of the teachers (between 10 and 20) were computer literate. It was further established that on average, less than 10 were trained in.

Head teachers were further asked to rate their respective teachers' confidence in the use of ICT in teaching and learning, to which most respondents affirmed that a majority of their teachers were very confident, while others rated their respective teachers' confidence in the use of ICT in teaching and learning as average . Some of the responses are as hereby quoted:

"Moderate, we need more training on the same" (Interview with Head teacher 10).

"Very confident when using the ICT devices" (Interview with Head teacher 14).

Interview respondents were further asked to rate the teachers' attitudes in their use of ICT in teaching and learning, to which most respondents affirmed that a majority of their teachers had a positive attitude, while others rated their respective teachers' attitudes in the use of ICT in teaching and learning as average and others as poor. Some of the responses are as hereby quoted:

"They are a bit positive and we are still encouraging them to use it until they get used to" (Interview with Head teacher 2).

"Very positive especially with the changing online communication with TSC and the ministry" (Interview with Head teacher 16).

"Very poor attitude… Trying to encourage them to embrace change" (Interview with Head teacher 21).

From the foregoing responses, it is inferred that whereas a majority of teachers (55.2%) in the study area are computer literate, most are only moderately competent and confident in the application of ICT in their teaching profession. This, coupled with a negative attitude among a considerable number of teachers curtail the effective ICT's integration in learning and teaching.

The findings are consistent with Newhouse (2012) who found that secondary school teachers who did not have the skills and knowledge to utilize computers lacked enthusiasm concerning the integration and changes of learning that is supplementary related to introducing computers into the teaching profession. The findings are also in line with Ayere et al. (2010) who study on e-learning in secondary schools in Kenya reported that at least 50% of secondary school teachers had not received any training in ICT use during their formative years at teacher training institutions before joining the profession. The findings are also in line with a report by the Ministry of Higher education, Science and Technology (GOK, 2010) on secondary school teachers' adoption and use of ICT

indicated that the number of teachers skilled in ICT in secondary schools was not more that 40%. The findings are further in line with a study by Mingaine (2013) carried out in Meru County that found that, there is limited supply of qualified ICT teachers and that majority of secondary school teachers in Meru County were not competent to facilitate use of ICT in schools.

4.6.3 School Environment

The study further sought to assess the extent to which school environment influences integration ICT in teaching and learning in public primary schools. The study also set out to examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools. In this regard, school environment was measured on the basis of 15 items and on the Likert scale: 1= Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree. Mean scores of 2.4 or less are taken to indicate low level of agreement, while mean scores of between 2.5 and 3.4 imply moderate level of agreement and mean scores of between 3.5 and 5.0 imply high level of agreement. The descriptive statistics are portrayed on Table 4.28. The School Environment had a mean of 3.6972 (N=293).

Table: 4.28: School Environment

Statistics	N		Mean	Med.	Mod.	Std. Dev.	Var.	Skew.	Kurt.	Percentiles		
	Val.	Mis.								25	50	75
Our school has a mission	288	24	4.25	4.00	5	.919	.845	-1.392	1.866	4.00	4.00	5.00
The mission of our school is known to all students	286	26	3.56	4.00	4	.971	.942	-.472	.095	3.00	4.00	4.00

	N	Missing	Mean	Median	Mode	Std. Dev	Variance	Skewness	Kurtosis	25	50	75
My school buildings are in good condition	287	25	3.77	4.00	4	.945	.893	-.520	-.029	3.00	4.00	4.00
Our class size has enough furniture for everyone	291	21	3.46	3.00	3	1.142	1.304	-.194	-.853	3.00	3.00	4.00
There are free interactions between the teachers and learners	288	24	4.00	4.00	4	.889	.791	-.695	-.023	4.00	4.00	5.00
In my school, teachers want learners to contribute their thoughts in class	288	24	4.08	4.00	4	.809	.655	-.431	-.645	4.00	4.00	5.00
In my school, teachers expect learners to be well behaved in school	289	23	4.32	5.00	5	.783	.614	-.801	-.359	4.00	5.00	5.00
Our library has up-to-date instructional materials	288	24	2.99	3.00	3	1.098	1.205	-.036	-.718	2.00	3.00	4.00
In my school, teachers make learning interesting using technology and involving the learners in the learning process	286	26	3.23	3.00	3	1.001	1.001	-.166	-.205	3.00	3.00	4.00
In my school, teachers inform learners about their progress in their class and involves	288	24	3.84	4.00	4	.954	.911	-.661	.316	3.00	4.00	5.00

	Val.	Mis.	Mean	Med.	Mod.	Std. Dev.	Var.	Skew.	Kurt.			
their parents in the learning process												
The Board of Management is supportive to the learning process	286	26	3.70	4.00	4	.948	.899	-.436	-.041	3.00	4.00	4.00
The parents, guardians and sponsors relate well with the teachers and pupils	285	27	3.60	4.00	4	.872	.761	-.225	-.008	3.00	4.00	4.00
The head teacher supports teachers' initiatives and encourages them	287	25	3.73	4.00	4	.883	.779	-.515	.348	3.00	4.00	4.00
In my school, the administration involves teachers in making decisions	285	27	3.49	3.00	3	1.020	1.040	-.317	-.242	3.00	3.00	4.00
The head teacher motivates teachers to keep performing well	286	26	3.49	4.00	4	1.078	1.163	-.387	-.447	3.00	4.00	4.00
Composite	287	25	3.701	4	3.867	0.954	0.920	-0.483	-0.063	3	4	4

Val., Valid; Mis., Missing, Med., Median; Mod., Mode; Std. Dev., Standard Deviation; Var., Variance; Skew., Skewness; Kurt., Kurtosis

As demonstrated in Table 4.29, most of the participants indicated that to a large extent, their respective schools have a mission (4.25); the mission of the respective schools is known to all students (3.56); their respective school buildings are in good condition (3.77); there are free interactions between the teachers and learners (4.00); in their respective schools, teachers want learners to contribute their thoughts in class (4.08); and that in their respective schools, teachers expect learners to be well behaved in school (4.32). Respondents further indicated that to a moderate extent, in their respective schools, the administration involves teachers in making decisions (3.49); the head teacher motivates teachers to keep performing well (3.49); in their respective schools, teachers make learning interesting using technology and involving the learners in the learning process (3.23); and that their respective libraries have up-to-date instructional materials (2.99). Both skewness and kurtosis values were recorded between -2 and 2 implying that the data pertinent to school environment was normally distributed.

It can be inferred from the foregoing findings that the school environment across the schools reached is to a large extent supportive and receptive to the uptake and use of technology in teaching and learning. The environment in most schools reached is particularly characterized by a well-known mission, school buildings in good condition, free interactions between the teachers and learners. There is further, moderate use of technology in teaching and learning as well as moderate involvement of teachers in making decisions, by the administration.

4.6.4 ICT Integration

The study sought to assess transformational leadership style, teachers' self-efficacy in technology and information communication and technology integration in learning and teaching in public primary schools in Nairobi County, Kenya. To this end, ICT

Integration was measured on the basis of 18 indicator items and on the Likert scale: 1= Not at all; 2 = Little extent; 3 = Moderate extent; 4 = Great extent; 5 = Very great extent. The descriptive statistics are portrayed on Table 4.30.

Table: 4.30: ICT Integration

Statistics	N		Mean	Med.	Mod.	Std. Dev.	Var.	Skew	Kurt.	Percentiles		
	Val.	Mis.								25	50	75
Able to keep and manage learners' records	294	18	3.09	3.00	3	1.072	1.149	.117	-.574	2.00	3.00	4.00
Access further capacity building programs online	291	21	2.90	3.00	3	1.046	1.094	.121	-.545	2.00	3.00	4.00
Belong to knowledge information organisation	282	30	2.74	3.00	3	1.094	1.196	.118	-.626	2.00	3.00	3.00
Sourcing for additional material to teach	289	23	3.20	3.00	3	1.123	1.260	-.024	-.666	2.00	3.00	4.00
Technology available anytime you need it	297	15	2.92	3.00	3	1.190	1.416	.199	-.796	2.00	3.00	4.00
Research for class activities	290	22	2.86	3.00	3	1.100	1.211	.102	-.548	2.00	3.00	4.00

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using ICT

	N		Mean	Median	Mode	Std. Dev	Variance	Skewness	Kurtosis	25	50	75
ICT is readily available for use in class	287	25	2.59	3.00	3	1.106	1.223	.189	-.782	2.00	3.00	3.00
Belong to a teacher's community of practice	288	24	2.70	3.00	3	1.195	1.428	.254	-.785	2.00	3.00	4.00
Share online notes with other teachers	291	21	2.72	3.00	3	1.224	1.498	.239	-.852	2.00	3.00	4.00
Participate in online team teaching	290	22	2.37	2.00	2	1.178	1.388	.562	-.496	1.00	2.00	3.00
Conduct online discussions with learners	286	26	2.10	2.00	1	1.122	1.259	.902	.103	1.00	2.00	3.00
Engage in online chat discussions with learners	287	25	2.01	2.00	1	1.046	1.094	.902	.154	1.00	2.00	3.00
Allow learners to reach out through social media	289	23	2.33	2.00	2	1.070	1.145	.598	-.240	2.00	2.00	3.00
Delivering an ICT integrated lesson	289	23	2.71	3.00	3	1.102	1.214	.172	-.617	2.00	3.00	3.00

	Val.	Mis.		Med.	Mod.	Std. Dev.	Var.	Skew.	Kurt.			
Use ICT in giving assignments	286	26	2.26	2.00	2	1.094	1.196	.671	-.234	1.00	2.00	3.00
Use ICT in monitoring learners' academic progress	292	20	2.44	2.00	3	1.172	1.374	.420	-.599	1.00	2.00	3.00
Class management through technology	289	23	2.26	2.00	2	1.057	1.116	.479	-.489	1.00	2.00	3.00
Designing technology driven projects	291	21	2.24	2.00	2	1.087	1.182	.507	-.659	1.00	2.00	3.00
Composite	289	23	2.58	2.555556	3	1.115444	1.246833	0.362667	-0.51394	2	3	3

Val., Valid; Mis., Missing, Med., Median; Mod., Mode; Std. Dev., Standard Deviation; Var., Variance; Skew., Skewness; Kurt., Kurtosis

As demonstrated in Table 4.30, most of the participants indicated that to a moderate extent, teachers are able to keep and manage learners' records (3.09); teachers can access further capacity building programs online (2.90); teachers belong to knowledge information organisation (2.74); sourcing for additional material to teach (3.20); technology available anytime you need it (2.92); research for class activities using ICT (2.86); share online notes with other teachers (2.72); belong to a teacher's community of practice (2.70).

A majority however indicated that only to a small extent, teachers participate in online team teaching (2.37); conduct online discussions with learners (2.10); engage in online chat discussions with learners (2.01); allow learners to reach out through social media (2.33); use ICT in giving assignments (2.26); use ICT in monitoring learners' academic progress (2.44); manage their classes through technology (2.26); and design technology driven projects (2.24).

From the foregoing findings, ICT Integration had a composite mean of 2.6018 (N=298). This implies a weakness in the ability to utilize technology in participating in online team teaching, conducting online discussions with learners, engage in online chat discussions, allow learners to reach out through social media, using ICT to give assignments, class management through technology and designing technology-driven projects. The results in all the other items on the confidence in the use of ICT for teaching and learning indicate a moderate extent (2.6018) of confidence in ICT integration.

4.6.5 Availability of ICT

As an indicator of ICT integration, the availability of ICT devices was also assessed in terms of its adequacy. This would indicate the degree at which the various ICT tools used in teaching and learning are available for the teaching practice in the schools reached. Answers were provided along a Likert scale (5-point), where 1= Not available; 2 = Inadequate; 3 = Moderately Adequate; 4 = Adequate; 5 = Highly Adequate. Mean scores of 2.4 or less are taken to indicate low adequacy, while mean scores of between 2.5 and 3.4 imply moderate adequacy and mean scores of between 3.5 and 5.0 imply high adequacy. The results are portrayed on Table 4.31.

Table: 4.31: Availability of ICT

Statistics	N Val.	Mis.	Mean	Med.	Mod.	Std. Dev.	Var.	Skew	Kurt.	Percentiles 25	50	75
Computers	291	21	2.88	3.00	3	1.127	1.269	.232	-.560	2.00	3.00	4.00
Power supply	290	22	3.60	4.00	4	1.137	1.293	-.448	-.665	3.00	4.00	5.00
Internet connection	291	21	2.65	2.00	2	1.277	1.629	.387	-.871	2.00	2.00	4.00
Digital content	285	27	2.85	3.00	3	1.099	1.208	.085	-.647	2.00	3.00	4.00
Projectors	289	23	2.60	2.00	2	1.132	1.282	.323	-.715	2.00	2.00	3.00
Desktop	286	26	2.38	2.00	2	1.192	1.422	.599	-.509	1.00	2.00	3.00
Laptop	288	24	2.61	2.00	2	1.095	1.199	.522	-.382	2.00	2.00	3.00
Printers	292	20	2.00	2.00	1	1.035	1.072	.879	.008	1.00	2.00	3.00
Scanners	287	25	1.73	1.00	1	.936	.875	1.204	.743	1.00	1.00	2.00
TV	291	21	2.57	2.00	2	1.147	1.315	.504	-.483	2.00	2.00	3.00
Video decks	286	26	2.16	2.00	1	1.165	1.356	.783	-.344	1.00	2.00	3.00
LCD Projections	286	26	2.03	2.00	1	1.066	1.136	.859	-.018	1.00	2.00	3.00
Composite	289	24	2.505	2.25	2	1.117333	1.254667	0.494083	-0.37025	2	2	3

Val., Valid; Mis., Missing, Med., Median; Mod., Mode; Std. Dev., Standard Deviation; Var., Variance; Skew., Skewness; Kurt., Kurtosis

As demonstrated in Table 4.31, the high mean of 3.6 would imply a great success of the national rural electrification project implemented in the run-up to the digital literacy

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program in the period of 2013-2016. The comparatively higher mean on digital content and computers also point to the success of the development and provision of digital content as well as the provision of computing devices (learner and teacher devices) which were central to the digital literacy program of the Republic of Kenya in the 2013-2017 term. There is a significant lag in the provision of broadband connection, projection equipment, desktop computers and TVs. The TV would be a remarkable observation given the advent of broadcast content ramped up by the Kenya Institute for Curriculum Development. Printers, scanners, video decks and LCD projections have a very significant low score.

The study further conducted observation across the schools reached with the aid of an observation guide. The objective of the observation was to assess the adequacy of the various ICT tools used in both the teaching practice and in learning with a view to triangulate both the questionnaires and the key informant interviews. It was established to this end, that in a majority of the schools reached, computers, power supply, internet connection, digital content, projectors, desktop, TVs, printers and laptops were present and in a state of condition. In most schools however, the same were not adequate. Additionally, in most schools, scanners, video decks and LCD Projections were not available.

The foregoing findings were echoed in the key informant interviews held with school head teachers who when asked to comment on the types of ICTs infrastructure is available in their respective schools for teaching and learning cited tablets, projectors, laptops, televisions, speakers, phones, Wi-Fi connections and computer rooms. Asked to rate the adequacy of the infrastructure, a majority rated them as inadequate. An interview for instance observed as quoted:

"They are there but not enough" (Interview with Head teacher 1).

"They are not adequate….. sometimes they fail" (Interview with Head teacher 4).

"We have the computers but we lack the software for the CBC content" (Interview with Head teacher 9).

Some of the respondents however rated ICT infrastructure in their respective schools as adequate. An interview for instance observed as quoted:

"We need more computers, laptops and most importantly, Wi-Fi connections" (Interview with Head teacher 3).

"Tablets are enough, but the TDD laptops are few" (Interview with Head teacher 7).

Participants were further prompted to establish in the interviews the frequency with which these ICT tools are used in the school, from which it emerged that while in some schools the ICT tools are used often and regularly including once or twice a week, some schools use them only occasionally. Some of the responses are as hereby quoted:

"We use them very often, almost every day" (Interview with Head teacher 11).

"At least once in a while depending on the subject the teacher is teaching" (Interview with Head teacher 14).

"They are used on a daily basis by all learners and teachers from Grade, up to Standard 8" (Interview with Head teacher 17).

"We use them often, during ICT classes and during class presentation when projectors are used" (Interview with Head teacher 20)

The study further conducted lesson observations with a view to assess the integration of ICT in teaching and learning across the schools reached. In this regard, the study was first interested in the ICT devices that are available in the classroom. It was established that whereas some classrooms had a laptop, a projector and tablets, some lacked the same while others only had a desktop computer or a television.

The study further observed the digital content that was being used during the teaching/ learning process if any. It was established in this regard that most teaching lessons relied on Kenya Institute of Curriculum Development and RTI, as well as other sources including recorded videos, YouTube and Google. The researcher also set out to establish whether or not the pupils had devices, whereby a majority of the pupils were found to not have devices. Of those that had devices, a majority had an average of 200 devices in the whole school, with a ratio of sharing the devices among learners being in most classrooms.

Lessons were also observed for the clarity of interactions between learner and teachers as well as the instructions for device utilization, in which case interactions and instruction were deemed moderately to very clear. The interaction between learners and the devices was also observed where it emerged that in 70% of the classrooms, only the teacher had an ICT device, while only in a few classrooms, collaborative learning was observed. In 30% of classrooms however, there was no interaction at all.

The study further observed the level of learner interaction with the devices, with particular reference to the learners' manipulation skills, level of interest and whether learning was taking place. It was accordingly found out that in 70% of the classroom lessons, learning was moderately to very interactive, while in some classrooms, learning

was not interactive. The teachers' competence was also observed and rated to be largely adequate owing to the level of interaction.

It can be inferred from the foregoing responses that ICT infrastructure in a majority of the primary schools reached is inadequate, both in terms of their availability and accessibility. Some of the schools reached lacked pertinent ICT infrastructure requisite in both teaching and learning while in other schools reached, the available ICT infrastructure are either not used as frequently as they should be, or have a high number of pupils relying on less infrastructure.

4.6.6 Overall Descriptive Statistics for the Variables

The study further sought to explore descriptive statistics for each of the variables in order to determine the overall status of their application in the study area, results of which are as shown in Table 4.32. The means for each of the items used to measure the respective variables were obtained. Mean scores of 2.4 or less are taken to indicate low affirmation, while mean scores of between 2.5 and 3.4 imply moderate affirmation and mean scores of between 3.5 and 5.0 imply high affirmation.

Table 4.32: Composite Means of the Variables

	N	Mean	Std. Deviation	Variance	Skewness	Kurtosis
ICT Integration	298	2.6018	.80537	.649	.268	-.246
Transformational Leadership Style	297	3.3814	.86420	.747	-.160	-.686
Teacher Self Efficacy in Technology	288	3.0127	.79415	.631	-.021	-.132
School Environment	293	3.6972	.60639	.368	.094	-.427

As tabulated in Table 4.32, the dependent variable ICT Integration had a mean of 2.6018 (N=298) implying moderate levels of ICT integration. The independent variables had 3.3814 (N=297) for Transformational Leadership Style implying moderate levels of use of the Transformational Leadership Style, 3.0127(N=288) for Teacher Self Efficacy in Technology indicating moderate levels of Teacher Self Efficacy in Technology and 3.6972 (N=293) for the School Environment indicating high approval levels of the School Environment.

4.7 Inferential Analysis of Variable Sub-constructs

Inferential analysis was carried out for the variable sub-constructs including Pearson product moment correlation analyses with a view to determine both the strength and direction of relationships between pairs of the sub-constructs making up the composite variables. To establish the effect of various sub-constructs under Transformational Leadership Style, Teacher Efficacy and School Environment on ICT Integration, multiple regression analyses were conducted to determine the effect of the various variable sub-constructs on the dependent variable. All regression analyses were carried out with the assumption that: variables are normally distributed to avoid distortion of associations and significance tests, which was achieved as outliers were not identified; a linear relationship between the independent and dependent variables for accuracy of estimation, which was achieved as the standardized coefficients were used in interpretation (Kumar, 2011). Regression analysis output includes the model summary, Analysis of Variance (ANOVA) and regression coefficients, all of which are presented. The variable sub-constructs were computed with the aid of SPSS Version 25.

4.7.1 Correlation between Sub-Constructs of Transformational Leadership Style and ICT Integration

Table 4.33 shows the Pearson product moment correlations for the linkage between the sub-constructs under transformational leadership style, including idealized influence attributed, inspirational motivation, intellectual stimulation and individual consideration. From the findings, a weak, positive and significant correlation is seen between each pair of subscales. The strongest correlation was obtained between inspirational motivation and ICT integration (r = .228; p<.01), followed by intellectual stimulation and ICT integration (r = .223; p<.01). Idealized influence attributed (r=.187; p<0.01) and individual consideration (.130; p<0.05) was also positively and significantly correlated with ICT integration. The correlation was carried out at 95% confidence interval.

Table 4.33 Correlation between Sub-Constructs of Transformational Leadership Style and ICT Integration

		ICT integration	Idealized Influence attributed	Inspirational Motivation	Intellectual Stimulation	Individual Consideration
ICT integration	Pearson Correlation	1	.187**	.228**	.223**	.130*
	Sig. (2-tailed)		.004	.000	.000	.044
	N	245	241	242	242	240
Idealized Influence attributed	Pearson Correlation	.187**	1	.783**	.776**	.718**
	Sig. (2-tailed)	.004		.000	.000	.000
	N	241	291	286	289	286
Inspirational Motivation	Pearson Correlation	.228**	.783**	1	.781**	.755**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	242	286	290	288	285
Intellectual Stimulation	Pearson Correlation	.223**	.776**	.781**	1	.789**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	242	289	288	293	288

Individual Consideration	Pearson Correlation	.130[*]	.718[**]	.755[**]	.789[**]	1
	Sig. (2-tailed)	.044	.000	.000	.000	
	N	240	286	285	288	290

**. Correlation is 2-tailed and significant at 0.01.

*. Correlation is significant at the 0.05 level (2-tailed).

The findings imply that albeit weakly, each component making up the transformational leadership style is positively and significantly associated with ICT integration. As such, should the head teachers increase their levels of idealized influence attributed, inspirational motivation, intellectual stimulation and/or individual consideration there would be an increase in ICT integration. Similar correlation statistics were reported by Ngina (2016) in their study on influence of principals' transformative corporate leadership style on teachers' job commitment in public secondary schools in Athi River Sub County, Machakos County, Kenya and Kirui (2016) in the role of transformational leadership in organizational performance of state-owned banks in Kenya.

4.7.2: Regression between Sub-Constructs of Transformational Leadership Style and ICT Integration

Regression analysis was done to establish the statistical significance of the relationships between the sub-constructs under transformational leadership style and the dependent variable, ICT Integration. The results are presented by way of model summary (Table 4.34), ANOVA (Table 4.35) and the coefficients (Table 4.36).

Table 4.34: Regression between Sub-Constructs of Transformational Leadership Style and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.263[a]	.069	.053	14.35367

a. Predictors: (Constant), Individual Consideration, Idealized Influence Attributed, Inspirational Motivation, Intellectual Stimulation

As Table 4.34 demonstrates, a correlation value (R) of .263 was recorded, which illustrates that there exists a linear dependency between the sub-constructs (Individual Consideration, Idealized Influence Attributed, Inspirational Motivation, Intellectual Stimulation) and ICT Integration. With an adjusted R-square of .053, the regression model shows that individual consideration, idealized influence attributed, inspirational motivation and intellectual stimulation explain 5.3 percent of the variance in ICT Integration, while 94.7 percent is explained by other factors not included in the model.

Table 4.35: Regression between Sub-Constructs of Transformational Leadership Style and ICT Integration: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3482.860	4	870.715	4.226	.003[b]
	Residual	46974.350	228	206.028		
	Total	50457.210	232			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), Individual Consideration, Idealized Influence attributed, Inspirational Motivation, Intellectual Stimulation

An F statistic of 4.226 was recorded in the regression model, and a P-value of 0.003 (<0.05) implying that individual subscales making up transformational leadership style, including Individual Consideration, Idealized Influence Attributed, Inspirational Motivation and Intellectual Stimulation have a significant joint association with ICT Integration, which is significant.

Table 4.36: Regression between Sub-Constructs of Transformational Leadership Style and ICT Integration: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	35.083	3.798		9.238	.000
	Idealized Influence attributed	.206	.608	.040	.338	.735
	Inspirational Motivation	.992	.636	.189	1.560	.120
	Intellectual Stimulation	1.227	.663	.236	1.850	.066
	Individual Consideration	1.314	.591	.259	2.224	.027

a. Dependent Variable: ICT Integration

As demonstrated in Table 4.36, the regression model further reveals that a unit change in Idealized Influence attributed would lead to 4.0% unit change in ICT Integration, keeping other factors constant. The relationship was however not significant at 95% confidence level implying that Idealized Influence attributed does not significantly influence ICT Integration (β = .040, p = .735>.05). It was also established that a unit change in Inspirational Motivation would lead to 18.9% unit change in ICT Integration, while a unit variation in Intellectual Stimulation would lead to 23.6% change in ICT Integration keeping other factors constant. The relationships were however not significant at 95% confidence level implying that both Inspirational Motivation (β = .189, p = .120>.05) and Intellectual Stimulation (β = .236, p = .066>.05) do not have a significant effect on ICT Integration. Individual Consideration was however found to significantly influence on ICT Integration (β =.259, p = .027<.05), with a unit change leading to .259 change in ICT Integration keeping other factors constant.

The findings imply that in order to realize effective ICT integration, head teachers in the primary schools reached ought to among other interventions, invest in leadership that inspires idealized influence attributed, inspirational motivation, intellectual stimulation and individual consideration. This is consistent with Ngina (2016) who found that idealized inspiration, intellectual stimulation, and individualized consideration are four factors that influence teachers' job commitment. The study further recommended that there is need for principals in public secondary schools to adopt transformation leadership styles so as to improve on teachers' job commitment. The findings are also in tandem with Kirui (2016) who found out that idealized influence, inspirational motivation, intellectual stimulation and individual consideration positively influenced organizational outcomes.

4.7.3: Correlation between Sub-Constructs of Teacher Efficacy and ICT Integration

Table 4.37 presents the Pearson product moment correlations for the linkage between the sub-constructs under teacher efficacy, including Level of teacher competence, enhanced teacher confidence and teacher motivation. From the findings, a moderate, positive and significant correlation is seen between each pair of subscales. A moderate correlation was obtained between enhanced teachers' confidence and ICT integration (r = .555; p<.01), followed by teacher motivation and ICT integration (r = .520; p<.01). Level of teacher competence (.518; p<0.01) was also moderately, positively and significantly correlated with ICT integration. The correlation was carried out at 95% confidence interval.

Table 4.37 Correlation between Sub-Constructs of Teacher Efficacy and ICT Integration

		ICT integration	Level of teacher competence	Enhanced teachers Confidence	Teacher motivation
ICT integration	Pearson Correlation	1	.518**	.555**	.520**
	Sig. (2-tailed)		.000	.000	.000
	N	245	233	236	230
Level of teacher competence	Pearson Correlation	.518**	1	.750**	.675**
	Sig. (2-tailed)	.000		.000	.000
	N	233	283	281	273
Enhanced teachers Confidence	Pearson Correlation	.555**	.750**	1	.678**
	Sig. (2-tailed)	.000	.000		.000
	N	236	281	286	276
Teacher motivation	Pearson Correlation	.520**	.675**	.678**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	230	273	276	277

**. Correlation is 2-tailed and significant at 0.01.

The positive and significant correlations imply that each component making up the teacher efficacy is positively associated with ICT integration. As such, should the schools reached enhance teachers' confidence and the level of competence of teachers in utilizing ICT as well as increase teacher motivation through such avenues as trainings and development programs, there would be an increase in ICT integration. Similar correlation statistics were reported by Buabeng-Andoh (2012) in their desktop review on factors influencing teachers' adoption and integration of information and communication technology into teaching; and Peralta and Costa (2007) in their study on teachers' competence and confidence in ICT use.

4.7.4: Regression between Sub-Constructs of Teacher Efficacy and ICT Integration

Regression analysis was done to establish the statistical significance of the relationships between the sub-constructs under teacher efficacy (Teacher motivation, Level of teacher competence, Enhanced teachers' confidence) and the dependent variable, ICT Integration. The results are presented by way of model summary (Table 4.38), ANOVA (Table 4.39) and the coefficients (Table 4.40).

Table 4.38: Regression between Sub-Constructs of Teacher Efficacy and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.597[a]	.357	.348	11.89492

a. Predictors: (Constant), Teacher motivation, Level of teacher competence, Enhanced teachers' confidence

From the results in Table 4.38, a correlation value (R) of .597 was recorded, which illustrates a moderate linear dependency between the sub-constructs including teacher motivation, level of teacher competence, enhanced teachers' confidence and ICT Integration. With an adjusted R-square of .348, the regression model shows that teacher motivation, level of teacher competence and enhanced teachers' confidence explain 34.8 percent of the variance in ICT Integration, while 65.2 percent is explained by other factors not included in the model.

Table 4.39: Regression between Sub-Constructs of Teacher Efficacy and ICT Integration: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17510.267	3	5836.756	41.252	.000[b]
	Residual	31552.051	223	141.489		
	Total	49062.317	226			

a. Dependent Variable: ICT Integration

b. Predictors: (Constant), Teacher motivation, Level of teacher competence, Enhanced teachers' confidence

An F statistic of 41.252 was recorded in the regression model, and a P-value of 0.000 (<0.05) implying that individual subscales making up teacher efficacy, including teacher motivation, level of teacher competence and enhanced teachers' confidence have a significant joint association with ICT Integration. A F-test was particularly preferable to other tests as it shows whether the regression model adopted best fits the population from which the data were sampled.

Table 4.40: Regression between Sub-Constructs of Teacher Efficacy and ICT Integration: Regression Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	12.890	3.204		4.023	.000
	Level of teacher competence	1.005	.498	.169	2.017	.045
	Enhanced teachers' confidence	2.312	.712	.280	3.246	.001
	Teacher motivation	1.740	.598	.220	2.909	.004

a. Dependent Variable: ICT Integration

As demonstrated in Table 4.40, the regression model further reveals that a unit change in level of teacher competence would lead to 16.9% unit change in ICT integration, keeping other factors constant. The relationship was further significant at 95% confidence level implying that teacher competence exhibits a significant effect on ICT Integration (β = .169, p = .045<.05). It was also established that a unit change in enhanced teachers' confidence would lead to 28.0% unit change in ICT Integration, while a unit variation in teacher motivation would lead to 22.0% change in ICT Integration keeping other factors constant. The relationships were also statistically significant at 95% confidence level implying that both enhanced teachers' confidence (β = .280, p = .001<.05) and teacher motivation (β = .220, p = .004<.05) have a significant effect on ICT Integration.

The findings imply that in order to realize effective ICT integration, the primary schools reached ought to among other interventions, invest in such avenues as trainings and development programs with a view to enhance their teachers' confidence and the teacher competence level in utilizing ICT as well as increase teacher motivation. This is in agreement with Buabeng-Andoh (2012), whose study found that teacher ICT skills and lack of teacher confidence significantly determine teachers' adoption and integration of information and communication technology into teaching. Similarly, in a qualitative multiple case-study research on primary school competence and confidence level regarding the use of ICT in teaching practice conducted in five European countries, Peralta and Costa (2007) found that technical competence influenced Italian teacher's use of ICT in teaching. The findings are also in line with Knezek and Christensen (2002) who found that a critical factor of effective ICT utilization in teaching is the competence of teachers with computer technology.

4.7.5: Correlation between Sub-Constructs of School Environment and ICT Integration

Table 4.41 presents the Pearson product moment correlations for the linkage between the sub-constructs under School Environment, including availability of a school mission, good infrastructure, good class interaction between the teachers and the learners, accessibility of instructional materials, interaction between parents and teachers and support from head teacher. From the results, a significant, positive and weak association is noticed between each subscale pair.

The strongest association was recorded between support from head teacher and ICT integration (r = .304; p<.01), followed by Accessibility of instructional materials and ICT integration (r = .294; p<.01), then Availability of a School mission and ICT integration (r = .187; p<.01). Good infrastructure (.112; p>0.05) and good class interaction between the teachers and the learners (.108; p>0.05) were also positively correlated with ICT integration albeit not significantly. The correlation was carried out at 95% confidence interval.

Table 4.41 Correlation between Sub-Constructs of School Environment and ICT Integration

		ICT integration	Availability of a School mission	Good infrastructure	Good class interaction between the teachers and the learners	Accessibility of instructional materials	Interaction between parents and teachers	Support from head teacher
ICT integration	Pearson Correlation	1	.187**	.112	.108	.294**	.239**	.304**
	Sig. (2-tailed)		.004	.087	.100	.000	.000	.000
	N	245	233	234	233	233	231	232
Availability of a School mission	Pearson Correlation	.187**	1	.452**	.466**	.374**	.560**	.521**
	Sig. (2-tailed)	.004		.000	.000	.000	.000	.000
	N	233	284	280	277	273	272	276
Good infrastructure	Pearson Correlation	.112	.452**	1	.430**	.402**	.417**	.463**
	Sig. (2-tailed)	.087	.000		.000	.000	.000	.000
	N	234	280	287	280	276	275	279

Good class interaction between the teachers and the learners	Pearson Correlation	.108	.466**	.430**	1	.395**	.585**	.408**
	Sig. (2-tailed)	.100	.000	.000		.000	.000	.000
	N	233	277	280	286	279	278	281
Accessibility of instructional materials	Pearson Correlation	.294**	.374**	.402**	.395**	1	.499**	.444**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	233	273	276	279	282	274	277
Interaction between parents and teachers	Pearson Correlation	.239**	.560**	.417**	.585**	.499**	1	.643**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	231	272	275	278	274	281	278
Support from head teacher	Pearson Correlation	.304**	.521**	.463**	.408**	.444**	.643**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	232	276	279	281	277	278	284

**. Correlation is 2-tailed and significant at 0.01.

The positive and significant levels of correlation imply that various components making up the school environment are positively associated with ICT integration. These include availability of a school mission, accessibility of instructional materials, interaction between parents and teachers and support from head teacher. As such, schools that develop, formalize and mainstream their school missions, increase the accessibility of instructional materials, enrich the interaction between parents and teachers and the respective head teachers provide and increase their support to teachers, realize more effective ICT Integration than schools that do not. Similar results were reported by Ghavifekr and Rosdy (2015).

4.7.6: Regression between Sub-Constructs of School Environment and ICT Integration

Regression analysis was done to establish the statistical significance of the relationships between the sub-constructs under school environment (support from the head teacher, good class interaction between the teachers and the learners, accessibility of instructional materials, availability of a school mission, good infrastructure, good interaction between parents and teachers in monitoring the learners progress) and the dependent variable, ICT Integration. The results are presented by way of model summary (Table 4.42), ANOVA (Table 4.43) and the coefficients (Table 4.44).

Table 4.42: Regression between Sub-Constructs of School Environment and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.347[a]	.120	.095	14.01147

a. Predictors: (Constant), Support from the head teacher, Good class interaction between the teachers and the learners, Accessibility of instructional materials, Availability of a school mission, Good infrastructure, Good interaction between parents and teachers in monitoring the learners progress

From the results in Table 4.42, a correlation value (R) of .347 was recorded, which illustrates a linear dependency between the sub-constructs including support from the head teacher, good class interaction between the teachers and the learners, accessibility of instructional materials, availability of a school mission, good infrastructure, good interaction between parents and teachers in monitoring the learners progress and ICT Integration. With an adjusted R-square of .095, the regression model shows that teacher motivation, level of teacher competence and enhanced teachers' confidence explain 9.5 percent of the variance in ICT Integration, while 90.5 percent is explained by other factors not included in the model.

Table 4.43: Regression between Sub-Constructs of School Environment and ICT Integration: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5549.306	6	924.884	4.711	.000[b]
	Residual	40638.489	207	196.321		
	Total	46187.794	213			

a. Dependent Variable: ICT Integration

b. Predictors: (Constant), Support from the head teacher, Good class interaction between the teachers and the learners, Accessibility of instructional materials, Availability of a school mission, Good infrastructure, Good interaction between parents and teachers in monitoring the learners progress

An F statistic of 4.711 was recorded in the regression model, and a P-value of 0.000 (<0.05) implying that individual subscales making up school environment including teacher efficacy, including support from the head teacher, good class interaction between the teachers and the learners, accessibility of instructional materials, availability of a school mission, good infrastructure, good interaction between parents and teachers in monitoring the learners progress have a joint and significant linkage with ICT Integration, which is significant.

Table 4.44: Regression between Sub-Constructs of School Environment and ICT Integration: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	25.858	6.598		3.919	.000
	Availability of a school mission	-.119	.747	-.013	-.160	.873
	Good infrastructure	-.530	.653	-.066	-.812	.418
	Good class interaction between the teachers and the learners	-.388	.575	-.055	-.675	.500
	Accessibility of instructional materials	1.053	.472	.175	2.231	.027

Good interaction between parents and teachers in monitoring the learners progress	.712	.638	.113	1.116	.266
Support from the head teacher	1.125	.510	.200	2.205	.029

a. Dependent Variable: ICT Integration

As demonstrated in Table 4.44, the regression model further reveals that a unit change in Availability of a school mission would lead to 1.3% unit change in ICT Integration, keeping other factors constant. The relationship was however not significant at 95% confidence level implying that the availability of a school mission does not exhibit a significant effect on ICT Integration (β =.013, p = .873<.05). It was also established that a unit change in good infrastructure would lead to 6.6% unit variation in ICT Integration, while a unit change in Good class interaction between the teachers and the learners would lead to 5.5% change in ICT Integration keeping other factors constant.

The relationships were also not statistically significant at 95% confidence level implying that both enhanced teachers' confidence (β = .066, p = .418>.05) and teacher motivation (β = .055, p = .500>.05) have a significant effect on ICT Integration. A unit change in Good interaction between parents and teachers in monitoring the learners progress was also found to lead to 11.3% change in ICT Integration keeping other factors constant, which was not statistically significant at 95% confidence level implying that good interaction between parents and teachers in monitoring the learners progress (β = .113, p = .266>.05) does not significantly influence ICT Integration.

Further, a unit change in accessibility of instructional materials would lead to 17.5% unit change in ICT Integration, while a unit variation in Support from the head teacher would lead to 20.0% change in ICT Integration keeping other factors constant. Both relationships were statistically significant at 95% confidence level implying that both accessibility of instructional materials ($\beta = .175$, $p = .027 < .05$) and support from the head teacher ($\beta = .200$, $p = .029 < .05$) have a significant effect on ICT Integration.

The results imply that in order to achieve effective ICT Integration, schools ought to increase the accessibility of instructional materials and increase head teacher support to teachers. This agrees with findings by Ghavifekr and Rosdy (2015) whose study indicated that access to ICT infrastructure and teachers' well-equipped preparation with ICT tools and facilities are the main factors in success of technology-based teaching and learning. The findings however contrast those by Farmery (2014), who found in their study that despite good technology provision and access to resources, ICT use is variable within and between departments and despite the Senior Leadership Team (SLT) vision for student-centred use of ICT, its use is mainly teacher-led. Issues such as how differences in understanding and interpretation of policy between SLT and teaching staff affect ICT use in practice and how teachers' beliefs affect their practice are identified. The difference can be attributed to context, as Farmery (2014) focused on schools in a developed economy.

4.8 Tests of Study Hypotheses

In this section, various statistical tests are carried out with a view to test the stated hypotheses and are subsequently discussed in relation to the study's conceptual framework and previous extant literature findings. As the conceptual framework illustrates, four main variables underpinned the study, the interrelationship among which,

the present study set out to assess. As per the conceptual framework, Transformational Leadership Style was the factor construct, hypothesized as exerting a direct influence on the integration of ICT in learning and teaching and was indexed by five sub-constructs, including, idealized influence attributed, idealized influence behaviour, inspirational motivation, intellectual stimulation and individual consideration.

School Environment was on the other hand conceptualized as moderating the relationship between Transformational Leadership Style and ICT Integration in teaching and learning and was measured by six sub-constructs, including availability of a school mission, good infrastructure, accessibility of instructional materials, good class interaction between the teachers and the learners, good support from the head teacher and good interaction between parents and teachers in monitoring the learners progress.

Teacher Efficacy in ICT was further conceptualized as mediating the relationship between Transformational Leadership Style and ICT Integration in teaching and learning and was measured by four sub-variables, including teachers' confidence, enhanced teachers Competencies, teacher motivation and change in teachers attitude. ICT Integration in teaching and learning was the dependent variable and was indexed by six sub-constructs including knowledge of instructional technology, access to instructional materials through ICT, existence of teacher-to-teacher collaboration in the learning process, learner centred approach in learning process, use of E-pedagogies and teachers' innovations in teaching using ICT.

In this section the hypothesis test results are substantiated with previous pertinent observations from empirical studies. The inferences are supported by the hypothetical proposals bringing to light areas of both dissimilarities and convergence. The inferences

section is done in accordance with the postulation, conceptual and empirical compasses as based on the underpinning theories which comprise the dynamic capabilities theory, technological networks innovation theory, Porter's sustainable competitive advantage model and the knowledge-based view of the firm.

Inferential statistics were derived to estimate the correlation between the independent, the moderating and the mediating variables; determine whether the independent variable was a significant determinant of the dependent variable; test the magnitude of the effect between the independent variables and the dependent variable as well as conduct test of hypothesis.

4.8.1 Correlation Analysis

Pearson Moments Coefficient of Correlation (PMCC) was used to estimate the magnitude and direction of the correlation of the relationship between the variables. The PMCC value, $r\pm1$ would indicate the magnitude of correlation while the p-value of significance would indicate the significance of the relationship.

Table 4.45: Inferential Statistics for Composite Variables: Correlation Analysis

		ICT Integration	Transformational Leadership Style	Teacher Self-Efficacy in Technology	School Environment
ICT Integration	Pearson Correlation	1	.207**	.534**	.282**
	Sig. (2-tailed)		.000	.000	.000
	N	298	295	285	290
Transformational Leadership Style	Pearson Correlation	.207**	1	.229**	.428**
	Sig. (2-tailed)	.000		.000	.000
	N	295	297	287	292
Teacher Self-Efficacy in Technology	Pearson Correlation	.534**	.229**	1	.420**
	Sig. (2-tailed)	.000	.000		.000
	N	285	287	288	288
School Environment	Pearson Correlation	.282**	.428**	.420**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	290	292	288	293

**. Correlation is 2-tailed and significant at 0.01.

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As shown in Table 4.45, ICT Integration has a significant positive relationship with transformational leadership style at r=0.207 and p-value<0.05. It also emerged that that ICT Integration has a significant positive correlation with teacher self-efficacy in Technology at r=0.534, p<0.05 and so also with the school environment at r=0.282, p<0.05. The results of correlation analysis imply that the ICT integration in education has a significant positive correlation with the transformational leadership style of head teachers, teacher self-efficacy in technology and the school environment. This means that an improvement in the transformational leadership, teacher efficacy in technology and the school environment has an enhancing or reinforcement effect on the level of ICT integration in education.

4.8.2 Regression Analysis

The study conducted regression analysis to establish the statistical significance of the relationships between the four hypotheses of this study namely; transformational leadership style, teacher self-efficacy and school environment and the dependent variable, ICT Integration. The results are presented by way of the coefficients, ANOVA and model summary.

4.8.2.1 Hypothesis One (H_{01}): Transformational leadership style does not have a significant influence on the ICT integration in teaching and learning

The first objective of the study was to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools. The statistical model $Y = \alpha + \beta_1 X_1 + \varepsilon$ where: Y = ICT Integration, α =constant, β_1 = Coefficient of X_1, X_1 = Transformational leadership, ε = Error term was used to explore the relationship.

Table 4.46: Transformational Leadership Style and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.207[a]	.043	.040	.78554	.043	13.124	1	293	.000

a. Predictors: (Constant), Transformational Leadership Style

From the tables, there was correlation between transformational leadership and ICT integration indicated by R which was 0.207. The value of R Square = 0.043 meaning that transformational leadership style explains the variance of ICT integration by 4.3% of the variance of ICT integration

Table 4.47: Transformational Leadership Style and ICT Integration: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.098	1	8.098	13.124	.000[b]
	Residual	180.800	293	.617		
	Total	188.898	294			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), Transformational Leadership Style

ANOVA was carried out to ascertain the significance of the regression model adopted. From the ANOVA results in Table the model was found to be statistically significant (F $(1,293) = 13.124$, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that transformation leadership is a good predictor of ICT integration. ANOVA was particularly employed to analyze the differences among means in the independent variables.

Table 4.48: Transformational Leadership Style and ICT Integration: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.941	.185		10.476	.000
	Transformational Leadership Style	.192	.053	.207	3.623	.000

a. Dependent Variable: ICT Integration

Given the statistical model $Y = \alpha + \beta_1 X_1 + \varepsilon$, the beta coefficients of transformational leadership in Table show that $\beta_1 = 0.207$, $t = 3.623$, p-value < 0.001 indicating that a unit improvement in the transformational leadership style contributes to a 20.7% improvement in ICT integration. This further affirms that transformational leadership style is significant predictor of ICT Integration in teaching and learning.

The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{01} is accepted. The results indicate a p-value < 0.001. This is also supported by a t-statistic of 3.623 which is larger than the critical t-statistic of 1.96. There was, therefore, sufficient evidence to reject the null hypothesis, H_{01}, that transformational leadership style does not have a significant influence on the ICT integration in teaching and learning. The study therefore concluded that transformational leadership style has a significant influence on the ICT integration in teaching and learning.

The finding is in agreement with Nguni, Sleegers, and Denessen (2016) who studied the effects of transformational leadership on teachers' job satisfaction, organizational commitment, and organizational citizenship in schools in Tanzania. They observed that the leadership style was distinguished by the different ways' leaders motivate their followers and appeal to the emotions and values of their followers. The finding is also consistent with Nthuni (2012) in whose study on leadership style factors that influence motivation of pre-school teachers in public pre-schools in Embu North District, revealed that there was need to adopt a transformational leadership style in order to enhance motivation of pre-school teachers in public pre-schools and improve their working environment by involving them in decision making and in policy formulation in their schools.

4.8.2.2 Hypothesis Two (H$_{02}$): School environment does not have a significant influence on integration ICT in teaching and learning in public primary schools

The second study objective was to assess the extent to which school environment influences integration ICT in teaching and learning in public primary schools. The statistical model $Y = \alpha + \beta_2 X_2 + \varepsilon$ where: Y = ICT Integration, α = constant, β_2=Coefficient of X_2, X_2 = School Environment, ε = Error term was used to explore the relationship.

Table 4.49: School Environment and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.282[a]	.080	.076	.77346	.080	24.926	1	288	.000

a. Predictors: (Constant), School Environment

As seen in Table 4.49, the value of R Square = 0.080 meaning that 8 per cent of the variation in ICT integration can be explained by the school environment. ICT integration teaching and learning is a function of school environment.

Table 4.50: School Environment and ICT Integration: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.911	1	14.911	24.926	.000[b]
	Residual	172.291	288	.598		
	Total	187.203	289			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), School Environment

From the ANOVA results in Table the model was found to be statistically significant (F (1,288) = 24.926, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that the school environment is a good predictor of ICT integration.

Table 4.51: School Environment and ICT Integration: Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.216	.280		4.345	.000
School Environment	.373	.075	.282	4.993	.000

a. Dependent Variable: ICT Integration

Given the statistical model $Y = \alpha + \beta_2 X_2 + \varepsilon$, the beta coefficients of transformational leadership in Table show that $\beta_2 = 0.282$, t = 4.993, p-value < 0.001 indicating that a unit improvement in the school environment contributes to a 28.2% improvement in ICT integration. In this regard school environment is a significant predictor of school environment

The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{02} is accepted. The results indicate a p-value < 0.001. This is also supported by a t-statistic of 4.993 which is larger than the critical t-statistic of 1.96. There was, therefore, sufficient evidence to reject the null hypothesis, H_{02}, that school environment does not have a significant on integration ICT in teaching and learning in public primary schools. The study therefore concluded that the school environment does have a significant influence on the integration of ICT in teaching and learning in public primary schools.

The findings are supported by Hoy and Sabo (1998) who observe that a positive school environment is related to the effectiveness of whole school. This is to say that there is a connection between positive school environment and school effectiveness. Similarly, Sherman and Howard (2019)reviewed studies that examined school climate and concluded that how schools are run is directly related to the level of behavioral disruptions and therefore school performance.

The finding is further in accordance with Griffith (2016) whose findings provide support for the hypothesis that positive aggregate perceptions of school climate will be significantly associated with a stronger relationship between students' individual perceptions of climate and their academic and behavioral performance.

4.8.2.3 Hypothesis Three (H$_{03}$): Teachers self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning

The third study objective was to establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools. The statistical model $Y = \alpha + \beta_3 X_3 + \varepsilon$ where: Y = ICT Integration, α = constant, β_3 = Coefficient of X_3, X_3 = Transformational leadership, ε =Error term was used to explore the relationship.

Table 4.52: Teacher Self-Efficacy in Technology and ICT Integration: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.534[a]	.285	.282	.68248	.285	112.690	1	283	.000

a. Predictors: (Constant), Teacher Self-Efficacy in Technology

As seen in Table 4.52 the value of R Square = 0.285 meaning 28.5 per cent of the variation in ICT integration can be explained by teacher self-efficacy in technology. The correlation is very high. Teacher self-efficacy in technology influence ICT Integration in teaching and learning in Nairobi Primary schools. ICT Integration in teaching and learning is a function of teachers' self-efficacy in technology.

Table 4.53: Teacher Self-Efficacy in Technology and ICT Integration: ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.488	1	52.488	112.690	.000[b]
	Residual	131.815	283	.466		
	Total	184.303	284			

a. Dependent Variable: ICT Integration

b. Predictors: (Constant), Teacher Self-Efficacy in Technology

From the ANOVA results in Table 4.54 the model was found to be statistically significant $(F_{(1,284)} = 112.69$, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that teacher self-efficacy in technology is a good predictor of ICT integration.

Table 4.54: Teacher Self-Efficacy in Technology and ICT Integration: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.974	.158		6.152	.000
	Teacher Self-Efficacy in Technology	.539	.051	.534	10.616	.000

a. Dependent Variable: ICT Integration

Given the statistical model $Y = \alpha + \beta_3 X_3 + \varepsilon$, the beta coefficients of transformational leadership in Table show that $\beta_3 = 0.534$, t = 10.616, p-value < 0.001 indicating that a unit improvement in the teacher self-efficacy in technology contributes to a 0.534 improvement in ICT integration.

The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{03} is accepted. The results indicate a p-value < 0.001. This is also supported by a t-statistic of 10.616 which is larger than the critical t-statistic of 1.96. There was, therefore, sufficient evidence to reject the null hypothesis, H_{02}, that teachers' self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning. The study therefore concluded that teachers' self-efficacy in technology does have a significant influence on ICT integration in teaching and learning. This consistent with Ayere et al (2010) whose study compared e-learning in NEPAD and non NEPAD schools that were offering computer studies and found that teachers in NEPAD schools

integrated ICT in the learning in all subjects, whereas little or no integration took place in the non-NEPAD schools. The finding was explained by the fact that more teachers from NEPAD schools were computer literate (60%) as compared to their non-NEPAD counterparts (31%).

4.8.2.4 Multivariate Regression

The results of the multivariate statistical model $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + + \varepsilon$ where Y = ICT integration, α is the y-intercept or model coefficient; β_1 are the coefficients of the independent variables; X_1 = Transformational Leadership Style; X_2 = School Environment; X_3 = Teacher Self-efficacy in Technology and ε = the error term was also obtained.

As seen in Table the value of R Square = 0.295 meaning 29.5 per cent of the variation in ICT integration can be explained by the transformation leadership style, school environment and teacher self-efficacy in technology.

Table 4.55: Multivariate Regression: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.543[a]	.295	.288	.67983	.295	39.261	3	281	.000

a. Predictors: (Constant), School Environment, Teacher Self-Efficacy in Technology, Transformational Leadership Style

From the ANOVA results in Table 4.56 the model was found to be statistically significant ($F(1,281) = 39.261$, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that transformation leadership style, school environment and teacher self-efficacy in technology are good predictors of ICT integration.

Table 4.56: Multivariate Regression: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.435	3	18.145	39.261	.000[b]
	Residual	129.868	281	.462		
	Total	184.303	284			

a. Dependent Variable: ICT Integration

b. Predictors: (Constant), School Environment, Teacher Self-Efficacy in Technology, Transformational Leadership Style

Given the statistical model $Y = \alpha + \beta_3 X_3 + \varepsilon$, the beta coefficients of Transformational Leadership Style, School Environment and Teacher Self-Efficacy in Technology result in $Y = 0.084X_1 + 0.043X_2 + 0.496X_3$ as shown Table 4.56. However, at p-value ≤ 0.05 on the teacher self-efficacy in technology shows positive influence on ICT integration in the multiple regression model. This implies, viewed in combination only a significant improvement in teacher self-efficacy in technology would significant unit improvements in ICT integration.

Table 4.57: Multivariate Regression: Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.614	.260		2.364	.019
	Transformational Leadership Style	.078	.052	.084	1.511	.132
	Teacher Self-Efficacy in Technology	.501	.056	.496	8.957	.000
	School Environment	.058	.079	.043	.731	.465

a. Dependent Variable: ICT Integration

4.8.2.6 Hypothesis Four (H$_{04}$): Teachers self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning

The fourth study objective was to examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools. The statistical model Y = α +β$_1$X$_1$*X$_3$+ ε where: Y = ICT Integration, α =constant, β$_1$ = Coefficient of X$_1$, X$_1$ = Transformational leadership, X$_3$ = Teacher Self-Efficacy in Technology, ε = Error term was used to explore the relationship.

Both the transformational leadership style and teacher self-efficacy in technology were confirmed to be significant predictors of ICT integration. This was the first important step before testing the moderating effect.

As shown in Table 4.58, the model without the interaction term, teacher self-efficacy in technology, is significant with $F_{(1, 283)} = 14.311$, p-value < 0.001. The model with the interaction term is also significant with $F_{(2, 282)} = 58.721$, p-value < 0.001.

Table 4.58: Moderating Effect of Teacher Self-Efficacy: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.871	1	8.871	14.311	.000[b]
	Residual	175.432	283	.620		
	Total	184.303	284			
2	Regression	54.188	2	27.094	58.721	.000[c]
	Residual	130.115	282	.461		
	Total	184.303	284			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), Transformational Leadership Style
c. Predictors: (Constant), Transformational Leadership Style, Teacher Self-Efficacy in Technology

From Table we note that R Square change without the interaction term = 0.048, p-value < 0.001 while with the interaction term R Square change = 0.294, p-value < 0.001. This indicates a significant moderation effect between transformation leadership style and teacher self-efficacy in technology. Transformational leadership style alone contributes 4.8 per cent on the state of ICT integration. When the moderating variable, teacher self-efficacy in technology, is introduced the contribution rises more than sixfold to 29.4 per cent.

Table 4.59: Moderating Effect of Teacher Self-Efficacy: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.219ᵃ	.048	.045	.78734	.048	14.311	1	283	.000
2	.542ᵇ	.294	.289	.67927	.246	98.214	1	282	.000

a. Predictors: (Constant), Transformational Leadership Style
b. Predictors: (Constant), Transformational Leadership Style, Teacher Self-Efficacy in Technology

The criterion for acceptance or rejection was to reject if p-value less than 0.05 otherwise H_{04} is accepted. The results indicate a significant increase in the R Square change from 0.048 to 0.294 at p-value < 0.001. This is also supported by the significant F-statistic with $F_{(1, 283)}$ = 14.311, p-value < 0.001 without the interacting term and significant $F_{(2, 282)}$ = 58.721, p-value < 0.001 with the interacting term. The null hypothesis, H_{04}, teachers' self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning was rejected. The study concluded that teachers' self-efficacy in technology does have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning.

4.8.2.7 Hypothesis Five (H$_{05}$): School environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning

The fifth study objective was to examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools. The statistical model $Y = \alpha + \beta_1X_1 + \beta_2X_2 + \varepsilon$ where: Y = ICT Integration, α = constant, β_1 = Coefficient of X_1, X_1 = Transformational leadership, β_2 = Coefficient of X_2, X_2 = School Environment, ε = Error term was used to explore the relationship. , and $X_1 = \alpha + \beta_2X_2 + \varepsilon$ where X_1 = Transformational Leadership Style, α = constant, β_2 = Coefficient of X_2, X_2 = School Environment, ε = Error term (to establish whether Transformational Leadership Style and School Environment have a relationship since mediation only makes sense if Transformational Leadership Style affects School Environment). The absence of relationship between Transformational Leadership Style and School Environment would mean that School Environment is just another independent variable (Rector and Visitors, 2020).

The first crucial step was to test the statistical model $Y = \alpha + \beta_1X_1 + \varepsilon$. As previously seen in Table the value of R Square = 0.043, p-value < 0.001 meaning that 4.3 per cent of the variation in ICT integration can be explained by transformation leadership style. From the ANOVA results in Table the model was found to be statistically significant (F (1,293) = 13.124, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that transformation leadership is a good predictor of ICT integration. Given the statistical model $Y = \alpha + \beta_1X_1 + \varepsilon$, the beta coefficients of transformational leadership in Table show that β_1 = 0.207, t = 3.623, p-value < 0.001 indicating that a unit improvement in the transformational leadership style contributes to a 0.207 improvement in ICT integration.

The second crucial step was to test the statistical model $X_1 = \alpha + \beta_2 X_2 + \varepsilon$ where $X_1 =$ Transformational Leadership Style, $\alpha =$ constant, $\beta_2 =$ Coefficient of X_2, $X_2 =$ School Environment, $\varepsilon =$ Error term (to establish whether Transformational Leadership Style and School Environment have a relationship since mediation only makes sense if Transformational Leadership Style affects School Environment). The results are shown on Tables. The model has a significant R Square change $= 0.183$, p-value < 0.001. In essence, 18.3 per cent of transformational leadership style can be explained by the school environment.

Table 4.60: Mediating Effect of School Environment: Model Summary (1)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.428[a]	.183	.181	.78363	.183	65.147	1	290	.000

a. Predictors: (Constant), School Environment

The model also demonstrates goodness of fit with $F(1, 290) = 65.147$, p-value < 0.001. This implies we have a significant regression between transformation leadership style and school environment.

Table 4.61: Mediating Effect of School Environment: ANOVA[a] (1)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.005	1	40.005	65.147	.000[b]
	Residual	178.082	290	.614		
	Total	218.087	291			

a. Dependent Variable: Transformational Leadership Style
b. Predictors: (Constant), School Environment

A review of the beta coefficients indicates that $X_1 = \alpha + \beta_2 X_2 + \varepsilon$ results in $X_1 = \alpha + 0.428 X_2$. That is $\beta_2 = 0.428$, $t = 8.071$, p-value < 0.001. This implies that a unit improvement in the school environment leads to 0.428 improvement in the transformational leadership style.

Table 4.62: Mediating Effect of School Environment: Coefficients[a] (1)

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1　(Constant)	1.127	.283		3.976	.000
School Environment	.611	.076	.428	8.071	.000

a. Dependent Variable: Transformational Leadership Style

The third crucial step was to test the statistical model $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$ where: $Y =$ ICT Integration, $\alpha =$ constant, $\beta_1 =$ Coefficient of X_1, $X_1 =$ Transformational leadership, $\beta_2 =$ Coefficient of X_2, $X_2 =$ School Environment, $\varepsilon =$ Error term. This is shown in Tables.

There was a significant R Square value = 0.084, p-value < 0.001. This implies that 9.1 per cent variation in ICT integration can be explained by transformational leadership style and school environment. Transformational leadership style alone could account for 4.3 per cent of ICT integration while school environment alone could account for 8 per cent.

Table 4.63: Model Summary[b] (2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.301[a]	.091	.084	.77015	1.629

a. Predictors: (Constant), School Environment, Transformational Leadership Style
b. Dependent Variable: ICT Integration

From the ANOVA results in Table 4.64 the model was found to be statistically significant $(F (1,287) = 14.308$, p-value<0.001) and implies that there was a goodness of fit of the model. This also indicates that transformation leadership style and school environment are good predictors of ICT integration.

Table 4.64: ANOVA[a] (2)

Model	Sum of Squares	df	Mean Square	F	Sig.
1　Regression	16.973	2	8.487	14.308	.000[b]
Residual	170.230	287	.593		
Total	187.203	289			

a. Dependent Variable: ICT Integration
b. Predictors: (Constant), School Environment, Transformational Leadership Style

The beta coefficients in Table 4.65 indicates that the independent variable, transformational leadership style is not significant given $\beta_1 = 0.116$, t = 1.864, p-value > 0.05 for transformational leadership style while is significant at $\beta_2 = 0.232$, t = 3.726, p-value < 0.001 for the school environment. This implies that the school environment has a mediating influence on the status of ICT integration.

Table 4.65: Coefficients[a] (2)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model	B	Std. Error	Beta		
1 (Constant)	1.094	.286		3.820	.000
Transformational Leadership Style	.108	.058	.116	1.864	.063
School Environment	.307	.082	.232	3.726	.000

a. Dependent Variable: ICT Integration

In step one of analysis for mediating effect of the school environment, it was demonstrated that, with R Square = 0.043, p-value < 0.001, 4.3 per cent of the variation in ICT integration can be explained by transformation leadership style. Further, model goodness of fit between ICT integration and transformational leadership style with $F_{(1,293)} = 13.124$, p-value<0.001. Finally, it was demonstrated that the beta coefficients of transformational leadership style were significant, $\beta_1 = 0.207$, t = 3.623, p-value < 0.001 indicating that a unit improvement in the transformational leadership style contributes to a 0.207 improvement in ICT integration. In step two the relationship between transformational leadership style and school environment was demonstrated with R Square change = 0.183, p-value < 0.001, goodness of fit with $F_{(1, 290)} = 65.147$, p-value < 0.001 and t-statistic, $\beta_2 = 0.428$, t = 8.071, p-value < 0.001. In the final of three steps it was demonstrated that there was an increase in the significant R Square value = 0.084, p-

value < 0.001 from 0.043, p-value < 0.001 when the mediating term was introduced, that the model was statistically significant (F (1,287) = 14.308, p-value<0.001). And that the beta coefficients were not significant at β_1 = 0.116, t = 1.864, p-value > 0.05 for transformational leadership style but is significant β_2 = 0.232, t = 3.726, p-value < 0.001 for the school environment.

The null hypothesis, H_{05}, school environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning was therefore rejected. The study concluded that school environment has a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning. The finding is in line with Griffith (2016) who employed the descriptive design to examine how individual- and school-level perceptions of school climate interact with one another in relation to student performance using a sample of elementary school students and found that "group or school-level climate moderated within-school relations of climate to student self-reported academic performance"

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

The main objective of the study was to investigate how transformational leadership style predicts ICT integration in teaching and learning in public primary schools in Nairobi County and the mediating and moderating roles of teachers' self-efficacy on technology and school environment respectively. More specifically, the study sought to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools; assess the extent to which school environment influences integration of ICT in teaching and learning in public primary schools; establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools; examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of ICT in teaching and learning in public primary schools; and examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools.

To assess the interrelationships among the main constructs being investigated, the study advanced four corresponding hypotheses. The outcomes of the hypothesis tests were interpreted and presented in the fourth chapter and the deductions delved into. In this chapter, a concise summarization of the main study findings is presented and the resultant conclusion drawn. The limitations faced during the study are also outlined along the recommendations for theory, policy, research and practice.

The present chapter's focus is to link the stated hypotheses and the respective objectives to the results and deductions drawn from the study findings, and propose recommendations informed by findings of the study and deductions. In this regard, each hypothesis and corresponding objective is stated, the subsequent findings presented and results of the hypothesis test presented, in turn informing the relevant inferences.

Each research, policy, theory and practice implication are as informed directly by the reported conclusions and findings. The logistical and methodological limitations are then outlined, culminating in propositions for future studies as a way of indicating how the knowledge gaps identified as well as limitations can be addressed and bridged.

5.2 Summary of Key Findings

To address the objectives of the study, the study stated four hypotheses, formulated from corresponding objectives. The study used a cross-sectional survey design since the object of the study is to document the situation as it is at the present time. The target population for this study comprised of public primary school teachers and head teachers drawn from Nairobi County. Primary data was gathered by use of both structured questionnaires, key informant interviews and an observation guide. The instruments used for data collection were structured questionnaires for teachers. The head teachers were on the other hand taken through an in-depth interview using an interview guide while the observation guide was used to collect observable data on the ICT infrastructure.

Both inferential and descriptive statistics were utilized in data analysis, headed by tests of assumption including missing values, normality, outliers, multicollinearity, singularity linearity and homoscedasticity. Descriptive analysis included percentages, frequencies, standard deviations and means.

On the other hand, inferential analysis comprised of a simple linear regression utilized to assess the transformational leadership style's direct effects, school environment and teacher efficacy on the integration of ICT in teaching and learning in public primary schools and therefore test H_{01}, H_{02} and H_{03}. Hierarchical regression analysis was also employed to determine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools and therefore test H_{04}. A step-wise regression analysis was further employed to examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools and test H_{05}.

5.2.1 Transformational Leadership Style and ICT Integration

The first objective of the study was to establish the extent to which transformational leadership style influences ICT integration in teaching and learning in public primary schools. To this end, transformational leadership style was measured by five sub-constructs including idealized influence attributed, idealized influence behaviour, inspirational motivation, intellectual stimulation and individual consideration. Descriptive analysis revealed that most of the participants indicates that to a large extent, head teacher makes people they interact with feel good to be around him/her (3.56); and that those the head teacher interacts with have complete faith in him or her (3.52). A majority however indicated that only to a moderate extent, head teacher helps others find meaning in their work (3.49); those the head teacher interacts with are proud to be associated with him or her (3.45); head teachers express with a few simple words what we could and should do (3.38); and that head teacher helps us develop ourselves (3.38).

The first objective of the study informed the corresponding first null hypothesis of the study (H_{01}), that states that transformational leadership style does not have a significant influence on the ICT integration in teaching and learning. Both the Pearson correlation analysis and a simple linear regression were carried out accordingly to test the hypothesis. Transformational leadership style was seen to have significant positive correlation with ICT integration (r=.207[**]<.05). There was also a goodness of fit of the model between transformational leadership style and ICT integration (R = .207[a]). This also indicates that transformation leadership style is a good predictor of ICT integration. The t-statistic was larger than the criterion t-statistic of 1.96 (β = .207, t = 3.623, P=.000<.05) and thus the null hypothesis was rejected and conclusion made that transformational leadership style has a significant influence on the ICT integration in teaching and learning.

5.2.2 School Environment and ICT Integration

The second objective of the study was to assess the extent to which school environment influences integration ICT in teaching and learning in public primary schools. The variable, school environment, was measured by six sub-constructs, including availability of a school mission, good infrastructure, accessibility of instructional materials, good class interaction between the teachers and the learners, good support from the head teacher and good interaction between parents and teachers in monitoring the learners progress.

Descriptive analysis revealed to this end that most of the participants indicated that to a large extent, their respective schools have a mission (4.25); the mission of the respective schools is known to all students (3.56); their respective school buildings are in good condition (3.77); there are free interactions between the teachers and learners (4.00); in their respective schools, teachers want learners to contribute their thoughts in class (4.08);

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and that in their respective schools, teachers expect learners to be well behaved in school (4.32). Most of the participants further indicated that to a moderate extent, in their respective schools, the administration involves teachers in making decisions (3.49); the head teacher motivates teachers to keep performing well (3.49); in their respective schools, teachers make learning interesting using technology and involving the learners in the learning process (3.23); and that their respective libraries have up-to-date instructional materials (2.99).

The second objective of the study informed the corresponding second null hypothesis of the study (H_{02}), that states that school environment does not have a significant influence on integration ICT in teaching and learning in public primary schools. Both the Pearson correlation analysis and a simple linear regression were carried out accordingly to test the hypothesis. The school environment was also observed to have a significant positive correlation with ICT integration (r=.282[**]<.05). There was also a goodness of fit of the model between the school environment and ICT integration. (R = .282[a]) This also indicates that the school environment is a good predictor of ICT integration. The t-statistic was larger than the criterion t-statistic of 1.96 (β = .282, t = 4.993, P=.000<.05) and thus the null hypothesis was rejected and conclusion made that the school environment style has a significant influence on the ICT integration in teaching and learning.

5.2.3 Teacher Self-Efficacy in Technology and ICT Integration

The third objective of the study was to establish the extent to which teacher efficacy in technology influences integration ICT in teaching and learning in public primary schools. Teacher efficacy in ICT was in this regard measured by teacher confidence, enhanced teachers' competencies, teacher motivation and change in teacher attitude. To this end,

descriptive analysis revealed that most of the participants perceive themselves as moderately competent in selecting and using various media to support teaching and learning (3.15); moderately prepared to evaluate software to support teaching and learning (3.01); and moderately integrate technology across the curriculum (3.10).

The third objective of the study informed the corresponding third null hypothesis (H_{03}) that states that teachers self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning. Both the Pearson correlation analysis and a simple linear regression were carried out accordingly to test the hypothesis. Teacher self-efficacy in technology was seen to have a significant positive correlation with ICT integration (r = .534[**]<.05). Further, there was a goodness of fit of the model between teacher self-efficacy in technology and ICT integration (R = .534[a]). This implies that the school environment is a good predictor of ICT integration. The t-statistic was larger than the criterion t-statistic of 1.96 (β = .534[a], t = 10.616, P=.000<.05) and thus the null hypothesis was rejected and conclusion made that teacher self-efficacy in technology has a significant influence on the ICT integration in teaching and learning.

5.2.4 Transformational Leadership Style, Teacher Self-Efficacy in Technology and ICT Integration

The fourth objective of the research was to examine the moderating influence of teachers' self-efficacy in technology on the relationship between transformational leadership style and integration of in teaching and learning in public primary schools. The fourth objective of the informed the fourth hypothesis that states that teachers' self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning (H_{04}). To test the hypothesis, a hierarchical regression analysis was carried out.

Both the transformational leadership style and teacher self-efficacy in technology were confirmed to be significant predictors of ICT integration. The results indicate a significant increase in the R Square change from 0.048 to 0.294 at p-value < 0.001, with the introduction of the interaction term. This is also supported by the significant F-statistic with F (1, 283) = 14.311, p-value < 0.001 without the interacting term and significant F (2, 282) = 58.721, p-value < 0.001 with the interacting term. The moderating effect of the teacher self-efficacy in technology on the relationship between transformational leadership style and ICT integration was therefore confirmed with a significant six-fold increase the R square change when the moderating variable was factored in.

5.2.5 Transformational Leadership Style, School Environment and ICT Integration

The fifth objective of the research was to examine the mediating influence of school environment on the relationship between transformational leadership style and ICT integration in teaching and learning in public primary schools. The fifth objective informed the fifth null hypothesis (H_{05}) that states that school environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning. To test the hypothesis, a step-wise regression analysis was carried out.

The goodness of fit for the regression model between transformation leadership style and ICT integration was confirmed by the F statistic. The regression model between the transformational leadership style and the school environment was also seen to be statistically significant. The introduction of the mediating variable, school environment, rendered the relationship between transformational leadership style and ICT integration statistically insignificant. It was demonstrated that there was an increase in the significant R Square value = 0.084, p-value < 0.001 from 0.043, p-value < 0.001 when the mediating

term was introduced, that the model was statistically significant (F (1,287) = 14.308, p-value<0.001). And that the beta coefficients were not significant at $\beta_1 = 0.116$, t = 1.864, p-value > 0.05 for transformational leadership style but is significant $\beta_2 = 0.232$, t = 3.726, p-value < 0.001 for the school environment. The null hypothesis was therefore rejected and thus, the conclusion that the school environment has a significant mediating effect on the relationship between transformation leadership style and ICT integration.

5.2.6 ICT Integration

The study sought to assess transformational leadership style, teachers' self-efficacy in technology and information communication and technology integration in teaching and learning in public primary schools in Nairobi County, Kenya. The variable, ICT Integration in learning was measured by six sub-constructs, including knowledge of instructional technology, access to instructional materials through ICT, existence of teacher-to-teacher collaboration in the learning process, learner centred approach in learning process, use of E-pedagogies as well as teachers' innovations in teaching using ICT.

Most of the participants indicated that to a moderate extent, teachers are able to keep and manage learners' records (3.09); teachers can access further capacity building programs online (2.90); teachers belong to knowledge information organisation (2.74); sourcing for additional material to teach (3.20); technology available anytime you need it (2.92); research for class activities using ICT (2.86); share online notes with other teachers (2.72); belong to a teacher's community of practice (2.70).

Table 5.1 presents a summary of all the hypotheses stated and their corresponding test results.

Table 5.1: Summary of Hypotheses and Test Results

Number	Hypotheses	Test results
H_{01}	Transformational leadership style does not have a significant influence on the ICT integration in teaching and learning	Rejected
H_{02}	School environment does not have a significant influence on integration ICT in teaching and learning in public primary schools	Rejected
H_{03}	Teachers self-efficacy in technology does not have a significant influence on ICT integration in teaching and learning	Rejected
H_{04}	Teachers self-efficacy in technology does not have a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning	Rejected
H_{05}	School environment does not have a significant mediating influence on the relationship between Transformational leadership style and ICT integration in teaching and learning	Rejected

5.3 Conclusions

The study, based on the literature, the descriptive statistics, the correlation analysis, regression analysis and the test of hypotheses and research questions makes conclusions that, each independent variable at a time, that transformational leadership style, teacher self-efficacy in technology and school environment influence the state of ICT integration in primary schools. In multivariate analysis, all the predictor variables together, only the teacher self-efficacy in technology demonstrates influence on the observed level of ICT integration. There is a significant positive correlation between the transformational leadership style of head teachers, teacher self-efficacy in technology and the school environment and ICT integration with the implication that an improvement in the transformational leadership, teacher efficacy in technology and the school environment has an enhancing or reinforcement effect on the level of ICT integration in education.

5.3.1 Transformational Leadership Style and ICT Integration

The study particularly concludes that transformational leadership style significantly and positively the ICT integration in teaching and learning. This can be attributed to the supportive, accommodative and change-oriented role played by head teachers across a majority of the schools reached, that inspires and motivates teachers to develop themselves part of which including improving their grasp of the concept of ICT and its implication for and application in teaching and learning. Head teachers were observed to practice the transformational leadership style largely to a moderate extent. This is exhibited in a majority of the head teachers' ability to make people they interact with feel proud, good and have complete faith in him or her. Head teachers were also found to help others find meaning in their work, expresses with a few simple words what we could and should do and help teachers develop themselves.

5.3.2 School Environment and ICT Integration

The study also concludes that school environment has a significant influence on integration ICT in teaching and learning in public primary schools. This can be attributed to the conducive environment for the integration of ICT in teaching and learning in a majority of the schools reached. It is particularly noted from the foregoing findings that the school environment across a majority of the schools reached is to a large extent supportive and receptive to the uptake and use of technology in teaching and learning. The environment in most schools reached is particularly characterized by a well-known mission, school buildings in good condition, free interactions between the teachers and learners. There is further, moderate use of technology in teaching and learning as well as moderate involvement of teachers in making decisions, by the administration.

5.3.3 Teacher self-efficacy and ICT Integration

It is also concluded that teachers' self-efficacy in technology has a significant influence on ICT integration in teaching and learning. As expected, the more conversance, confidence and motivation a teacher exhibits in the use of ICT in teaching and learning, the more inclined they are to integrating ICT in their teaching and learning profession. A majority of the respondent teachers reached were found to exhibit only moderate levels of self-efficacy in using technology in their teaching profession. This was manifested in the teachers' moderate competences in selecting and using various media to support teaching and learning, in the evaluation of software to support teaching and learning, ability to integrate technology across the curriculum as well as the moderate capability to determine why, when, and how to use technology in education.

5.3.4 Transformational Leadership Style, Teacher Self-Efficacy and ICT Integration

The study further concludes that teacher self-efficacy in technology has a significant moderating influence on the relationship between transformational leadership style and ICT integration in teaching and learning. This can be attributed to the ability of a well-versed teacher in the application of ICT in teaching, to leverage the supportive and accommodative role of the head teacher to harness the available ICT infrastructure and integrate the same in their teaching profession, as compared to a teacher with low self-efficacy in technology.

5.3.5 Transformational Leadership Style, School Environment and ICT Integration

It is further concluded that school environment has a significant mediating influence on the relationship between transformational leadership style and ICT integration in teaching and learning. This can be attributed to the dependence of head teacher practicing the transformational leadership style on the adequacy and richness of the school environment in terms of its endowment with ICT infrastructure, in order to realize effective ICT

integration in teaching and learning. The more endowment a school is with ICT infrastructure and administrative systems, the more likely a transformational head teacher's motivation to teachers is likely to result in effective ICT integration.

5.4 Recommendations

The study, via the objectives formulated, the stated corresponding hypotheses and established findings, presents distinguished insinuations pertaining ICT's integration in learning and teaching among primary schools in the country as well as implications to policy, theory and methodology. As such, the following recommendations are made, aimed at advancing ICT's integration in learning and teaching among Kenyan primary schools.

5.4.1 Implications to Practice and Policy

The study has established that the transformational leadership style significantly and positively influences integration of ICT in teaching and learning. It is thus recommended that school administrations take a keen review of the leadership style given that transformational leadership style is seen to have a significant influence on ICT integration in primary schools. The study recommends that head teachers adopt the transformational leadership style and offer support, motivation and encouragement to their teacher geared towards enabling teachers train and develop their teaching practice especially towards horning their skills in their application of ICT in teaching.

The study also established that school environment has a significant influence on integration ICT in teaching and learning in public primary schools. It is recommended in light of the finding that both the administration and Boards of management of primary schools across the country mobilize requisite resource to acquire pertinent ICT infrastructure for use by both teachers and learners in their teaching practice and learning respectively.

It was further established that teachers' self-efficacy in technology has a significant influence on ICT integration in teaching and learning. As such, teacher self-efficacy in technology emerges as a very core plank in ICT integration when juxtaposed with the school environment and transformational leadership. It is therefore recommended that school administrations as well as teacher management under the Teachers Service Commission develops and executes programs to reinforce teachers' efficacy in the adoption, use and innovation in technology. The study further asserts based on the findings that the onus is squarely on teachers to develop their teaching careers and practice through leveraging such avenues as training programmes and seminars with a view to improve their knowledge, confidence, experience and therefore self-efficacy in the use of ICT and its integration in their teaching practice.

The study further recommends that in the context of COVID-19 and the unprecedent school closures, digital distance education platforms have become critical to the continued provision of education. It is thus pertinent, that school leadership in the country adapt to the changing times and avail enabling school environments for the adoption of ICT in teaching and learning. It is also incumbent among teachers that they develop competencies in ICT for its effective integration in teaching and learning in public primary schools in the country.

It is recommended that the policy governing teacher training, establishment, improvement, support and maintenance of school environments be reinforced with a view to impart digital skills in trainee teachers, invest in the right infrastructure and reinforce the right school environment. It is also recommended that the Ministry of Education and the related co-actors take measures to improve the school environment, especially in setting up the right infrastructure, and operative policy environment given that the school environment is seen to exert a significant influence on ICT integration.

Policy makers and regulators are also urged, as informed by the study findings to formulate polices and regulations that ensure that as technological innovations progress and advance rapidly, their application in the education sector in general and in teaching and learning in particular is leveraged to the utmost benefit and safety of the consumers of these innovative products and services, which includes learners and teachers.

5.4.2 Implications to Theory

The findings of the study have extended the suppositions of the underpinning theories, including the Transformational Leadership Theory and Situational Theory. The findings are for instance, in support of the Transformational Leadership Theory developed by Burns (1978) and later enhanced by Bass and Avolio (1994), which holds that the transformational leaders inspire followers to accomplish more by concentrating on the follower's values and helping the follower align these values with the values of the organization. The present study findings are in support of the theory, by establishing that head teachers who practice the transformational leadership style exhibit the components making up the theory, including idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1985), which significantly influences the integration of ICT in teaching and learning.

The study findings have also affirmed the assertions of the Situational theory proposed by Hoy and Miskel (2001), which proposes two basic hypotheses, that leadership traits and characteristics of the situation combine to produce leader behavior and effectiveness; and that situational factors have direct effect on effectiveness. The study has, through the findings, demonstrated that the school environment and the level of teacher self-efficacy in technology coupled with the transformational leadership style positively influence the integration of ICT in teaching and learning among primary schools in Kenya. This is in tandem with Hoy and Miskel (2001), who referring to the school situation, explain further that the level of motivation and ability of both teachers and students are related to the goal attainment of schools.

5.4.3 Implications to Methodology

This study was grounded on the pragmatism point of view in which mixed methodologies including quantitative and qualitative techniques including quantitative data collected by closed-ended questionnaires, as well as descriptive analysis, inferential analysis and statistical hypothesis tests and key informant interviews were employed. The study findings, having made ground-breaking contributions to the body of knowledge validating the pragmatism point of view, the mixed methodologies and the techniques employed.

This study further adopted a mix of cross-sectional survey, correlational and mixed methods designs as they were found most appropriate both in data collection by use of primary data collected by both structured questionnaires and key informant interviews and for realizing the research objectives which entails both descriptive accounts of the variables explored in the study articulation of relationships between and among the conceptualized variables as well as content analysis. The study findings further lead to the validation of the research designs adopted.

The study further makes philosophical contributions to the field of distance education. Through the pragmatism point of view, the study has demonstrated how the relatively novel use if ICT in teaching and learning in Kenyan public primary schools is supported by the divergent leadership styles adopted by headteachers, teacher self-efficacy in the same as well as the extent to which school environment supports its adoption. This owes to ICT being dynamic, and therefore attracting divergent approaches in terms of headteachers' leadership styles with no definite one-size-fits-all approach to assure its desirable integration.

5.5 Areas for Further Research

This study focused on Nairobi City County's primary schools. It was also a snapshot kind of study. It is recommended that further studies be carried out in secondary, tertiary and higher education institutions to give further insight on the drivers of ICT integration. These studies should delve deeper taking into considerations the unprecedented impact experienced during the covid-19 pandemic. How different would the consequent research findings be post-covid? It is also recommended that longitudinal studies may be considered to evaluate how the education ecosystem is responding to the adaptive environment of the digital age education.

Further, in order to test the stated hypotheses and achieve the corresponding set study objectives, the present study assessed both the indirect and direct associations among and between the independent, dependent, mediating and moderating variables. Whereas the study objectives were met and stated hypotheses tested, the statistical approaches utilized were not exhaustive since the study did not explore other underlying factors in the effect and cause associations among the study variables. To counter this limitation, it is

recommended that future studies conduct deeper analytics such as moderated mediation and mediated moderation for richer insights on how the various variables interrelate.

Further, the present study was largely quantitative in design, utilizing quantitative in data collection, sampling, and analysis whereby the analytical tools including multiple, simple linear, step-wise and hierarchical regression analyses. Whereas the statistical tools robustly helped in realizing the objectives of the study, various associations and qualitative concepts pertinent to a richer understanding of the abstracted associations were not analyzed and captured in the study. The study recommends that future studies also employ qualitative approaches in addition to quantitative conceptualization, modelling and testing for the indirect and direct cause and effect relationships among and between variables, in order to factor in emotive and sentimental factors. This would help in understanding the interrelationships in more depth.

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APPENDICES
Appendix I: Cover Letter

Esther Gacicio

University of Nairobi

P.O. Box 30197 – 00100

Nairobi, Kenya

September 2017

Dear Sir/Madam,

RE: DATA COLLECTION

I am a doctorate learner at the University of Nairobi undertaking a Doctor of Philosophy Degree in Distance Education. My research topic "Moderating Influence of Self-Efficacy on the Effect of School Leadership on ICT integration in Teaching and Learning in Primary Schools in Nairobi County".

You have been selected to form part of the study. This is to kindly request you allow me to collect data from your teachers. I would also wish to request you to grant me time for an interview and allow me access to your ICT facilities. The information provided will be used strictly for academic purposes and will be treated with utmost confidentiality. Your assistance will be highly appreciated.

Yours Sincerely,

Esther Gacicio

Appendix II: Questionnaire For Teachers

The following questions will be used as guidelines to seek information on the teachers' self-efficacy in the ICT integrations in their schools. Note that the information collected will be strictly used for this study and will be kept in confidence.

Indicate in the boxes provided by a (√) your response (s) and write any other information in the spaces provided. Kindly do this in the sincerest way.

PART A: BACKGROUND INFORMATION

1. Respondent Gender

   Male   [ ]   Female   [ ]

2. Number of years of use of ICTs

   0 – 5   [ ]   6 – 9   [ ]

   Over 10 years [ ]

3. What is your age?

   30 or less   [ ]

   31-35   [ ]

   36-45   [ ]

   46-55   [ ]

   More than 55 [ ]

4. Highest Education Level Attained:

   Diploma   [ ]

   Undergraduate   [ ]

   Postgraduate   [ ]

PART B: ICT INTEGRATION

Following is a list of questions designed to gather information relating to your confidence in the use of ICT for teaching and learning. Indicate the extent to which you competently use ICT, using the scale: 1= Not at all; 2 = Little extent; 3 = Moderate extent; 4 = Great extent; 5 = Very great extent.

ICT Integration	1	2	3	4	5
Knowledge of Instructions					
Able to keep and manage learners' records					
Access further capacity building programs					
Belong to knowledge information organisation					
Sourcing for additional material to teach					
Access to Instructional technology					
Technology available anytime you need it					
Research for class activities					
Readily available for use in class					
Teacher to teacher collaboration					
Belong to a teacher's community of practice					
online notes with other teachers					
Online team teaching					
Teacher to learner collaboration					
Conduct discussions with learners					
Engage in chat discussions with learners					
Allow learners to reach out through social media					
Use of e-pedagogies					
Delivering an ICT integrated lesson					
Giving assignments					
Teachers innovation in Teaching					
Monitoring learners' academic progress					
Class management through technology					
Designing technology driven projects					

Following is a list of questions designed to gather information relating to the ICT infrastructure used in teaching and learning in your school. How would you rate the adequacy of the following in your school, using the scale: 1= Not available; 2 = Inadequate; 3 = Moderately Adequate; 4 = Adequate; 5 = Highly Adequate.

Facility	1	2	3	4	5

	0	1	2	3	4
Computers					
Power supply					
Internet connection					
Digital content					
Projectors					
Desktop					
Laptop					
Printers					
Scanners					
TV					
Video decks					
LCD Projections					

PART C: TRANSFORMATIONAL LEADERSHIP STYLE

INSTRUCTIONS: This questionnaire provides a description the school head teacher's leadership style.

Judge how frequently each statement fits you. The word others may mean your followers, clients, or group members.

KEY

Using the scale: 0 - Not at all 1 - Once in a while 2 = Sometimes 3 = Fairly often 4 = Frequently, if not always indicate the extent to which the following statements describe the school head's leadership style.

Transformational Leadership Style	0	1	2	3	4
Idealized Influence attributed					
Head teacher makes people they interact with feel good to be around him/her					
Those the head teacher interacts with have complete faith in him or her					
Those the head teacher interacts with are proud to be associated with him or her					
Inspirational Motivation					
Head teachers expresses with a few simple words what we could and should do					
Head teacher provides appealing images about what we can do					
Head teacher helps others find meaning in their work					

Intellectual Stimulation					
Head teacher enable those he/she interacts with to think about old problems in new ways					
Head teacher provide us with new ways of looking at puzzling things					
Head teacher gets us to rethink ideas that they had never questioned before					
Individual Consideration					
Head teacher helps us develop ourselves					
Head teacher lets us know how I think they are doing.					
Head teacher give personal attention to those who seem rejected					

PART D: TEACHERS' SELF- EFFICACY IN TECHNOLOGY

Before e-leaming programme being introduced, had you ever used a computer in your school?

Yes [ ]   No [ ]

Have you been trained for the computer application programme?

Yes [ ]   No [ ]

Which of the listed application software have you trained in

Microsoft Word	Yes [ ]	No [ ]
Microsoft Excel	Yes [ ]	No [ ]
Power Point	Yes [ ]	No [ ]
World Wide Web / email	Yes [ ]	No [ ]
Microsoft Access / Database	Yes [ ]	No [ ]
Desktop publishing	Yes [ ]	No [ ]
Web design	Yes [ ]	No [ ]
Information skills / (Research)	Yes [ ]	No [ ]
Programming skills	Yes [ ]	No [ ]

How many days in total were you trained for the programme?
2 days [ ]   More than 10 days [ ]
3 days [ ]   Other (specify)……………………………………
4 days [ ]

Please rate your self-efficacy in technology. Use the scale: 'No extent' as 1; 'Little extent' as 2; 'Moderate extent' as 3; 'Great extent' as 4; 'Very great extent as 5

	1	2	3	4	5
Level of teacher's competence					
How competent do you perceive yourself to select and use various media to support teaching and learning?					
How well prepared are you to evaluate software to support teaching and learning?					
To what extent can you integrate technology across the curriculum?					
Enhanced teachers Confidence					
How capable are you of determining why, when, and how to use technology in education?					
Did you incorporate technology to enhance teaching and learning in the lessons you taught today					
Teacher motivation					
Frequency of using the technology in class					
Participate in social networks					

PART E: SCHOOL ENVIRONMENT

Read the statement below and select how much do you agree or disagree. Please answer based on your experience and perceptions. Use the scale: 1= Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

	1	2	3	4	5
Availability of a School mission					
Our school has a mission					
The mission of our school is known to all students					
Good infrastructure					
My school buildings are in good condition					
Our class size has enough furniture for everyone					
Good class interaction between the teachers and the learners					
There are free interactions between the teachers and learners					
In my school, teachers want learners to contribute their thoughts in class					
In my school, teachers expect learners to be well behaved in school					
Accessibility of instructional materials					
My school provides learners with the textbooks and learning materials					
Our library has up-to-date instructional materials					
In my school, teachers make learning interesting using technology and					

involving the learners in the learning process				
Good interaction between parents and teachers in monitoring the learners progress				
In my school, teachers inform learners about their progress in their class and involves their parents in the learning process				
The Board of Management is supportive to the learning process				
The parents, guardians and sponsors relate well with the teachers and pupils				
Good support from the head teacher				
The head teachers support teachers' initiatives and encourages them				
In my school, the administration involves teachers in making decisions				
The head teacher motivates teachers to keep performing well				

Appendix III: Interview Guide For School Head Teachers

The following questions will be used as guidelines to seek information on the head teachers leadership styles and their roles in the ICT integration in their schools. The information collected will be strictly used for this study and will be kept in confidence. They interview will be recorded if the respondent is comfortable with it.

The following questions will be asked:

1. What are the types of ICTs infrastructure is available in your school for teaching and learning?

………………………………………………………………………………………..

……………………………………………………………………………………….

How would you rate the adequacy of the infrastructure listed above?

----

2. How often are these ICT tools used in the school? --

----

3. Using the Likert scale provided, how would you describe your leadership style?

4. How would you describe your role in the implementation of ICT in this school?

……………………………………………………………………………………………

……………………………………………………………………………………………

5. How would you describe teachers' ICT Competency in your school?

……………………………………………………………………………………………

……………………………………………………………………………………………

   a. How many teachers are computer literate?

   ----

   b. How many are trained in ?

   ----

c. How would you rate the teachers confidence in use of ICT in teaching and learning?---
----
----

d. How would you rate the teachers attitudes in use of ICT in teaching and learning?---
----

How would you rate your leadership style? how frequently each statement fits you using:
0 - Not at all 1 - Once in a while 2 = Sometimes 3 = Fairly often 4 = Frequently, if not always

	0	1	2	3	4
Idealized Influence attributed					
I makes people I interact with feel good to be around me					
Those I interact with have complete faith in me					
Those I interact with are proud to be associated with me					
Inspirational Motivation					
I express with a few simple words what my followers could and should do					
I provide appealing images about what my followers can do can do					
I help my followers find meaning in their work					
Intellectual Stimulation					
I enable those I interact with to think about old problems in new ways					
I provide my followers with new ways of looking at puzzling things					
I gets my followers to rethink ideas that they had never questioned before					
Individual Consideration					
I help my followers develop themselves					
I let my followers know how I think they are doing.					
I give personal attention to my followers who seem rejected					

Appendix IV: Observation Guide

The observation guide will help assess the availability and adequacy of ICT infrastructure in the school

ITEM	Availability Yes / No	Working Condition Good/ Poor	No Of Users	Adequate/ Not adequate
Computers				
Power supply				
Internet connection				
Digital content				
Projectors				
Desktop				
Laptop				
Printers				
Scanners				
TV				
Video decks				
LCD Projections				

Appendix V: Lesson Observation
General Information

School: ……………… County: …………… Subject ………………..

1. What ICT devices are available in the classroom

    Laptop ☐   Projector ☐   Tablets ☐

    (Any other; specify)...

2. What digital content is being used during the teaching/ learning process if any (Check on the subject, source /author)

    KICD ☐   RTI ☐   Other ☐

3. Do the pupils have devices? Yes ☐   No ☐

4. If yes i) How many devices in class...

    ii) What is the ratio of sharing the devices among learners?

    1:1 ☐   1:2 ☐   1:3 ☐   1: = or >4 ☐

5. How is the Learner-teacher interaction/ instructions for device utilization?

    Very clear ☐   moderately clear ☐   not clear ☐

6. How do the learners interact with the devices

    Collaborative learning ☐   teacher only using power point ☐   only the teacher has an ICT device ☐   No interaction at all ☐

7. What is the level of learner interaction with the devices? (observe learner manipulation skills level of interest and whether learning is taking place

    Very interactive ☐   moderately interactive ☐   not interactive ☐

8. Rate the teacher's competence in the following

	Very limited	Limited	Average	Good	Very good
Handling the ICT tools					
Integrating ICT in teaching and learning process					

Appendix VI: Missing Value Analysis

Demographic Information

		Respondent Gender	Number of years of use of ICTs	What is your age?	Highest Education Level Attained:
N	Valid	312	312	312	312
	Missing	0	0	0	0

ICT integration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18.00	5	1.6	1.6	1.6
	19.00	2	0.6	0.6	2.2
	21.00	2	0.6	0.6	2.9
	22.00	5	1.6	1.6	4.5
	23.00	6	1.9	1.9	6.4
	24.00	2	0.6	0.6	7.0
	25.00	6	1.9	1.9	9.0
	27.00	7	2.2	2.2	11.2
	28.00	4	1.3	1.3	12.5
	29.00	6	1.9	1.9	14.4
	30.00	4	1.3	1.3	15.7
	31.00	3	1.0	1.0	16.7
	32.00	7	2.2	2.2	18.9
	33.00	5	1.6	1.6	20.5
	34.00	11	3.5	3.5	24.0
	35.00	5	1.6	1.6	25.6
	36.00	7	2.2	2.2	27.9
	37.00	6	1.9	1.9	29.8
	38.00	9	2.9	2.9	32.7
	39.00	3	1.0	1.0	33.7
	40.00	6	1.9	1.9	35.6
	41.00	9	2.9	2.9	38.5

42.00	5	1.6	1.6	40.1
43.00	8	2.6	2.6	42.6
44.00	5	1.6	1.6	44.2
45.00	6	1.9	1.9	46.2
46.00	5	1.6	1.6	47.8
47.00	9	2.9	2.9	50.6
48.00	7	2.2	2.2	52.9
49.00	8	2.6	2.6	55.4
50.00	7	2.2	2.2	57.7
51.00	6	1.9	1.9	59.6
52.00	5	1.6	1.6	61.2
53.00	11	3.5	3.5	64.7
54.00	8	2.6	2.6	67.3
55.00	6	1.9	1.9	69.2
56.00	13	4.2	4.2	73.4
57.00	5	1.6	1.6	75.0
58.00	4	1.3	1.3	76.3
59.00	4	1.3	1.3	77.6
60.00	9	2.9	2.9	80.4
61.00	6	1.9	1.9	82.4
62.00	2	0.6	0.6	83.0
63.00	2	0.6	0.6	83.7
64.00	4	1.3	1.3	84.9
65.00	4	1.3	1.3	86.2
66.00	4	1.3	1.3	87.5
68.00	4	1.3	1.3	88.8

		Frequency	Percent	Valid Percent	Cumulative Percent
	69.00	4	1.3	1.3	90.1
	70.00	4	1.3	1.3	91.3
	71.00	4	1.3	1.3	92.6
	73.00	2	0.6	0.6	93.3
	74.00	2	0.6	0.6	93.9
	75.00	2	0.6	0.6	94.5
	76.00	4	1.3	1.3	95.8
	77.00	2	0.6	0.6	96.5
	78.00	2	0.6	0.6	97.1
	79.00	3	1.0	1.0	98.1
	80.00	2	0.6	0.6	98.7
	82.00	2	0.6	0.6	99.4
	90.00	2	0.6	0.6	100.0
	Total	312	100.0	100.0	
Missing	System	0	0.0		
Total		312	100.0		

Transformational Leadership Style

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16.00	2	0.6	0.6	0.6
	17.00	3	1.0	1.0	1.6
	18.00	2	0.6	0.6	2.2
	19.00	3	1.0	1.0	3.2
	20.00	3	1.0	1.0	4.1
	21.00	3	1.0	1.0	5.1
	23.00	5	1.6	1.6	6.7
	24.00	4	1.3	1.3	8.0
	25.00	7	2.2	2.2	10.2

26.00	3	1.0	1.0	11.2
27.00	5	1.6	1.6	12.8
28.00	8	2.6	2.6	15.3
29.00	7	2.2	2.2	17.6
30.00	9	2.9	2.9	20.5
31.00	8	2.6	2.6	23.0
32.00	10	3.2	3.2	26.2
33.00	14	4.5	4.5	30.7
34.00	8	2.6	2.6	33.3
35.00	10	3.2	3.2	36.5
36.00	8	2.6	2.6	39.1
37.00	7	2.2	2.2	41.3
38.00	11	3.5	3.5	44.8
39.00	10	3.2	3.2	48.0
40.00	6	1.9	1.9	50.0
41.00	15	4.8	4.8	54.8
42.00	10	3.2	3.2	58.0
43.00	8	2.6	2.6	60.5
44.00	6	1.9	1.9	62.5
45.00	9	2.9	2.9	65.3
46.00	12	3.8	3.8	69.2
47.00	8	2.6	2.6	71.8
48.00	22	7.1	7.1	78.8
49.00	2	0.6	0.6	79.4
50.00	10	3.2	3.2	82.7
51.00	4	1.3	1.3	83.9

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		Frequency	Percent	Valid Percent	Cumulative Percent
	52.00	3	1.0	1.0	84.9
	53.00	4	1.3	1.3	86.2
	54.00	11	3.5	3.5	89.7
	55.00	13	4.2	4.2	93.9
	56.00	8	2.6	2.6	96.4
	57.00	1	0.3	0.3	96.8
	58.00	1	0.3	0.3	97.1
	59.00	3	1.0	1.0	98.0
	60.00	6	1.9	1.9	100.0
	Total	312	100.0	100.0	
Missing	System	0	0.0		
Total		312	100.0		

Teacher Self-Efficacy in Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	7.00	4	1.3	1.3	1.3
	8.00	5	1.6	1.6	2.9
	10.00	5	1.6	1.6	4.5
	11.00	6	1.9	1.9	6.4
	12.00	5	1.6	1.6	8.0
	13.00	6	1.9	1.9	10.0
	14.00	17	5.4	5.4	15.4
	15.00	6	1.9	1.9	17.3
	16.00	13	4.2	4.2	21.5
	17.00	20	6.4	6.4	27.9
	18.00	27	8.7	8.7	36.6
	19.00	20	6.4	6.4	43.0
	20.00	17	5.4	5.4	48.4
	21.00	19	6.1	6.1	54.5

		Frequency	Percent	Valid Percent	Cumulative Percent
	22.00	16	5.1	5.1	59.6
	23.00	23	7.4	7.4	67.0
	24.00	22	7.1	7.1	74.1
	25.00	14	4.5	4.5	78.5
	26.00	19	6.1	6.1	84.6
	27.00	14	4.5	4.5	89.1
	28.00	15	4.8	4.8	93.9
	29.00	2	0.6	0.6	94.6
	30.00	6	1.9	1.9	96.5
	31.00	3	1.0	1.0	97.5
	32.00	2	0.6	0.6	98.1
	33.00	1	0.3	0.3	98.4
	35.00	5	1.6	1.6	100.0
	Total	312	100.0	100.0	
Missing	System	0	0.0		
Total		312	100.0		

School Environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	34.00	4	1.3	1.3	1.3
	39.00	4	1.3	1.3	2.6
	42.00	6	1.9	1.9	4.5
	43.00	5	1.6	1.6	6.1
	44.00	4	1.3	1.3	7.4
	45.00	6	1.9	1.9	9.3
	46.00	10	3.2	3.2	12.5
	47.00	6	1.9	1.9	14.4
	48.00	8	2.6	2.6	17.0

49.00	13	4.2	4.2	21.2
50.00	9	2.9	2.9	24.1
51.00	8	2.6	2.6	26.6
52.00	10	3.2	3.2	29.8
53.00	3	1.0	1.0	30.8
54.00	6	1.9	1.9	32.7
55.00	10	3.2	3.2	35.9
56.00	9	2.9	2.9	38.8
57.00	16	5.1	5.1	43.9
58.00	12	3.8	3.8	47.8
59.00	13	4.2	4.2	51.9
60.00	14	4.5	4.5	56.4
61.00	15	4.8	4.8	61.2
62.00	10	3.2	3.2	64.4
63.00	11	3.5	3.5	68.0
64.00	14	4.5	4.5	72.5
65.00	9	2.9	2.9	75.3
66.00	2	0.6	0.6	76.0
67.00	7	2.2	2.2	78.2
68.00	9	2.9	2.9	81.1
69.00	8	2.6	2.6	83.7
70.00	4	1.3	1.3	85.0
71.00	5	1.6	1.6	86.6
72.00	3	1.0	1.0	87.5
73.00	7	2.2	2.2	89.8
74.00	8	2.6	2.6	92.3

		4	1.3	1.3	93.6
75.00		4	1.3	1.3	93.6
76.00		5	1.6	1.6	95.2
77.00		4	1.3	1.3	96.5
78.00		2	0.6	0.6	97.1
80.00		9	2.9	2.9	100.0
Total		312	100.0	100.0	
Missing	System	0	0.0		
Total		312	100.0		

Appendix VII: Mahalanobis Distance Test

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	25.3762	69.7204	46.9594	8.64382	197
Std. Predicted Value	-2.497	2.633	.000	1.000	197
Standard Error of Predicted Value	.873	3.753	1.658	.495	197
Adjusted Predicted Value	25.6245	69.1349	46.9718	8.64098	197
Residual	-31.96587	33.97665	.00000	12.04867	197
Std. Residual	-2.633	2.798	.000	.992	197
Stud. Residual	-2.671	2.834	-.001	1.004	197
Deleted Residual	-32.89779	34.86014	-.01246	12.32516	197
Stud. Deleted Residual	-2.714	2.888	-.001	1.008	197
Mahal. Distance	.019	17.729	2.985	2.592	197
Cook's Distance	.000	.070	.006	.010	197
Centered Leverage Value	.000	.090	.015	.013	197

a. Dependent Variable: ICTinteg