

UNIVERSITY OF NAIROBI

**THE IMPACTS OF METACOGNITIVE AWARENESS ON ACADEMIC
PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN NAIROBI COUNTY,
KENYA**

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M.ED

(MEASUREMENT AND EVALUATION)

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DECLARATION

This research project is my original work and has never been submitted for a degree in any other university.

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E58/85031/2016

Sign..... Date.....2020

This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

Immense gratitude goes to the Almighty God, the creator of all things without whose grace, wouldn't have been able to accomplish this work. Special recognition too, goes to my lovely wife, Felicitus and my four children; Ezra, Dan, Debra and Keziah who proved understanding in my long absence owing to the exigencies of this course and whose encouragements spurred my quest to accomplish this work.

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LIST OF ABBREVIATIONS/ACRONYMS

CAT	Continuous Assessment Tests
CBC	Competency Based Curriculum
CK	Conditional Knowledge
DK	Declarative Knowledge
DS	Debugging Strategies
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examinations Council
MAIT	Metacognitive Awareness Inventory for Teachers
MAIS	Metacognitive Awareness Inventory for Students
MK	Metacognitive Knowledge
MR	Metacognitive Regulation
MOEST	Ministry of Education Science and Technology
ZPD	Zone of Proximal Development

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ABSTRACT

This research study delved into the construct of metacognitive awareness among students and teachers in teaching and learning, and how this has influenced educational achievement amongst senior secondary learners in the county under investigation. Metacognition is the ability of learners to actively think about how effectively or otherwise they are learning. The targets for the research were; (a) To find out the extent to which students incorporate metacognition in their studies, (b) To investigate the degree to which tutors foster metacognitive instruction in their pedagogy, (c) To determine the impacts of metacognitive knowledge on scholastic achievement and (d) To find out if there is gender disparities in metacognitive awareness among students. The research design that was adopted was descriptive survey design. The instruments for data collection were; Metacognitive awareness inventory for learners and Metacognitive awareness inventory for tutors. The MAIS and MAIT tools are self-reporting tools whereby the learners and teachers give their perception about their metacognitive awareness by answering a likert scale questionnaires with a number of statements capturing all aspects of metacognitive awareness. These tools had been tested and are known to have the recommended levels of reliability and consistency. Permission was sought from the owners of the instruments. Purposive sampling was used to sample three educational institutions within the County of Nairobi for the study. An aggregate of 300 form three students were sampled for this study from the three schools alongside 21 teachers, seven from each of the sampled schools randomly sampled. Analysis of data involved the computation of means and standard deviations and ANOVA to determine the relationships of the variables under study. The research findings revealed that learners in form three are average when it comes to metacognitive awareness in their daily learning endeavors. It was also discovered that teachers averagely engage metacognitive reflection in their daily teaching and learning pursuits. When comparative analysis of metacognitive awareness among students based on gender was done, it was evident that there was no significant differences among gender wise. The findings further proved that there is a strong positive correlation between students' metacognitive awareness and academic performance in general.

Key words: Metacognition, Metacognitive Awareness, Academic Performance.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Metacognition involves an active and overt ability of one to honestly discern one's understanding in general and how one can actively direct and regulate his knowledge domain to attain the learning goals desired, Hacker, (1998). Metacognition is an important component in the education sphere and has become a matter of concerted research for educational psychologists. Research has invariably indicated that metacognition is strongly associated with high academic performance (Labuhn, Zimmerman & Hasselhorn, 2010), which is part of the main influences of scholarly achievement (Schraw, 1998; van de Stel & Veenman, 2010). A research conducted by Wang, Heartel & Walberg (1990) on meta-review in ascertaining among the various aspects strongly have an effect on academic results.

They discovered that metacognition has a firm, progressively steady association with scholarly performance than practically all alternative variables like student earlier information, between teacher to student interaction with socio-economic status. Metacognition is associated with academic performance ranging from elementary students' academic performance (Jacobs & Paris, 1987) higher learners' academic performance (Young & Fry, 2012).

Studies also, have proved that adjustments in metacognitive capacities can emanate from both biological growth (Krebs & Roebbers, 2010; van del Stel & Veenman, 2010) and academic development (Hilden & Pressley, 2007; Huff & Nietfeld, 2009). Flavell (1992) opine that the introduction of metacognition is related with the conventional Piagetian phases of advancement. Piaget's hypothesis defines out intellectual advancement regarding adjustments in which a person understands and model the environment. Piaget advanced that cognitive phases can be described through use of cognitive activities of a person able to accomplish successfully. The Piagetian theory considers the main exceptional phase of emotional improvement is the abstract thinking phase, thought to start at age 12 and advances to adulthood. The abstract thinking stage is set apart by the capacity to utilize analytical thinking and the capacity to accomplish complicated and abstract mental activities (Moshman, 2011). Flavell, (1992) opine that abstract thinking demands metacognitive management. Analysts still can't seem to see if metacognition precedes formal-operational thinking or the other way around, yet they agree on the connection between the two.

Research has shown that most of the teaching approaches used by teachers are not achieving desirable learning outcome and that many learners get so little knowledge from what they learn and they retain so scanty information from what they learn (Fink, 2003). This scenario is replicated in Kenya and it has birthed the desire to rethink about teaching and learning by the Ministry of Education (MoE) together with other stakeholders.

The focal point of any educational program ought to be to instruct learners “how to learn” as well as imparting them with people’s skills like partnership, transmission and initiative alongside a longing and capacity for deep rooted learning.

The rethinking of education in Kenya has given impetus to the changes in the education curriculum from 8-4-4 system to the Competency Based Curriculum (CBC) which desires to develop learners’ varied competencies and potentials as opposed to over emphasis on grades and examinations.

From the challenges of an education system that is steeped in examination grades, focus currently is shifting from “teaching” to “learning to learn.” Therefore, the need to focus on current and emerging trends in teaching and learning one of which is metacognitive awareness.

1.2 Statement of the Problem

The scholastic performance amongst senior secondary school learners in KCSE examinations has been plummeting from 2016 as reported by the Kenya National Examinations Council (KNEC). The percentage of candidates attaining grade C+ has been oscillating between 8% and 11% for the last five years, KNEC, 2019. This state of affairs has been of great concern to stakeholders in Kenya and has necessitated a concerted effort from all fronts to find answers to this educational malaise. Our universities have also been churning out graduates whose skills and competencies has not been in tandem with the requirements in the world of work.

The primary point of modern learning is to inculcate in learners the abilities that enable them to overcome the challenges, socioeconomic, that faces them in their daily lives (Selcuk, et.al, 2008). In other words, modern education targets at producing effective and efficient problem solvers in society. This cardinal function of education has been the missing link in Kenya’s education system for a long time.

It is from the above situation that the researcher sought to delve into the possible gaps that could be there in Kenya’s education sector that needs to be addressed if any meaningful and sustainable academic performance is to be achieved.

1.2.1 The Research Objectives.

This research study had the following objectives;

To determine the degree to which learners adopt metacognitive awareness in their learning process in secondary schools.

To establish whether teachers actively foster metacognitive awareness in their pedagogy either explicitly or implicitly.

To find out whether metacognitive awareness of learners contribute to academic performance.

To find out whether there is gender disparity in metacognitive awareness among students.

1.2.2 Research Questions

This particular research sought to answer the following questions regarding metacognitive awareness and learning;

What is the degree of metacognitive awareness among high school learners in Kenya?

Do teachers foster metacognitive awareness instruction in secondary schools in Kenya?

Does metacognitive awareness contribute to academic performance?

Is there gender disparity in metacognitive awareness among students?

1.2.3 The Rationale for This Study.

The critical function which metacognitive awareness play in fostering lifelong learning in students is very important, in the sense that it is based on an ingrained effect on the learners' lifelong utilization of information and skills that they have been taught in school as well as what they have been able to acquire through experience. Studies have shown how overt instruction on "thinking skills" assist learners in developing avenues through which they can synthesize and utilize information gained from an effective learning to an authentic practical situations, Halpern, (1999). Furthermore, the adoption of metacognitive strategies by learners will distinguish stronger students from less competent learners (Pellegrino & Hilton, 2013). According to a research conducted by Young and Fry, (2008), there is a strong connection of learners' metacognition, and their final course grades. This is a testament that metacognitive component is a vital link in the academic wellbeing of learners.

This research attempted to provide one of the possible panacea to the missing link between what students learn, how they learn and the demands of the world of work. This critical link is metacognitive awareness in pedagogy and learning.

The research study is hoped to assist learners and teachers to embrace new and novel strategies in teaching and learning that will go a long way in fostering the acquisition of the 21st Century skills and attitudes among learners.

The Ministry of Education (MoE) will gain too with the discoveries from this research study in that it will get an opportunity to discover the need for incorporating metacognition in teaching and learning and ultimately produce holistic and properly endowed learners to the country and the economy.

Research fraternity will benefit from this study in that there will be a basis for further research on metacognition in the various academic echelons. Researchers on this area of study will be to conduct further research on the importance of introducing metacognition to Early Childhood Education, for instance, and the role of metacognition in language acquisition and numeracy.

1.3 Operational Definition of Terms.

Metacognition: Metacognition is frequently described as "reflection on reflections" It is a cognition administrative structure that enables an individual to comprehend and control their own intellectual productivity.

Metacognitive awareness: This is awareness of an individual's understanding, mental and emotional states and the regulation of those states too.

Academic performance: This is a measure of how much students have attained the expected academic value addition through standardized examination and assessment rubrics.

Gender: This is a term that describes either of the two sexes i.e. male or female and their differences, if any.

County: Comprises of an administrative jurisdiction headed by an elected governor and an oversight arm which is the representative of the people.

CHAPTER TWO

LITERATURE REVIEW

The section has extensively reviewed general literature pertaining metacognition and metacognitive awareness and its relationship to academic performance. This review is majorly international because there is scanty literature about Kenya regarding the construct of metacognition and its use in pedagogy. The chapter will first define what metacognition is, explain importance of metacognition in pedagogy and how it is fostered in classroom setting. Further, the section will seek to explain how metacognitive instruction can be implemented in teaching and learning and whether there exists gender disparities among students regarding metacognitive awareness in learning. Research on gaps on metacognition instruction will be dealt with also in this section including theoretical and conceptual frameworks.

2.1 Related Studies

This section delves into the analysis of what scholars have discovered with regard to metacognitive awareness among students and teachers and the contributions of metacognition on academic performance.

2.1.1 The Studies

Metacognition is understood to be one's active perception on matters of knowledge and other related aspects of it, for instance, deciphering of critical parts of a body of knowledge, Flavell (1976). As indicated by Hacker, (1998), metacognition incorporates both information on one's understanding, procedures, emotional and other non-cognitive attitudes, and the capacity to intentionally gauge and manage an individual's information, processes, intellectual and learning strategies in general.

The latest description of metacognition has stated to be encompassing information consciousness and managing an individual's knowledge and human knowledge in general, Terricone, (2011). Lack of exhaustive accord in the writing about what is and isn't metacognition, numerous scholars concur that metacognition incorporates both information on cognizance and the paradigm of awareness (Schraw,1998; Terricone, 2011), additionally alluded to as cognitive information and cognitive aptitudes (Veenman and Spaans, 2005) respectively.

Knowledge of cognition entails all what an individual knows and understands about cognitive techniques, his own thinking faculties and that of different people by and large as cognitive persons (Pintrich,2002). Information on metacognition incorporates the sub-parts of explicit, implicit and utilization of knowledge resources (Veenman, 2011).

Explicit cognition essentially is based on an individual's conception, and their convictions of performance domains, their understanding pursuits, and their own inherent abilities (Schraw et al. 2006). Presley, Borkowski & Schneider (1987) conducted a study geared towards the importance of declarative information during studying and came up with the conclusion that it plays an important part in meta-memory.

Procedural knowledge refers to how an individual "understands execute systematic approaches to solving cognitive problems" (Schraw and Moshman, 1995). Broadly speaking, this type of knowledge is clearly depicted by the strategies that individuals employ whenever they are faced by authentic problems that need to be solved. Presley, Borwowski and Schneider (1987) opine that individuals who possess a large percentage of procedural information almost invariably possess a huge percentage of plans and sequencing of actions is superb. Basically, procedural knowledge entails information about the potential of individuals in the performance of cognitive tasks (Paris & Paris, 2001; Pintrich; 2002).

Conditional knowledge is about how an individual "know the timing and for what reason to use different intellectual approaches (Schraw & Moshman, 1995). Young and Fry (2008) succinctly refers to this as the essential cognition that one has concerning the various cognitive strategies that suit different circumstances. Raynolds (1992) concluded that conditional application of knowledge is very vital in the sense that it assists learners to selectively apportion their skills in an effort to utilize various strategies more effectively.

Regarding metacognitive regulation, this is "metacognitive exercises that assist in managing an individual's reasoning or studying" (Schraw & Moshman, 1995). As opposed to metacognitive information, metacognitive regulation is progressively identified with a lot of activities, happenings that facilitate learning as opposed to a lot of information which guides how activities come up to. Schraw (2001) underscored the importance of metacognitive regulation, that it involves appropriate utilization of intentional cognitive assets, proper usage of existing approaches and acute consciousness of perception breakdown.

Metacognitive regulation has three administrative components namely strategizing, auditing and evaluating (Jacobs & Paris, 1987) which occupy a critical place in reorienting learners'abilities pertaining their learning enterprise. Scheming essentially entails “the choice of suitable methodologies and the allotment of cognitive assets that impacts one's learning productivity” (Schraw & Moshman, 1995). The abilities that possibly are associated with planning are goal setting, appropriate strategy choice and scheduling time and strategies. Individual’s planning skills involves making forecasts before skimming, technique sequencing, and distributing time or consideration specifically before starting the execution of activities.

Monitoring entails “an individual’s continuous alertness concerning his comprehension and execution of cognitive tasks “ (Schraw & Moshman, 1995). Monitoring skill is better understood through task execution and close assessment of how well the task is being carried out at regular intervals to discover whether learning has taken place or not. According to Delcos and Harrington, (1991), evaluation abilities are sharpened by constant action and learning. It is in this light that the need for incorporating metacognitive instruction in teaching and learning is encouraged.

Evaluation involves the assessment of the degree of cognitive results including administrative procedures of a learner’s cognitive processes” (Schraw & Moshman, 1995). In other words, evaluation involves taking an incisive review of the cognitive results and deciding whether the learning outcome matches our learning objectives and whether cognitive administrative activities utilized were worthwhile (Schraw & Moshman, 1995). Furthermore, evaluation includes re-assessing individual’s targets once a task has been done. According to Schraw and Dennison (1994) these things strongly correlate and they all accomplish similar function.

Studies have proved that metacognition is a significant cognitive component that student need to own since it fosters independent thinking and a higher sense of control of their learning processes (Hacker, Dunlosky & Graesser, 1998). Through the use of metacognition, learners can gain a lot of control of what and how they gain knowledge, which can facilitate the thriving of effective learning. It is evident that students who depict the possession of higher metacognitive skills will in general set fair goals in their academic pursuits, define the information by choosing the appropriate metacognitive skills and knowledge systems to use. In a nutshell, metacognitive knowledge is a vital element in student education and pivotal in the development of an autonomous learner (Wilkins, 1997).

Summary Outcome

Metacognition is an important component in the education sphere and has become a matter of concerted research for educational psychologists. Research has invariably indicated that metacognition is strongly associated with high academic performance (Labuhn, Zimmerman & Hasselhorn, 2010), which is part of the main influences of scholarly achievement (Schraw, 1998; van de Stel & Veenman, 2010). A research conducted by Wang, Heartel & Walberg (1990) on meta-review in ascertaining among the various aspects strongly have an effect on academic results. They discovered that metacognition has a firm, progressively steady association with scholarly performance than practically all alternative variables like student earlier information, between teacher to student interaction with socio-economic status. Metacognition is associated with academic performance ranging from elementary students' academic wellbeing (Jacobs & Paris, 1987) to higher learning overall academic performance (Young & Fry, 2012).

Studies too have proved that adjustments in deeper learning capacities can emanate from both biological growth (Krebs & Roebbers, 2010; van del Stel & Veenman, 2010) and academic inculcation (Hilden & Pressley, 2007; Huff & Nietfeld, 2009). Flavell (1992) opine that the introduction of metacognition is related with the conventional Piagetian phases of advancement. Piaget's hypothesis defines out intellectual advancement regarding adjustments in which a person understands and model the environment. Piaget advanced that cognitive phases can be described through use of cognitive activities of a person able to accomplish successfully. The Piagetian theory considers the main exceptional phase of reflective learning improvement is the abstract thinking phase, thought to start at age 11 or 12. The abstract thinking stage, set apart by the capacity to utilize analytical thinking and the capacity to accomplish complicated and deep thinking activities (Moshman, 2011). Flavell, (1992) opine that abstract thinking demand reflective thinking management. Analysts still can't seem to see if metacognition precedes formal-operational thinking or the other way around, yet they agree on the connection between the two.

2.2 Related Literature

Generally, we do not always know what we are doing when we do it. This is mostly true of how learning takes place in our classrooms. Unfortunately, it is difficult to advance an activity that one is involved in if one lacks awareness of what he is currently engaged in. If the main aim of education is to present students to be productive academicians and effective problem solvers, then there is an urgent need to help these learners become critically self-conscious and assume responsibility for their very own educational endeavors.

There is need therefore to shift focus from the traditional teaching and learning models to metacognitive awareness in teaching and learning which has been proved to bring about sustainable improvement in learning outcomes and an important basis for lifelong learning. Martinez (2006) asserts that metacognitive knowledge is "key to originations of being instructed" in a dynamic world replete with complex information, and demands "fresh thinking".

There are a myriad of things that educators can inculcate in their students to foster metacognitive awareness in their learning (Joseph, 2009; Paris and Paris, 2001; Paris and Winograd, 2003; Zumbunn, Tadlock and Roberts, 2011), within which they fall in to two classifications: Indirect guidance or direct guidance. Passive guidance happens when the educator encourages the utilization of metacognition without straightforwardly recognizing or talking about it (Dignat-van Ewijk et al, 2013; Kistner et al, 2010). Explicit instruction conversely, occurs when the teacher reminds students to adopt metacognition in their day-to-day learning (Dignat-van Ewijk et al, 2013; Kistner et al, 2010).

Encouraging a discourse about the importance of metacognition is especially significant since in this manner, students are propelled to a desire to get new learning and critical thinking methodologies and skills in comprehension (Veenman, et al, 2006). Both tacit together with active metacognitive inculcation is considered vital in learning and teaching (Joseph, 2009; Paris and Paris, 2001; Paris and Winograd, 2003; Pintrich, 2002; Veenman et al, 2006), yet instructors almost invariably, utilize active metacognitive guidance less regularly than passive metacognition guidance, (Veenman, 2011). In a study, it was found that only 15% of instructors' teaching approaches utilized active metacognition guidance (Kistner et al, 2010). This situation is thought to be a counter productive academically as active metacognition guidance is demonstrated to positively associate well to students scholarly prowess while tacit guidance isn't. (Kistner et al., 2010).

The general principles for executing important metacognitive guidance to bolster learning to learn have since been discovered. (Veenman, 2013; Veenman et al., 2006). Initially, Veenman considers guidance as being integrated towards a concrete educational setting. In spite of the ways, that metacognition could be dealt with apart from other course contents, it is best when given simultaneously alongside course work. Integrated introduction of metacognition empowers learners to associate the metacognitive information or aptitudes to a real learning

environment. In this manner, students can perceive how metacognition can help their grasp of course content in that particular setting. Besides, one aspect of metacognitive domain hinges on conditional knowledge, and matching metacognition with concrete learning tasks fosters an inference to related conditions under which an ability ought to be utilized. Conditional knowledge promotes the utilization of capacities in different situations. This is important since the cardinal thing is that functional capacities can be used in several distinct settings.

Veenman second dictum expresses that metacognition ought to be inculcated by utilizing what is known as educated sensitization (Campione, Brown and Ferrara, 1982). Educated sensitization includes overtly advising students regarding the advantages of utilizing metacognition. Acknowledging such advantages spurs the students to adopt metacognition and engenders a high expectation of academic progress.

Veenman last principle of metacognition guidance is drawn from protracted overt sensitization. For metacognitive learning to be effective, a protracted and concerted effort of inculcation is a requirement. This efforts can take weeks or even months for a meaningful and sustainable metacognitive awareness culture to be created. The protracted overt learning will lead to better results in the long run (Veenman, 2013; Dignath and Buttner, 2008).

Research has found out that the execution of metacognitive instruction in a majority of educational settings is very minimal. (Dignath-van Ewijk, Dickhauser, and Buttner, 2013; Clift, Ghatala, Naus, and Poole, 1990). Most investigations inspecting metacognition guidance which is measurable viewpoint based on teachers' report or perceptions have proved that teachers do not integrate explicit metacognitive instruction. Research utilizing individuals' reports approach reveal that several of instructors reportedly utilized scanty metacognitive instruction (Clift et al., 1990; Dignath-van Ewijk, and van der Werf, 2012). For instance, Clift and partners (1990) discovered educators frequently neglect incorporating metacognitive instruction in pedagogy and if they can, they do not include reflective learning as a critical component. Research on teachers' metacognitive instruction strategies have corroborated these findings. (Dignath-van Ewijk et al., 2013; Veenman, 2011).

There is only a scanty studies on how teachers have encouraged metacognitive instruction when approached from quantitative standpoint. (Perry and VandeKamp, 2000; Perry et al., 2012). Perry et al considered reflective learning guidance within junior grade levels. Based on analysts for an engaged proficient improvement program, instructors every now and again utilized covert strategy utilization guidance, reflection exercises, and class sensitizations

including information on metacognition. (Perry et al., 2012; Perry and VandeKamp, 2000). Away from engaging in significant career advancement, a few instructors incorporated metacognition guidance into their teaching, and some once in a while or never considered metacognitive instruction component at all (Perry, 1998).

Some scanty research studies conducted explicitly to determine whether there exists any notable differences among students based on their gender regarding their metacognitive awareness levels in school. Albeit the studies pointing to the existence of some degree of gender differences among learners, the continuum of the variability remains non – definitive. Studies done by Pokay with Blumenfeld, (1990), discovered that girls use greater reflective learning skills, cognitive and domain specific self-awareness strategies than their boy counterparts do. In the same vein, Wolters (1999) established that girls use more learning approaches compared to their male counterparts. Niemivirta, (1997) likewise discovered the existence of gender differences that favored girls; girls have the propensity of utilizing less shallow learning approaches, for instance content cramming as compared with their male peers.

2.3 Theoretical Perspective

This part delves into the theories that give the basis for this research study and attempts to establish the connections relating to this research.

2.3.1 Theories of Education

Learning is a complex enterprise in the sense that no two learners are the same regarding the approach they use in their day-to-day learning endeavors. It is against this backdrop that psychologists have established five major learning theories that educators can utilize to enhance and make learning more meaningful and effective for diverse types of learners.

Cognitivist theory was initially the work of Plato and Descartes but over time other psychologists notably, Jean Piaget unearthed the critical work that internal thoughts and external environmental factors impacts learning among students. This cognitive learning theory has helped learners appreciate their thought processes and how these affect their learning. Learners are therefore able to construct better and effective learning approaches.

Behaviorist learning theory is based on the psychology that is observable and quantifiable. This approach to learning is based on positive reinforcement and rewards as observed in the classical Pavlov's dog experiment. Here it is believed that external forces are responsible for student learning and as such, teachers can use rewards to encourage learning in class. This theory posits

that it is through rewards that learners can be helped to reinforce what is desirable and as such effective and meaningful learning can be achieved through this learning theory.

Constructivist learning theory regards learners as active participants who adds what they learn in class to what they already know from their past experiences. Learners in this regard are constructing knowledge in their own unique ways and the teachers in a constructivist classroom serve as enablers of learners to learn in their varied unique ways.

The humanism theory of learning draws heavily on the Maslow's hierarchy of needs where by each individual strives to reach the self-actualization point. This is a momentary point where one feels all their needs are met and that they have attained the best possible version of themselves. Learning environments are able to make learners to feel their needs are being met or not. It is upon teachers to create the best possible learning environment for learners to succeed in their academic pursuits.

Connectivism learning theory is the newest learning theory which emphasizes on the importance of connections in shaping learning. It posits that people learn and grow when they form connections. These connections can be with each other or those with their obligations and functions of their daily life. Teachers can use connectivism in class to make connections that excite students thus making them to learn better. Teachers can also use digital media to make good and positive connections to learning. They can also help create connections and relationships with their students and their peer groups to spur them to be motivated about learning.

2.3.1 Theories of Metacognition

Under metacognitive theories there are three in number these are;

(a) Tacit Theories. This theory is based on the belief that a person can construct or acquire this without explicit awareness of the knowledge that one has this theory (McCutcheon, 1992). When one looks at the work of Dweck and Leggett (1988) who assert that young children have implicit theories about the nature of intelligence that, eventually impact on their classroom demeanor. An incremental theory, in this respect is the belief by a child that intelligence is malleable and prone to change through other or personal endeavors. It is believed that children possess tacit theory about intelligence owing to the fact that they do not spontaneously and openly express their having a theory of intelligence in spite having convictions consistent with such theory.

(b) Informal Theories. In this case, individuals have a fragmented perceptions about phenomena because they have not yet constructed and explicit theoretical structure that integrates and justifies these beliefs. Informal theorists may possess only a mundane knowledge about their own metacognitive awareness. Informal theories gradually grow and are affected by social and personal factors related to theorizing.

(c) The Vygotskian theory originated from Russia between 1920 and 1980. Since then, Vygotskian work has attracted myriad interests of scrutiny, discussions with proposals of modifications to address emerging issues in educational psychology. Vygotsky's contribution to teacher education was framed as action theory after his death (Gredler & Shiels, 2004; Gredler, 2012). For this study, the underpinning theoretical framework is anchored on the Vygotskian theory as it is a critical component in pedagogy and the overall learning to learn paradigm thus effectively promoting learning attainment among students (Martinez, 2006).

When Vygotsky's work was accepted in the United States, its critique, additions and improvements was done in dantem with the changes in people's comprehension of instructing and learning in the education field changed and grew. The major contribution of Vygotskian theory to pedagogy and learning is the Zone of Proximal Development (ZPD) which formed the watershed in effective and learner centered teaching and learning. The greatest divergent is that, "Vygotsky never used any interpretation of the Zone of Proximal Development" (Gredler & Shields, 2004), despite the fact that it is invariably thought as such in tutor training set up. The Vygotskian learning environment use of the ZPD as used here involves students actively involved in creating and consolidating learning of concepts bysocially interacting with and getting assistance from more experienced persons. The Vygotskian theory of learning is premised on the "guide by more experienced others" paradigm (Van de Pol, et al, 2010). Often, student internalization of information is regarded as being anchored on one's interaction and concretization of the surrounding phenomena and also the critical input of their early life guides, (Bredekamp, 2014). The present study expressly adopted the Vygotskian model in pedagogy as a relevant theoretical underpinning owing to the fact that it has been proved through research that it can contribute robustly to the enhancement of academic performance in high school settings.

2.4 Conceptual Framework

The research was aligned towards gauging the impact of metacognitive knowledge on scholarly achievement in high schools in Nairobi County, Kenya. All variables will be measured.

The dependent variable in this case is the academic performance in high schools in Nairobi city while the independent variable is adoption of metacognitive consciousness in learning and pedagogy.

The factors to consider in dependent variables is the students' academic performance in general because metacognitive awareness forms an important basis for the development of adept problem solvers by encouraging metacognitive monitoring and planning coupled with self-reflection.

The independent variables comprised of the students' metacognitive awareness skills in problem solving and comprehension work. The teachers' implicit and explicit metacognitive instruction in authentic learning is also considered.

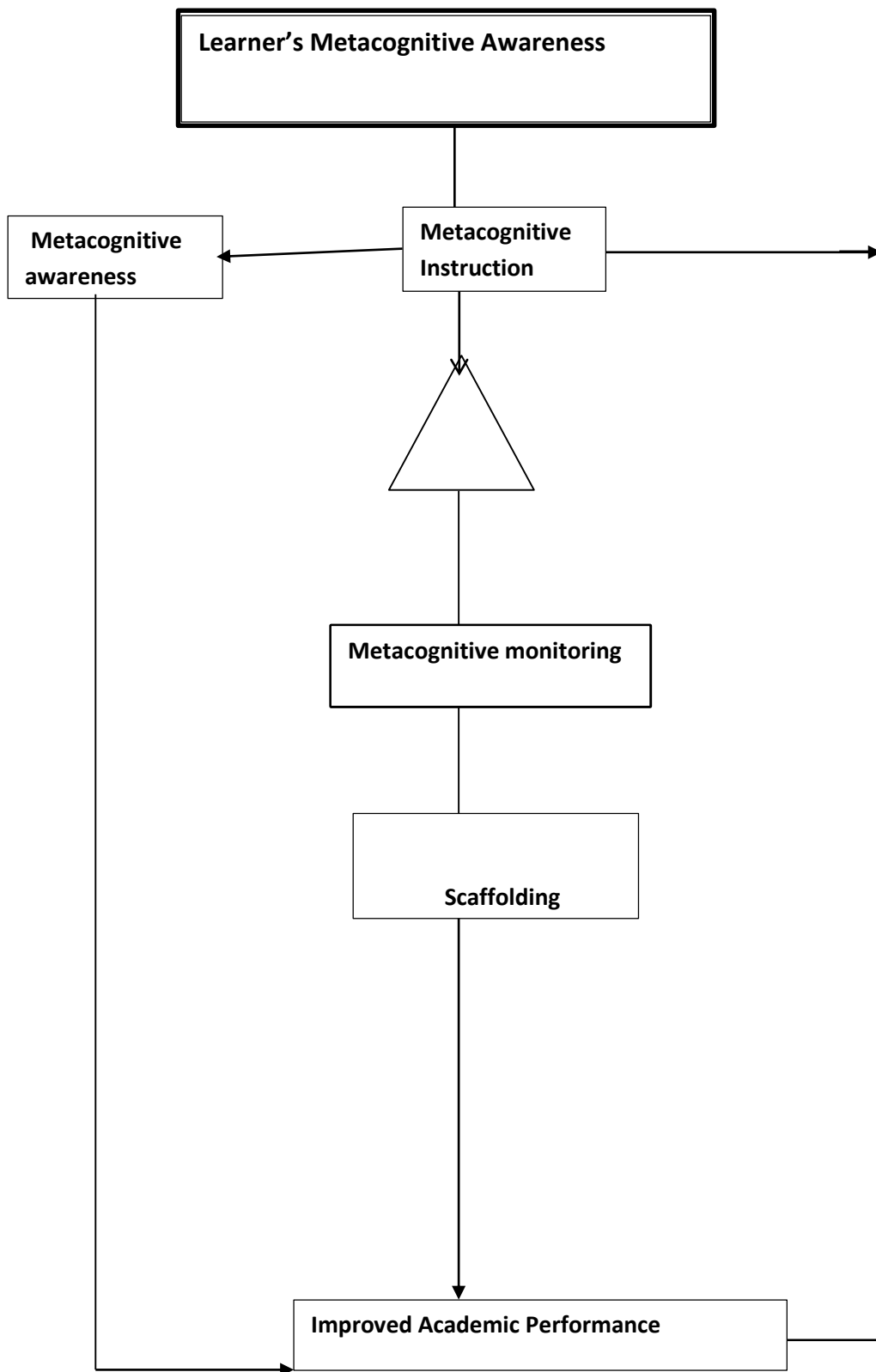


Fig. 1.1: Conceptual framework.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design.

This is the overall blueprint for the systematic and coherent data gathering and the analysis of the same in order to obtain answers for the research study and for use to mitigate the challenges experienced during the research process (Polit and Beck, 2004). The present study embraced a descriptive survey approach. This is a system of harvesting data to assess speculations or to react towards queries concerning the current situation with the subjects in the research. The survey method is applied in initial and exploratory research to enable experts to get data, condense, decipher and present them with the ultimate goal of explanation, Orodho, (2002).

The technique which manages the present development regarding conditions, activities, convictions, procedures, connections or patterns is alluded to as "research based on description". As per Dr. Y. P. Aggarwal (2008) this kind of research is based on capturing information on about the surrounding environment for analysis. It is isn't for only assembling, codifying data yet incorporates appropriate investigations, understanding, examinations, unmistakable confirmation of examples and associations.

3.2. Sample of the study.

Citing the work of John W. Best (2007) "A population is the entire set of phenomena who share at least one or more qualities for all needs and purposes that are important to the researcher. The populace might be every one of the people of a specific kind or a progressively confined portion of that association".

In the present research, the population comprises of high school students in form three in Nairobi County.

3.3 Sample Design

To facilitate data collection and time constraints, a sample of the learners was derived from three secondary schools in Nairobi County. A portion selected from a huge population with the point of yielding data about this population is named as sample. It is a smaller than normal image of the whole gathering or total from which it has been taken. It represents a big group or association.

Proportionate stratified random sampling method was employed to get the sample essential for this study. As indicated by Mugenda and Mugenda (2003), a stratified random sampling

includes aspects which have been chosen whereby, that current subgroups in the populace are pretty much repeated in the sample. A sample is a restricted portion of informative people from which relevant data is derived from for generalization about the whole populace (Webster, 1985).

The respondents of this research were drawn from form three high school learners in Nairobi County. The decision of selecting form three learners was informed by the fact that this category of students have had a longer study period in secondary school compared to those in form two and one. Form four students were excluded in this study due to the tight time schedules they have in the preparations for their summative assessment scheduled in the month of November this year. A total number of 300 students were sampled. Each school was represented by four teachers who were purposively sampled from the three schools sampled.

A sample comprising of three secondary schools were purposively sampled for this study. The schools were first categorized into National school, County Schools and Sub-county schools. It was from these categories that further purposive sampling was done to get the school and teachers to be involved in the study. A sum of 300 form three students were sampled from the three schools. Seven teachers were randomly sampled from each school making the total number of teachers to be 21.

The study variables were grouped into two categories, namely dependent and independent.

The independent variable is metacognitive skills in teaching and learning.

The dependent variable is the academic performance for high school learners in senior high school.

3.4 Instruments for Data Collection.

The research used two instruments for data gathering to facilitate effective and efficient collection of data. These are;

Metacognitive Awareness Inventory for Students – MAIS

Metacognitive Awareness Inventory for Teachers – MAIT

3.4.1 Metacognitive Awareness inventory for Students.

This instrument was first developed by Thomas, Anderson and Nashon, (2008) and was adopted for this study. MAIS comprises of 30 self - report aspects that evaluate various parts of metacognition and self -regulation and are classified into three sub-scales; Metacognitive

Knowledge, MK and Metacognitive Regulation, MR. Each sub-scale reflect a dimension of students' self-perceived metacognitive awareness parts: Metacognitive information and Metacognitive guideline (Schraw and Dennison, 1994) and the third sub-scale represented the executive processes of metacognition, which is self-efficacy (Veenman, 2012, Zohar & Dori, 2012).

The original MAIS comprise a likert scale between 1-nevertheless, it had to be modified so as to have a 1-4 likert scale; (1-strongly disagree, 2-disagree, 3-agree, 4- strongly agree).

The middle neutral choice was expunged because it it affords respondents an option to “avoid thinking about how they truly feel; which may not represent their true belief” (Mertler & Charles, 2011)

In this present study, the researcher had the urge to have the students' and teachers' responses about their perceptions to fall within a distinct side of the scales continuum thus, necessitating the 4-point scale as opposed to the usual 5-point scale.

3.4.2 Metacognitive Awareness Inventory for Teachers. (MAIT)

This instrument was developed by Cem Balcikanli, (2011). This inventory is designed to assist instructors in understanding metacognitive instruction and thus make informed changes to better their pedagogy. This instrument is aligned towards four point likert scale (1,-strongly disagree, 2-disagree, 3-agree, 4-strongly agree). The MAIT comprises 24 statements which quantifies the two levels of pedagogical in-depth comprehension. The intention for the MAIT data collection instrument was intended to capture the availability or otherwise of all the sub-aspects of metacognition: Debugging Strategies -DS, Conditional Knowledge -CK, , Declarative Knowledge -DK, Planning-P, Information Management Strategies -IMS, Monitoring-M, Procedural Knowledge -PK and Evaluation of Learning- E L.

3.4.3 Consistency of the instruments for Information Gathering.

This research adopted the Schraw and Dennison, 1994 metacognitive Awareness Inventory later modified by Cem Balcikanli (2011) in the case of MAIT and by Gregory Thomas (2014) in the case of MAIS. The instruments had excellent measure of reliability ranging from 0.93 to 0.88 thus providing a credible measurement of metacognition. (Schraw & Dennison, 1994).

3.5 Data Analysis

Quantitative approach was utilized during processing of the data. Data was analyzed using Statistical Package for Social Sciences SPSS. The process encompassed both descriptive and

inferential analysis of the information collected. Descriptive analysis uses the categories of variables which are summarized in terms of frequencies and percentages.

Quantitative methods are used in the analysis of quantitative data to facilitate the description of the relationship and variations amongst variables such as the various parts of metacognition like metacognitive knowledge, and metacognition regulation and debugging. Quantitative data will be arranged, coded and categorized for proper interpretation.

3.5.1 Data Analysis Techniques

Data that was collected was examined using descriptive statistical techniques. Averages, percentages, and deviations from the mean was used to describe the possible divergences in metacognition and academic performance. The significance was tested through computation of P – value at significance or alpha level of 0.05%.

3.5.2 Scope and Limitations

This particular research study was conducted amongst form three high school learners in Nairobi County, Kenya. The choice of Nairobi County was informed by the fact that here is where all categories of schools admitting learners from across the country are found. The accessibility of schools also encouraged the researcher to confine this research in Nairobi County.

The challenges faced during the research study were as follows

There was a time constraints since the study was conducted in third term of the school calendar which has two months only and packed with myriad of activities.

There were financial constraints which necessitated the scaling down of the number of selected schools.

The study relied on trust from the respondents for offering truthful and precise information when filling the metacognitive awareness inventories.

3.5.3 Synopsis of Objectives, Research Tools and Methods of data Analysis.

The summary of the study objectives, research tools adopted and methods of data analysis are outlined in table 3.1 below.

Table 3.1 Synopsis of Objectives, Research Tools and Methods of data Analysis.

Research Objective	Sample	Research Tool	Analysis Procedure
To determine the degree to which learners adopt metacognitive awareness in their learning process in secondary schools.	300 form three students from three types of schools	Metacognitive Awareness Inventory for Students	Quantitative analysis involving determining the Mean and Standard Deviation in each of the metacognitive components
To establish whether teachers actively foster metacognitive awareness in their pedagogy either explicitly or implicitly.	21 teachers from three secondary schools who teach form three students	Metacognitive Awareness Inventory for Teachers.	Quantitative analysis involving determining the Mean and Standard Deviation in each of the metacognitive components
To find out whether metacognitive awareness of learners contribute to academic performance.	300 form three students from three types of schools	Metacognitive Awareness Inventory for Students	Analysis of Variance between continuous assessment tests and score of metacognitive awareness inventory.
To find out whether there is gender disparity in metacognitive aware	200 boys and 100 girls sampled from three secondary schools.	Metacognitive Awareness Inventory for Students	Calculation of ANOVA to determine the existence of any variability in gender in metacognitive awareness.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

The motivation behind this study was to determine the degree of metacognitive awareness among high school learners and the effects of the same on academic performance. Further, it attempted to establish whether teachers foster metacognitive instruction in teaching. There was also an attempt to find out whether there exist gender disparities in metacognitive awareness among students. This was done by administering a self-report questionnaire called Metacognitive Awareness Inventory for teachers (MAIT) and Metacognitive Awareness Inventory for Students (MAIS) to determine;

The level of metacognitive awareness among form three learners in Nairobi County.

The extent to which teachers foster metacognitive awareness in pedagogy explicitly or implicitly.

The influence of metacognitive awareness on academic performance among form three students.

Whether there exists gender disparity in metacognitive awareness among high school learners.

As expressed in section three, the collection of data instruments embraced for this research were self-report questionnaires for Students, MAIS based on 30, four point likert-scale items and self-report questionnaire for Teachers MAIT comprising 24 likert-scale self-report items.

The independent variable; Metacognitive awareness of students and metacognitive instruction by teachers were considered against the dependent variable- Scholarly achievement of high school learners in Continuous Assessment Tests CAT. Both descriptive and presumed insights will be utilized to assess the information and to make inferences.

4.2 The Level of Metacognitive Awareness Among Students

The Metacognitive Awareness Inventory for students is a self-assessment tool that comprises of 30 likert-scale items with four points, 1-Strongly disagree, 2-Disagree, 3-Agree, 4-Strongly agree. A total number of three hundred form three learners were sampled within three learning institutions in Nairobi County. The sample was based of 100 girls and 200 boys. To collect data, the researcher used MAIS and students' end of term two Continuous Assessment Test

(CAT) results to establish the association between metacognitive knowledge and scholarly achievement.

The research focused on analyzing the connection between emotional knowledge in learning alongside information processing. It also sought to analyze the association linking emotional and educational achievement of students. There was the need also to determine whether there is gender disparity in metacognitive awareness among students.

To tackle the first question that attempts for assessing the level of metacognitive knowledge of learners in view of the general metacognition aspects, the researcher estimated the average, SD and percentage of the learners' outcomes on all aspects in Metacognitive Awareness Inventory for students. The outcomes are as featured in table 4.1 below.

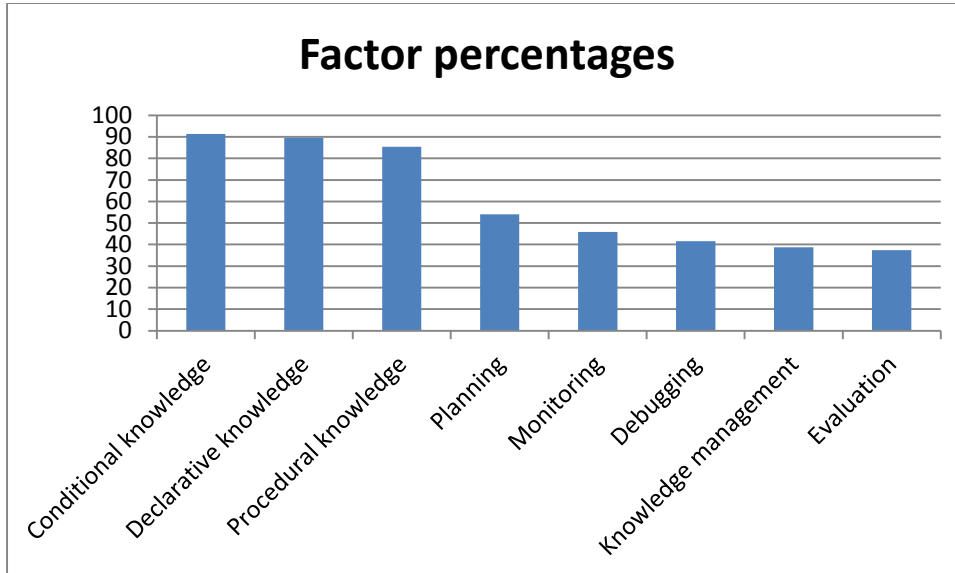
Table 4.1: Mean, SD, Percentages of the Outcomes on all aspects on Metacognitive Thinking

Factor	No. of items	Mean	SD	Minimum	Maximum	%
Declarative Knowledge	4	14.34	5.74	4	16	89.63
Procedural Knowledge	4	13.67	3.21	4	16	85.44
Conditional Knowledge	4	14.61	5.46	4	16	91.31
Planning	4	8.64	6.12	4	16	54.00
Monitoring	4	7.34	7.24	4	16	45.88
Evaluation	4	5.98	5.83	4	16	37.38
Knowledge Management	3	4.65	4.34	3	12	38.75
Debugging	3	4.98	8.14	3	12	41.50
Metacognition (overall)	30	74.21	46.08	30	102	72.75

From table 4.1 above, the learners' mean outcomes relating the eight aspects concerning reflective learning continuum oscillated around 4.65 to 14.61 scores, and the percentages

ranged between 37.38% and 91.31%. The percentages of the metacognition components in an ordered sequence from the greatest are as depicted in figure 2 below.

Figure2: Percentages of the eight Factors score on metacognitive awareness inventory.



It can be deduced from figure 2 that Conditional knowledge, Declarative Knowledge and Procedural knowledge ranked high at over 80% among the eight factors of metacognition whereas Evaluation strategies ranked low at 37%.

Generally, the students' level of metacognitive thinking was seen as above average having mean of 74.21 and SD, is 46.08 with a percentage of 72.75%. The results show that most of the respondents were in moderate level of metacognition.

Critically, MAI as deployed in this research study or in the same type of research in Kenyan case are subjective in nature and therefore they many not concisely depict the correct and determinate situation of learners' reflective learning strategies. MAI affords learners the opportunity to indicate the extend to which they are able to put in to practice reflective learning strategies in their day-to-day learning endeavors but does not require them to show explicitly the concrete ways they utilize these skills in daily critical thinking engagements regardless of how incorrectly they are utilized.

Incidentally, the findings of this research corroborates and relates to those obtained in past researches on the various aspects of reflective learning strategies. According to a study conducted by Yunus & Ali, 200, there was a high reflective learning levels based on: error

checking, Management of Knowledge and Speculative information in comparison with Strategic information, Auditing, Strategic and Decisive information.

4.3 The Influence of Metacognition on Academic Performance.

To determine whether metacognitive factors contribute to academic performance, the researcher conducted the computation of the coefficient of correlation of the various components of metacognition and academic performance of male and female learners as shown in table 4.3 below;

Table 4.3; Gender wise correlation among Metacognitive Factors and Academic Performance

Measures	Gender					
	Male		Female		Overall	
	r	P	r	P	r	p
Declarative Knowledge and Academic performance	.170**	.037	.335**	.002	.185**	.001
Procedural Knowledge and Academic performance	.107	.065	.168*	.023	.137**	.005
Conditional Knowledge and Academic Performance	.066	.442	.198**	.008	.122*	.020
Planning and Academic Performance	.133*	.036	.387**	.000	.197**	.000
Information Management and Academic Performance	.092	.253	.264*	.022	.207*	.023
Monitoring and Academic Performance	.324	.068	.235*	.041	.138**	.004
Debugging and Academic Performance	-.043	.635	.046	.638	-.004	.986
Evaluation and Academic Performance	.087	.186	.128	.084	.099*	.041
Overall Metacognitive Awareness and Academic performance	.245*	.045	.357**	.000	.885**	.000

** Correlation is significant at the 0.01 level.

*Correlation is significant at the 0.05 level

It can be noted from table 4.3 of the existence of a strong positive correlation relating to Declarative Knowledge with Academic performance for both male and female students

($r=.170$, $p=.037$) and ($r=.335$, $p=.002$) respectively. The overall contribution of Declarative Knowledge to academic performance depicted a positive major correlation, ($r=.186$, $p=.001$).

Planning showed a strong positive correlation to academic performance, ($r=.133$, $p=.036$). The overall correlation of planning and academic performance was positive and significant, ($r=.197$, $p=.000$).

There was a positive noteworthy connection linking metacognitive Awareness and educational achievements, ($r=.885$, $p=.000$). This research therefore corroborates the findings of Rahman et al. (2010) which stated that metacognitive awareness was significantly positively correlated with academic achievement of learners. This is also supported by a research done by Lubuhn et al. (2010) which discovered that educational performance can be improved by learners' metacognitive abilities.

4.4 Disparities in Metacognitive Awareness and Academic Performance Based on Gender.

The third objective required to determine whether there is any gender disparity in metacognition among secondary school students. The researcher started by determining the arithmetic average and the SD of the learners' score on the various aspects of reflective learning strategies and ultimately obtained the summative scores on the overall based on gender. Table 4.3 below depicts the findings.

Table 4.2: Mean and SD Values of Student Scores in Different Factors based on gender

Scale-factor	Gender	N	Mean	SD	“t”	Sig. (2-tailed)
Declarative	Male	200	13.45	5.61	0.585	0.564
knowledge	Female	100	12.67	5.35	0.543	0.543
Procedural	Male	200	14.56	3.12	-0.401	0.676
knowledge	Female	100	14.34	3.45	-0.377	0.675
Conditional	Male	200	15.74	5.86	0.543	0.603
knowledge	Female	100	14.32	5.45	0.534	0.583
Planning	Male	200	15.87	5.75	1.064	0.296
	Female	100	15.84	6.97	1.125	0.235
Monitoring	Male	200	15.99	7.49	1.427	0.148
	Female	100	14.76	4.86	1.456	0.163
Evaluation	Male	200	13.53	5.35	-0.350	0.745
	Female	100	15.42	4.36	-0.365	0.732
Debugging	Male	200	6.53	4.96	-1.156	0.276
	Female	100	7.86	4.54	-1.123	0.265
Managing	Male	200	8.64	8.21	0.433	0.643
knowledge	Female	100	7.23	8.36	0.457	0.647
Metacognition	Male	200	104.31	46.35	0.457	0.653
(overall)	Female	100	102.44	43.34	0.464	0.649

According to Table 4.2, the average score of male learners was slightly higher than that of female learners on over all and in reference to the six aspects as outlined: Decisive Information, Speculative information, Strategies, auditing, management of knowledge and Task oriented information.

In an attempt to establish whether there exists disparities as regarding the averages of gender are significant or not, the researcher determined t-values outlined in table 4.3.

Incidentally, no noteworthy distinction among gender in the various aspects on the metacognitive awareness inventory scale and the overall metacognition scale itself.

4.5 The extent to which Teachers foster metacognitive learning and Teaching

The reflective pedagogy strategy for teachers (MAIT) is essentially, a self-report questionnaire that seeks to initiate the level at which teachers foster metacognition in instructing and education both explicitly or implicitly. MAIT has 24 statements with four likert-scale and the sampled teachers were to tick only one in each item. The items covered six aspects related to reflective teaching strategies these are; expressive information, Conditional knowledge, Procedural knowledge, Scheming, assessment of learning.

Table 4.3; Mean, SD and Percentages of the Scores of Metacognitive Awareness of Teachers

Factor	No. of Items	Mean	SD	Minimum	Maximum	%
Declarative Knowledge	4	9.98	3.02	4	16	62.38
Procedural Knowledge	4	6.63	4.64	4	16	41.44
Conditional Knowledge	4	8.42	5.25	4	16	52.63
Planning	4	10.27	2.75	4	16	64.19
Monitoring	4	11.75	3.83	4	16	73.44
Evaluating	4	8.86	1.03	4	16	55.38
Metacognition (Overall)	24	55.91	20.52	24	96	58.24

From the table above, it can be noticed the average for instructors as per the six aspects on metacognitive instruction scale ranged around 6.63 and 11.75. The percentages varied between 41.44% and 73.44%.

Declarative Knowledge had 62.38%, Procedural Knowledge, 41.44%, Conditional Knowledge, 52.63%, Planning, 64.19%, Monitoring, 73.44% and Evaluation, 53.38%.

The teachers' level of metacognitive awareness was found to be average, 58.24%. The results indicated that most of the respondents were in an average level of metacognition level.

4.4 Summary

This study has found that there is no significant gender disparity in metacognition among secondary school students. It was also discovered under this study of the existence of an average degree of reflective learning strategies in high school learners. The influence of metacognition on academic performance was found to be positively significant. The metacognitive awareness of teachers was found to be slightly above average. This depicts the need to progressively train teachers on the need to bolster their fostering of metacognition in their pedagogy. It was also evident that there existed not significant disparity among gender in metacognitive awareness.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section aims at assessing the findings of the research objectives as stated in the first section.

The overarching objective pertaining to this research aimed at discovering the degree at which metacognitive awareness was deployed by form three learners in Nairobi County and its influence on academic performance. There was also the need to establish whether teachers foster metacognitive instruction in their pedagogical endeavors. The dependent variable in this study was the academic performance of students, whereas the independent variable was metacognitive awareness of learners and teachers. The instruments for data collection were students' reflective learning strategies instrument and teachers' reflective teaching strategies tool. These tools were self-reporting in nature which had a 4 point likert-scale.

5.2 Summary of findings by Objectives.

The principal goal of the research was: To determine the metacognitive awareness level of high school learners. The mean, standard deviation, percentages measured revealed that the degree of learners' metacognitive awareness was slightly above average.

On whether metacognitive awareness contributes to academic performance, Pearson correlation linking metacognition and educational achievement revealed the existence of a positive significant correlation.

On the question about whether there is gender disparity in metacognitive awareness among students, the study discovered that there is no major variance in metacognitive knowledge across gender, all gender are equal regarding metacognition.

On whether teachers adopt metacognitive knowledge in their pedagogical processes, the statistical processing of the MAIT information collection instruments revealed that teachers sampled had slightly above average level of metacognitive awareness. This is a testament that there is need to enhance the integration of metacognition in pedagogy as it will go a long way to boost academic excellence among students.

5.3 Conclusions

This research study discovered that there is a slightly above average level of metacognitive awareness among form three students and that there is a significant positive correlation between metacognitive awareness and academic performance. Teachers are at an average level in the adoption of metacognitive awareness in their pedagogy. It was also discovered under this research that there is not much significant disparity based on gender and metacognitive awareness among the sampled form three students.

5.4 Recommendations

Outlined below are some points which the researcher recommended;

The teacher training component in Kenya to critically consider the urgent need to train teachers in fostering metacognition in learning and teaching. This component will go a long way in improving learning and life - long pursuit of knowledge in authentic situations.

Students should be taught on the importance of “learning to learn” which is an important paradigm shift from the traditional ways of learning to an authentic learning platform. The need to develop lifelong learning hinges on the development of metacognitive thinking in learners.

Teachers should be sensitized on the need for embedding metacognitive instruction in teaching as this will go a long way in building conditional metacognitive knowledge as students get exposed to the multiplicity of situations requiring the utilization of varied metacognitive and cognitive skills.

REFERENCES

- Balcikanli, C. (2011). Metacognitive awareness inventory for teachers (MAIT). *Electronic Journal of Research in Educational Psychology*.
- Borkowski, J., Carr, M., & Pressley, M. (1987). "Spontaneous" strategy use: Perspectives from metacognitive theory. *Intelligence*.
- Bredenkamp, S. (2014). *Effective practices in early childhood education: Building a foundation*. Upper Saddle River, NJ: Pearson.
- Clift, R. T., Ghatala, E. S., Naus, M. M., & Poole, J. (1990). Exploring teachers' knowledge of strategic study activity. *Journal of Experimental Education*.
- Dignath-van Ewijk, C., Dickhauser, O., & Buttner, G. (2013). Assessing How Teachers Enhance Self-Regulated Learning: A Multiperspective Approach. *Journal of Cognitive Education and Psychology*.
- Dunlosky, J. & Thieda, K. W. (1998). What makes people experiment more? An evaluation of factors that affect self-paced experiment. *Acta psychology*.
- Flavell, J. H. (1979). Metacognitive aspects of problem solving. In Resnick (Ed.), *The Nature of Inteligence* (pp.231 – 235)
- Flavell, J. H. (1992). Perspectives on perspective taking. In H. Beilin & P. Pufall (Eds.). *Piaget's theory: Prospects and possibilities*.
- Gredler, M. E. (2012). Understanding Vygotsky for the classroom: Is it too late? *Educational Psychology Review*.
- Gredler, M., & Shields, C. (2004). Does no one read Vygotsky's words? Commentary on Glassman. *Educational Researcher*.
- Hacker, D. J., Bol, L., Horgan, D. D., and Rakow, E. A. (2000). Test prediction and performance in a classroom context. *Journal of Educational Psychology*.
- Hacker, D.J, Dunlosky, J., & Graesser, A. C. (Eds), (1998). *Metacognition in educational theory and practice* Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and disposition of a critical thinker. *New Directions for Teaching and Learning*.

Hilden, K. R., & Pressley, M. (2007). Self-regulation through transactional strategies instruction. *Reading & Writing Quarterly*.

Huff, J. D., & Nietfeld, J. L. (2009). Using strategy instruction and confidence judgement to improve metacognitive monitoring. *Metacognition and learning*.

Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist*, 22, 255–278.

Joseph, N. (2009). Metacognition needed: Teaching middle and high school students to develop strategic learning skills. *Preventing School Failure: Alternative Education for Children and Youth*.

Kistner, S., Rakoczy, K., Otto, B., Dignath-van Ewijk, C., Buttner, G., & Klieme, E. (2010). Promotion of self-regulated learning in classroom investigating frequency, quality, and consequences for student performance. *Metacognition and learning*.

Krebs, S. S., & Roebbers, C. M. (2010). Children's strategic regulation, metacognitive monitoring and control processes during test taking. *British Journal of Educational Psychology*.

Labuhn, A. S., Zimmerman, B. J., & Hasselhorn, M. (2010). Enhancing student's self-regulation and mathematics performance: the influence of feedback and self-evaluative standards. *Metacognition and learning*.

Moshman, D. (2011). *Adolescent rationality and development: Cognition, morality, and identity*, Taylor & Francis.

Mugenda, O. M. & Mugenda, A. G. (2003). *Research Methods: Qualitative and Quantitative Approaches*. Nairobi: ACTS Press.

Niemivirta, M. (1997). Gender differences in motivational-cognitive patterns of self-regulated learning. A paper presented at the Annual meeting of the American Educational Research Association, Chicago, IL.

Orodho, A. J. (2003). *Essentials of Educational and Social Sciences Research Methods*. Nairobi. Malosa Publishers

- Orodho, A. J., & Kombo, D. K. (2002). *Research methods*. Nairobi. Kenyatta University, Institute of Open Learning.
- Paris, S. G., & Paris, A. H. (2001). Classroom application of research on self-regulated learning. *Educational Psychology*.
- Paris, S., & Winograd, P. (2003). *The Role of Self-Regulated Learning in Contextual Teaching: Principles and Practice for Teacher Preparation*.
- Pellegrino, J. W., & Hilton, M. L, (Eds.) (2013). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. Committee on Defining Deeper Learning and 21st Century Skills. Washington, D.C.: National Research Council of the National Academies Press.
- Perry, N. E (1998). Young children's self-regulated learning and contexts that support it. *Journal of Educational Psychology*.
- Perry, G., Handerson, B., & Meier, D. R. (2012). *Our inquiry , our practice: Undertaking, supporting and learning from early childhood teacher research (ers)*. Washington, D. C.: National Assosiation for the Education of Young Children.
- Pintrich, P. R. (2002). The role of metacognitive knowledge in learning, teaching and assessing. *Theory into practice*.
- Pokay, P. & Blumenfeld, P. C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology*.
- Reynolds, R. E. (1992). Selective attention and prose learning: Theoretical and empirical research. *Educational Psychology Review*.
- Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional science*.
- Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broad perspective on learning. *Research in science education*.
- Schraw, G. & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*.

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review*, 7, 351–371.

Terricone, P. (2011). *The taxonomy of metacognition*. Psychology Press

Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher-student interaction: A decade of research. *Educational Psychology Research*.

Van der Stel, M., & Veenman, M. V. (2010). Development of metacognitive skillfulness: A longitudinal study. *Learning and individual differences*.

Veenman, M. V. J. (2013). Training metacognitive skills in students with availability and production deficiencies. In J. Bembenuity, T. Cleary & A. Kitsantas (Eds.). *Application of self-regulated learning across diverse disciplines* (pp. 299-324). Charlotte, NC: Information Age Publishing, Inc.

Veenman, M. V. J., van Hout-Wolters, B. H. A. M., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. *Metacognition learning*.

Veenma, M. V., & Spaans, M. A. (2005). Relation between intellectual and metacognitive skills: Age and task differences. *Learning and individual differences*.

Veenman, M. V. J. (2011). Learning to self-monitor and self-regulate. In R. Meyer & P. Alexander (Eds.). *Handbook of research on learning and instruction*.

Wang, M. C., Haertel, G. D., & Walberg, H. J. (1990). What influences learning? A content analysis of review literature. *The Journal of Educational Research*.

Wolters, A. (1999). The relation between high school student's motivational regulation and their use of learning strategies, effort and classroom performance. *Learning and Individual Differences*.

Young, A., & Fry, J. (2008). Metacognitive awareness and academic achievement in college students. *Journal of the Scholarship of Teaching and Learning*.

Zumbrunn, S., Tadlock, J., & Roberts, E. D. (2011). Encouraging self-regulated learning in the classroom. A review of the literature. Metropolitan Educational Research Consortium.

APPENDICES

**APPENDIX I: METACOGNITIVE AWARENESS INVENTORY FOR STUDENTS
(MAIS)**

Adm. No.....Gender M F Age.....

School.....

Instructions: The following are statements about what students do when they are engaged in academic activities and learning in general. Four numbers follow each statement (1,2,3,4,) and each number mean the following;

Means, “Strongly disagree.”

Means, “Disagree.”

Means, “Agree.”

Means, “Strongly agree.”

After reading each statement, use a tick (√) in the corresponding box to mark the response that applies to you. Use the scale provided to guide you.

Please note that there is NO right or wrong answer to the statements in this inventory.

S/N	Statements	1	2	3	4
1.	When confronted with a problem, I often compare it with the problems which I have previously solved.				
2.	When learning a new content, I compare it with the previously learned things.				
3.	I choose different learning methods according to the learning area.				
4.	I usually follow a strict time table for my studies.				
5.	Whenever I am making a decision, I think at least twice about about it.				
6.	I often try to complete my assignments and learning activities within the time schedule.				
7.	After learning, I try to revise the central ideas in the content.				
8.	I always try to discuss and solve the doubts related to the learning area with my teacher and friends.				
9.	I start learning only after getting a clear picture about the content to be learned.				
10.	When confronting with a problem situation, I always think about alternative ways of solving it.				
11.	I always accept the innovative changes occurring in the society.				
12.	As a student, I always critically analyze my abilities in learning activities.				
13.	I always try to improve myself academically.				
14.	I have the ability to completely concentrate on my learning activities in spite of all the disturbing situations.				
15.	Before starting the study, I collect all the relevant and recent information about the content.				
16.	After the successful completion of each learning task, my self-confidence increases.				

17.	I always ask myself as to whether I have gone for all other possibilities before selecting a final solution.				
18.	I find happiness in collecting information about interesting learning areas.				
19.	I am efficient in finding and rectifying my own weaknesses.				
20.	I split the learning task into simple units.				
21.	I evaluate the ability of myself as a student in solving the learning tasks.				
22.	I change the speed and time of learning according to the learning contents.				
23.	Whenever doing a task, I completely engage in it.				
24.	I regularly assess my learning efforts as whether I am going in the right way or not.				
25.	I control my emotions and wishes as they will hinder me from reaching the learning goal.				
26.	After completing a learning task, I always ask myself as to whether there are other ways of solving the same task.				
27.	I try to do the allotted learning tasks as successfully as possible by myself.				
28.	I like to collect meaningful and important information.				
29.	Before beginning a learning activity I always try to read the instructions carefully.				
30.	I consider my failures as milestones towards success.				

**APENDIX II: METACOGNITIVE AWRENESS INVENTORY FOR TEACHERS
(MAIT)**

Instructions

Please answer the following questions as accurately as possible.

Tick the correct answer in the boxes provided against the questions where necessary.

Write brief answers where explanation is required.

You need not write your name on the questionnaire.

There are no right and wrong answers in this case.

Information will be treated with confidentiality.

SECTION A: DEMOGRAPHIC INFORMATION

What is the name of your school? _____

What is your gender? Please tick (✓) as appropriate

Female() Male ()

What are your teaching subjects? Please tick (✓)as appropriate

Mathematics () Sciences () Languages () Humanities ()

Please indicate your highest education level attained. Tick (✓)as appropriate

College () University graduate ()

Post graduate () Other specify

Please indicate your teaching experience. Tick (✓) as appropriate

Less than 5 Years () 5 to 10 years ()

10 to 15 Years () 15 to 20 Years ()

Over 20 Years ()

The following table contains 24 statements. There is no right or wrong answers in this list of statements. It is simply a matter of what is true for you. Read every statement carefully and choose the one that best describes you. Thank you very much for your participation.

SCALE

Means, "Strongly disagree."

Means, "Disagree."

Means, "Agree."

Means, "Strongly agree."

After reading each statement, use a tick (✓) in the corresponding box to mark the response that applies to you. Use the scale provided to guide you.

S/N	Statements	1	2	3	4
1.	I am aware of my strengths and weaknesses in my teaching.				
2.	I try to use teaching techniques that worked in the past.				
3.	I use my strengths to compensate for my weaknesses in my teaching.				
4.	I pace myself while I am teaching in order to have enough time.				
5.	I ask myself periodically if I meet my teaching goals while I am teaching.				
6.	I ask myself how well I have accomplished my teaching goals once I am finished.				
7.	I know what skills are most important in order to be a good teacher.				
8.	I have a specific reason for choosing each teaching technique I use in class.				
9.	I can motivate myself to teach when I really need to teach.				
10.	I set my specific teaching goals before I start teaching.				
11.	I find myself assessing how useful my teaching techniques are while I am teaching.				
12.	I ask myself if I could have used different techniques after each teaching experience.				
13.	I have control over how well I teach.				
14.	I am aware of what teaching techniques I use while I am teaching.				
15.	I use different teaching techniques depending on the situation.				
16.	I ask myself questions about the teaching materials I am going to use.				

17.	I check regularly to what extent my students comprehend the topic while I am teaching.				
18.	After teaching a point, I ask myself if I'd teach it more effectively next time.				
19.	I know what I am expected to teach.				
20.	I use helpful teaching techniques automatically.				
21.	I know when each teaching technique I use will be more effective.				
22.	I organize my time to best accomplish my teaching goals.				
23.	I ask myself questions about how well I am doing while I am teaching.				
24.	I ask myself if I have considered all possible techniques after teaching a point.				

**APPENDIX III: CONSENT TO USE SEMLI-S FOR DATA COLLECTION
REQUEST TO USE YOUR STUDENTS' SELF-EFFICACY AND METACOGNITION
LEARNING- SEMLI-s INSTRUMENT**



Chepkieng Elius <echepkieng@gmail.com> Thu, 2 May, 17:05 (22 hours ago)

to gregory.thomas

Dear sir,

I am a post graduate student at the University of Nairobi and i am doing a study on metacognition and learning achievement in Kenyan secondary schools. To enable me be able to conduct data collection, i am kindly requesting your permission to adopt and modify your SEMLI-S tool as this will facilitate my collection of data from the learners. I will appreciate so much if my request will be granted. Thanks.

Yours sincerely

Elias K Chepkieng

Greg Thomas <gthomas1@ualberta.ca> Thu, 2 May, 21:52 (17 hours ago)

to me

Dear Elias,

Thanks for your email.

You are most welcome to use the SEMLI-S in your research.

Best wishes,

Greg

Dr Gregory P Thomas

Professor, Science Education

Acting Chair,

Department of Secondary Education

551 Education South

The University of Alberta

Edmonton, T6G 2G5, Canada

<https://www.ualberta.ca/education/about-us/professor-profiles/gregory-thomas>

gthomas1@ualberta.ca

+1 780 492 5671 (phone)

+1 780 492 9402 (fax)

**APPENDIX IV: PERMISSION TO ADOPT METACOGNITIVE AWARENESS
INVENTORY FOR TEACHERS**

Inbox x

Chepkieng Elias <echepkieng@gmail.com> Sat, 7 Sep, 12:23

to CEM

Dear Cem.

My name is Elias Chepkieng, a post graduate student of the University of Nairobi. I am intending to carry out a study on the role of metacognitive instruction on academic performance in Kenya. In this regard, i am asking for your permission to adopt the MAIT instrument for data collection.

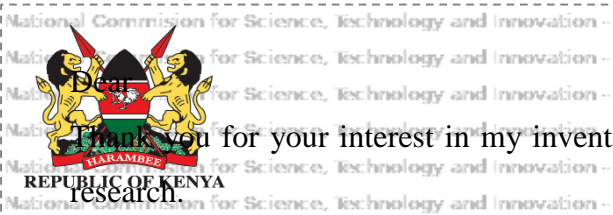
Will appreciate your kind gesture.

Yours sincerely,

Elias Chepkieng

Cem Balcikanli Tue, 10 Sep, 15:02

to me



Thank you for your interest in my inventory. You are welcome to use it. Good luck with your research.

Best
Cem



Elias,

wishes



APPENDIX V: THE PERMIT FOR RESEARCH FROM NACOSTI

APPENDIX VI: RESEARCH PERMIT FROM NACOSTI



THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

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