

**A CRITIQUE OF THE CONTRIBUTION OF CONSTRUCTIVIST LEARNING  
APPROACHES TO THE DEVELOPMENT OF CRITICAL THINKING**

**By**

**Purity Gathigia Kibui**

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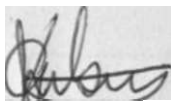
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## DECLARATION

This research project is my original work and has not been presented for a degree in any other university.



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This research project has been submitted for examination with my approval as the University Supervisor.



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## ABSTRACT

The acquisition of critical thinking skills by the learners is important if learners are going to face challenges posed by the many changes taking place in the society. Many instructional approaches have been employed in an attempt to ensure that learners acquire the essential critical thinking skills. Traditional learning approaches which are teacher-dominated emphasize on the acquisition of a set of skills which can be transferred from the teacher to the learner. Progressive approaches to learning emphasize on learner -centeredness where learners are involved in constructing knowledge; a process that eventually leads to development of critical thinking. A striking characteristic of constructivist learning is learner autonomy whereby learners are believed to be constructors of knowledge as opposed to recipients.

It is often assumed that learner autonomy can lead to development of critical thinking by learners. However, research findings indicated that this is not necessarily the case and that the use of constructivism by teachers does not necessarily lead to improvement of critical thinking.

This research sought to explain this paradox by investigating the relationship between constructivist pedagogical approaches and the development of critical thinking. This research also sought to find out the role of the teacher in constructivist learning and to investigate the pedagogical approaches and classroom practices that make the development of critical thinking fail.

Two philosophical methods of inquiry were employed in this study i.e. the critical method and philosophical analysis. The critical method was used to launch a critique on various classrooms practices associated with constructivism in order find out whether they lead to critical thinking, as it is often assumed. The analytic method was used to arrive at a better understanding of educational terms associated with constructivism and critical thinking. The study found that constructivist teachers must deliberately organize their teaching in such a way that it leads to critical thinking. Learner autonomy per se cannot lead to critical thinking unless the teacher ensures that the learning process has activities and content that will help in the development of critical thinking. The role of the constructivist teacher was emphasized on in the organization of

tasks and assignments who should ensure that in the process of performing these tasks, the learners acquire critical thinking skills.

The study recommended that if teachers were to effectively use constructivist learning approaches certain measures need to be put in place: teachers need to be trained during pre-service on the use of constructivist approaches; and teachers need to be aware of how to design classroom tasks and assignments so that their performance leads to learners becoming critical thinkers. Attention also needs to be paid to the design of the curriculum so that the objectives do not only deal with lower order thinking but should encompass even higher order tasks such as analysis, synthesis and evaluation. Assessment procedures also ought to be re-examined to ensure that they do not emphasize on reproduction of learned knowledge. Value-based questions could be used to ensure that learners relate the knowledge they acquire to real life situations.

## ACKNOWLEDGMENTS

## DEDICATION

This dissertation is dedicated to my son, Sammy Martin and my nephews, Ian and Lewis whom I hope to inspire as they continue with their education

I am truly grateful for the support and encouragement I received from so many wonderful people in my educational pursuit. My greatest appreciation and respect is extended to Dr. James Kariuki Gunga, my supervisor and chairman of the Department of Educational Foundations, School of Education, University of Nairobi who through his positive influence and encouragement, assisted me in every aspect of this study. His encouragement gave me the strength to persevere and his ability to see the 'big picture' helped me to stay focused.

My gratitude is also extended to other members of the Department of Educational Foundations for support and wise counsel as I worked on the project.

I also extend my sincerest appreciation to Dr. Wangari Karuri, Director of Kenya Education Management Institute, for her inspiration and support and giving me time off to work on this project.

It is with sincere appreciation that I thank my father, Mr. Samson Kibiri and my mother, Mrs. Japheth W. Kibiri for their continued support and encouragement - not only as I undertook the course, but since I began going through the process of education. Special thanks go to my name for continuously reminding me of the projects I had set to achieve.

Unique thanks go to my son, Sammy Martin, for his understanding as I spent long hours working on the project.

Finally, but most importantly, I wish to thank my wonderful family who supported me through this undertaking. Their belief in my abilities, and their love and support were the foundation I relied upon.

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background to the Problem**

For a long time, the development of critical thinking by learners has been the focus of educators at every level of education. Critical thinking refers to the disciplined mental activity of evaluating arguments (Eric, 1992). Lau and Chan (2011) define critical thinking to include the ability to engage in reflective and independent thinking. They go further to describe a critical thinking person as one who is able to: understand logical connections between ideas; identify, construct and evaluate arguments; detect inconsistencies and common mistakes in reasoning; solve problems; systematically identify the relevance and importance of ideas; and reflect on the justification of one's own beliefs and values. Ennis (1991) defines critical thinking as reasonable, reflective thinking that is focused on deciding what to believe or do. According to the Critical Thinking Co. (2011), critical thinking is that mode of thinking in which the thinker improves the quality of his/her thinking by skillfully analyzing, assessing and reconstructing it. It is self-directed, self-disciplined, self-motivating and self-correcting thinking which entails effective communication and problem solving as well as a commitment to overcome our ego-centricism and socio-centricism.

In the process of education, the learner is expected to develop cognitive abilities leading to acquisition of knowledge and understanding by the learners. It is assumed that the acquisition of such knowledge leads to critical thinking by the learners. However Lau and Chan (2011) assert that critical thinking is not the same as the accumulation of information as this can be done by a person with a good memory and who knows a lot of facts. Such a person will not necessarily be good at critical thinking. Rather, a critical thinker should be able to deduce consequences from what he knows and should be able to make use of information to solve problems and to seek relevant sources of information. It is generally agreed that retention of knowledge by learners is short lived which means that educators must look for learning outcomes that go beyond mere retention of facts and figures . Educators must think of developing critical thinking in learners so that they can be able to argue and persuade others and respond carefully to diverse points of views (Scheurman, Thomas and Russo, 1995)

To Lau and Chan (2011), good critical thinking is the foundation of science and a liberal democratic society. This is because science requires critical thinkers who use reason in experimentation and theory confirmation while the proper functioning of liberal democracy requires citizens who can think critically about social issues to inform their judgments about proper governance and to overcome biases and prejudice. According to Ennis (2011), the most fundamental reason for teaching critical thinking is that good thinking skills are essential for making appropriate decisions about what to believe and do, whether for personal decisions, work-related decisions or civic decisions. Critical thinking helps in ensuring that the best decisions are arrived at.

According to Lau and Chan (2011), the acquisition of critical thinking skills by learners is important for various reasons: First, the ability to think clearly and rationally is important in whatever we do because it enables one to think well and solve problems systematically. Secondly, critical thinking is very important in the new knowledge economy which is driven by information and technology. The new economy places increasing demands on flexible intellectual skills and the ability to analyze information and integrate diverse sources of knowledge in problem solving. Thirdly, critical thinking helps to enhance language and presentation skills. Thinking clearly and systematically can improve the way we express our ideas. In learning how to analyze logical structure of texts, critical thinking improves comprehension abilities. Fourthly, critical thinking helps to come up with creative solutions to problems. To generate new ideas applicable to particular situations requires one to think critically which helps to evaluate new ideas, select the best ones and modify them if necessary. Lastly, critical thinking helps one to live a meaningful life and to structure it accordingly. This can be done by reflecting on our values and decisions. Thus, critical thinking provides one with the tools for self-evaluation.

In discussing the importance of critical thinking, the Critical Thinking Co. (2011) warns that if children are taught everything that we know, their knowledge will be limited to ours. But if we teach them how to think, then their knowledge will be limitless. Our ability to succeed in life is directly proportional to our ability to solve the problems we encounter in life. When critical thinking skills are not developed by learners they are likely to encounter a number of problems:

In reading, learners may be able to read well but may fail to understand what they have just read. Learners with poor thinking skills have poor reading and comprehension skills. Learners who do not have critical thinking skills cannot also present or relate written ideas logically. For effective communication, the learner must have a social understanding of what he/she wants to say and the ability to outline a logical sequence and structure to his/her audience.

The incorporation of critical thinking in the curriculum not only helps learners to transfer critical thinking skills to other areas of life but also improves the effectiveness of lessons. Critical thinking requires deep analysis of a lesson which in turn produces deeper understanding resulting in better grades and higher test scores. Critical thinking empowers learners to be independent, innovative and helps them to succeed in school and in life (Critical Thinking Co, 2011). Critical thinking skills give learners ability to not only understand what they have read or been shown but to also build upon that knowledge without further guidance. It teaches learners that knowledge is fluid and builds upon itself.

The work of the teacher is to facilitate the intellectual growth of the learners by establishing a classroom environment conducive to critical thinking. In the past, development of critical thinking by learners depended on teaching methodologies that emphasized the memorization and retention of knowledge. Such approaches emphasized the power of authority and the great minds of the past to interpret experience (Dirks, 1998). Critical thinking skills have also been taught as a discreet set of technical skills to be learned by the learners in an isolated fashion (Scheurman, Thomas and Russo, 1995).

Current educational practices have seen attention shift from the teacher to the learner. Such progressive approaches assert the centrality of the learner in the acquisition of knowledge which depends a great deal upon the experience that the learner brings to the classroom and on the interaction with others. Scheurman, Thomas and Russo (1995) recommend new instructional approaches that focus on the entire experience of the learner.

In tandem with current research findings, most curricula today are modeled along constructivist philosophy which encourages active and meaningful learning and promotes responsibility and autonomy among learners (Dirks, 1998). Constructivist teaching is based on the belief that

learning occurs when learners are actively involved in a process of meaning and knowledge construction as opposed to passively receiving information. Learners are the makers of meaning and knowledge. The work of the teacher is to facilitate the intellectual growth of the learner by establishing a classroom climate conducive to critical thought and reflection.

According to Scheurman, Thomas and Russo (1995) constructivist approach represents a significant shift away from controlling the learning experience. Constructivists believe that knowledge is not something that can be simply given by the teacher but rather that knowledge is constructed by learners through an active, mental process of development where learners become the builders and creators of meaning and knowledge (Gray, 1997). In constructivist teaching, learners are actively involved in the process of meaning and knowledge construction rather than passively receiving information. A productive, constructivist classroom, then, consists of learner-centered, active instruction. In such a classroom, the teacher provides learners with experiences that allow them to hypothesize, predict, manipulate objects, and pose questions.

Gray (1997) holds the view that constructivist teaching can foster critical thinking by creating motivated and independent learners. A constructivist teacher and a constructivist classroom are distinguished from a traditional teacher and classroom by a number of identifiable qualities: the learners are actively involved; the environment is democratic; the activities are interactive and student-centered; and the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous. Such a constructivist environment encourages active and meaningful learning and promotes responsibility and autonomy (Dirks. 1998)

## **1.2 Statement of the Problem**

Despite the increasing acceptance of constructivist approaches in the shift away from the teacher controlled approaches, the increased learners' autonomy pose challenges in the development of critical thinking. Lunenburg (2011) observes that there is evidence to indicate that despite the current use of constructivist approaches by teachers, the learners do not develop critical thinking readily. Lack of critical thinking skills has affected the ability to learn various subjects. For instance, Critical Thinking Co. (2011) explains that in mathematics, students with no critical thinking skills may succeed in working with basic operations but fail to reason mathematically.

Learners struggle with word problems because they cannot comprehend the problem well to see the mathematical problem. In science, learners cannot apply the scientific method to the analysis of scientific problems. In social studies, learners often fail to see analogies because of poor analysis skills and the ability to reason by analogy. In examinations, learners fail to perform well in tests that assess the ability to think.

In a study carried out in 1995 by the Centre for Critical Thinking of the University of Sonoma, California to assess the teaching practices and knowledge of critical thinking in teacher preparation programs in California, it was found that critical thinking is a honorific phrase in the minds of most teacher educators such that they feel obliged to claim both familiarity with it and commitment to it in their teaching. However, the study reported that few have any in-depth exposure to research on the concept and most have only vague understanding of what it is and what it entails to bring it successfully into instruction. The study also found out that critical thinking is often confused with active involvement advocated for in constructivist approaches (Paul, Elder, & Bartell, 1997). This study investigated the apparent paradox between the intention of the constructivists and implications that the resultant learner autonomy does not lead to development of critical thinking processes.

### **1.3 Objectives of the Study**

This study aimed at investigating the relationship between the use of constructivist pedagogies and the development of critical thinking by learners. The specific objectives of the study were:

1. Identifying the principles of constructivism and the main features of a constructivist learning program.
2. Examining the role of the teacher in constructivist environment in the development of critical thinking.
3. Assessing the pedagogical practices that make the current application of constructivism problematic to critical thinking.
4. Identifying factors that may hinder the development of critical thinking while using constructivist approaches in the teaching and learning process.
5. Recommending learning strategies to improve the current constructivist practice.

#### **1.4 Purpose and Significance of the Study**

The purpose of this study was to examine principles of constructivism and the distinctive features of a constructivist teaching program and finding out how they can lead to critical thinking.

To develop critical thinking in learners requires that appropriate methodologies are used in the teaching and learning process. This is important because the rapid changes in all sectors of the society require that learners are equipped with critical thinking skills which will enable them face the challenges that accompany those changes.

Policy makers and educators are continuously looking for ways of making education more responsive to the needs of the society. Thus the findings of this study will help to identify ways in which the constructivist approaches can lead to critical thinking in learners.

New curricula emphasize a holistic and constructivist rationale and the implementation of these new approaches requires that teachers are aware of the significant changes they need to make in the way they teach. The study findings will go a long way towards this direction.

Administrators also need to provide supportive assistance to teachers as they make paradigm shifts to constructivist approaches and they need to be aware of instructional designs that will facilitate the acquisition of critical thinking skills by learners. Findings of this study can help to address the professional needs of teachers in the use of constructivist approaches aimed at developing critical thinking in learners.

The findings of this study will also provide a basis for educators to improve their skills and methodology of teaching critical thinking.

#### **1.5 Assumptions of the Study**

The following assumptions will be made in this study:

1. That critical thinking skills can be acquired from the teaching and learning process.

2. That the quality of learning can be enhanced if learners acquire critical thinking skills.
3. That the use of appropriate pedagogical approaches enhances the development of critical thinking by learners.
4. That use of constructivist approaches in the teaching and learning process can enhance the development critical thinking by learners.

### **1.6 Delimitations of the Study**

This study examined how constructivist approaches can be used to promote critical thinking. The study limited itself to constructivist approaches and did not attempt to look at other approaches used to develop critical thinking.

The study also looked at development of critical thinking by learners in general and did not look at any specific level of education.

### **1.7 Operational Definition of Terms**

Critical thinking:	The process of analyzing, processing and interacting with information.
Critical thinking skills:	Conceptualization, applying, analyzing, problem-solving, synthesizing and evaluation.
Constructivist approaches:	Teaching strategies where the learner is actively involved in discovering knowledge and giving meaning to his/her experiences.
Instructivist approaches:	Teaching strategies where the teacher determines what the learners should learn and how it should be learnt.
Pedagogical approaches:	Methodologies used and processes applied to the teaching and learning process.

Teaching methodologies: A set of skills and strategies that the teacher utilizes to facilitate learning.

Traditional teaching approaches: teacher-centered teaching and learning where the learner plays the passive role of a recipient

### **1.8 Organization of the rest of the Study**

Chapter one of this study introduced the problem statement, described the purpose and significance of the study as well as definition of significant terms used in the study.

Chapter two presents a review of literature and relevant research associated with the problem of this study.

Chapter three looks at the methodologies used in examining the problem of this study.

Chapter four examines the relationship between constructivism and critical thinking by analyzing the current principles and practice of constructivism; the role the teacher plays in the development of critical thinking in a constructivist classroom; the pedagogical practices that make constructivism less effective and factors that may hinder the development of critical thinking in a constructivist learning environment.

Chapter five gives a summary and discussion of the study findings, implications for practice and recommendations for further research.



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## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter looked at literature on critical thinking and constructivism. In Section one, literature on the development of critical thinking, a historical overview, its importance and current practices on development of critical thinking was reviewed. Section two of this chapter looked at constructivist philosophy, its principles and its current use in the school. Section three examined current pedagogical approaches that employ constructivism as a vehicle towards the achievement of critical thinking and the challenges faced by such approaches.

#### **2.2 The Concept of Critical Thinking**

According to Critical Thinking Co. (2011) critical thinking refers to thinking that explicitly aims at well-founded judgment and hence utilizes appropriate evaluation standards in an attempt to determine the true worth, merit or value of something. The Foundations of Critical Thinking (2009) states that critical thinking seeks to understand the mind and training the intellect so that errors, blunders and distortions of thought are minimized. It assumes that the capacity of human beings for good reasoning can be nurtured and developed through educational processes aimed directly at that end.

##### **2.2.1 Historical Overview of Critical Thinking**

In discussing the history of critical thinking, Paul, Elder and Bartell (1997) trace its formal beginning to Socrates who stressed on the need to think reflectively, question common beliefs and explanations. Socrates thought that this was the only way a person could be able to distinguish those beliefs that are reasonable from those which lack adequate evidence or rational foundation to warrant belief.

After Socrates, the practice of critical thinking was adopted by Plato and Aristotle and the Greek Skeptics. These people emphasized that things are very different from how they appear to be and that only a trained mind is prepared to see through the delusive appearances to the deeper

realities of life. Paul, Elder and Bartell (1997), state that it is from this ancient Greek tradition that there emerged the need for anyone who aspired to understand the deeper realities to think systematically, and to trace implications broadly and deeply. To them, it is only thinking that is comprehensive, well-reasoned and responsive to objections that can take us beyond the surface.

In the middle ages the tradition of critical thinking was emphasized by scholars such as Thomas Aquinas. To Paul, Elder and Bartell (1997), Aquinas was instrumental in the critical thinking movement as he emphasized that if thinking is to meet the test of critical thinking, it should always be systematically stated, considered and should answer all criticism. This assertion by Aquinas can be said to have heightened people's awareness not only of the potential power of reasoning but also of the need for reasoning to be systematically cultivated and cross examined. Aquinas illustrated that those who think critically do not always reject established beliefs; rather they reject those beliefs that lack reasonable foundation.

During the Renaissance, scholars in Europe began to think critically about religion, art, society, human nature, law and freedom. According to Paul. Elder and Bartell (1997), this interest in critical issues affecting the society at that time was based on the assumption that most of the domains of human life were in need of analysis and critique. Such concerns led Francis Bacon to take an interest in the way human minds seek knowledge. He recognized that the mind cannot be left to its natural tendencies and he argued for the importance of studying the world empirically. On his part. Rene Descartes argued for the need for special systematic disciplining of the mind to guide thinking. Descartes articulated and defended the need for clarity and precision and he developed a method of critical thought based on the principle of systematic doubt. According to Descartes, every part of thinking should be questioned, doubted and tested. Based on the work of the renaissance scholars, Paul, Elder and Bartell (1997), feel that the renaissance opened the way for the emergence of science and for the development of democracy and human rights and freedom of thought. St. Thomas Moore felt that every domain of the present world should be subject to critique and analysis. Machiavelli critically assessed the politics of the day and laid the foundation for modern critical political thought. He refused to assume that government functions as those in power said it did. Rather, he critically analyzed how it did function and exposed on

the one hand, the real agenda of politicians, on the other hand, the many contradictions and inconsistencies of the hard, cruel world of politics of his day.

Hobbes and Locke, displayed the same confidence in the critical mind of the thinker and according to Paul, Elder and Bartell (1997), neither accepted the traditional picture of things dominant in the thinking of their day. Neither accepted as necessarily rational that which is considered normal in our culture. Both insisted that the critical mind should open up new spheres of learning. Hobbes adopted a naturalistic view of the world in which everything was to be explained by evidence and reasoning. Locke on his part defended common sense analysis of everyday life and thought. After Boyle and Newton, it was recognized that for those who reflected seriously on the natural world, they had to abandon egocentric views of the world in favour of views based entirely on carefully gathered evidence and sound reasoning.

Other significant contributors to critical thinking were Voltaire and Diderot who began with the premises that the human mind, when disciplined by reason, is better able to figure out the nature of the social and political world. They felt that reason must turn inward upon itself in order to determine weaknesses and strengths of thought.

In the 18<sup>th</sup> century, the concept of critical thinking was extended further; scholars of this period developed our sense of the power of critical thought and of its tools. It is during this time that scholars such as Adam Smith applied critical thinking to problems of economics. Kant on his part tried to make a case for pure reason as a way of arriving at the truth.

In the 19<sup>th</sup> Century, critical thought was extended further into the domain of human social life by Comte and Spencer. They applied critical thinking to the problems of capitalism and this produced the social and economic critique of Karl Marx. In history, critical thinking was applied to human culture and the basis of biological life. This led to the Charles Darwin's theory. Sigmund Freud applied critical thinking to the unconscious mind leading to the study of psychoanalysis. The application of critical thinking in the study of cultures led to the study of anthropology, while in languages, it led to the study of linguistics.

According to Paul, Elder and Bartell (1997), the 20th Century, witnessed remarkable growth in our understanding of the power and nature of critical thinking. This led to more explicit formulations especially after publications of works by William Graham Sumner who in 1906 published a study of the foundations of sociology and anthropology where he talked of the tendency of the human mind to think socio-centrally and the parallel tendency for schools to serve the uncritical function of social indoctrination. According to Sumner, the critical faculty is a product of education and training. It is a mental habit and power. It is a prime condition of human welfare that human beings should be trained in it.

Jean Piaget and John Dewey developed theories of childhood development and education leading to development of progressive theories of education. According to Education Broadcasting Corporation (2004), progressive theories led to evolution of constructivism. Piaget believed that human beings learn through the construction of one logical structure after another. He asserted that the logic of children and their mode of thinking are initially entirely different from those of adults. The implications of this theory and how to apply them have shaped the foundations for constructivist education. Piaget increased our awareness of the egocentric and socio-centric tendencies of human thought and of the special need to develop critical thinking which is able to reason with multiple standpoints.

John Dewey called for education to be grounded on real experience. He advocated for sustained enquiry which requires one to study, ponder, consider alternatives and arrive at beliefs grounded on evidence. He emphasized on the instrumental nature of human thought especially its grounding in actual human purposes, goals and objectives (Educational Broadcasting Corporation, 2004).

Paul, Elder and Bartell (1997), sum up their historical expose of critical thinking by saying that the tools and resources of critical thinking have been vastly improved with hundreds of thinkers from different disciplines making their contributions. Thus, today critical thinking is the concern of all involved in education and this concern has led to the adoption of various strategies for ensuring that critical thinking is actually taught to the learners.

### **2.2.2. Importance of Critical Thinking**

Paul and Elder (2005) view critical thinking as involving the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question-at-issue; assumptions; concepts; empirical grounding; reasoning leading to conclusions; implications and consequences; objections from alternative viewpoints; and frame of reference. According to Glaser (in Paul and Elder, 2005), critical thinking involves three things: first an attitude of being disposed to consider thoughtfully the problems and subjects that come within the range of one's experience; secondly, knowledge of the methods of logical enquiry and reasoning; thirdly, some skill in applying those methods. Glaser goes further to explain that critical thinking requires persistent efforts in examining any belief or supposed form of knowledge in the light of the evidence that supports it and further conclusions to which it tends. It also generally requires one to be able to recognize problems, to find workable means for meeting those problems, to gather all pertinent information, to recognize unstated assumptions and values, to comprehend and use language with accuracy, clarity and discrimination, to interpret data, to appraise evidence and evaluate arguments, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations, to put to test the conclusions and generalizations at which one arrives, to reconstruct one's patterns of beliefs on the basis of wider experience, and to render accurate judgments about specific things and qualities in everyday life.

Braithwaite (2006), in examining the importance of critical thinking, logic and reasoning, viewed critical thinking as a set of skills that must be deliberately taught to the students. He categorically states that students' critical thinking does not automatically follow because one is intelligent. Rather critical thinking is a process that helps us arrive at the most useful, helpful and most likely destinations when evaluating claims for scientific truth. To Braithwaite (2006) critical thinking facilitates one to think clearly, fairly, rationally, objectively and independently. It is a process that leads hopefully to an impartial investigation of the data and facts, un-swayed by irrelevant emotions. The aim is to arrive at well reasoned, considered, and justifiable conclusions. It is an ability to engage with the evidence, to consider and to evaluate the evidence (type and quality of evidence, etc.) from multiple and relevant competing sources.

## **2.3 Constructivist Philosophy and its Application to Teaching and Learning**

This section looks at constructivism in the perspective of the teaching and learning process. Constructivist philosophy and the principles of constructivism will be discussed. The section also traces the origins of constructivist philosophy and the constructivist epistemology. It is also important to look at constructivism as a learning theory and see how it is applied to the teaching and learning process.

### **2.3.1 Constructivist Philosophy**

Constructivism is a twentieth century philosophy which holds the belief that a human being constructs his own knowledge from the world around him (Murphy, 1997). Elgedawy and Summers (2001) define constructivism as a theory of knowledge and learning which illustrates how we know, what we know and what knowing is. It deals with knowledge as temporary, developmental, socio-culturally and internally constructed. As a theory of learning, constructivism puts emphasis on individual learning. It rejects the traditional notion of transmitting knowledge from teacher to student and instead suggests teaching and learning techniques that encourage students to contextually construct their own concepts and to take on more ownership of an idea.

From the perspective of psychology, epistemology considers the genesis and the nature of knowledge and learning (Glaserfeld, 1989). Knowledge, its nature and how we come to know, are essential considerations for constructivists. Glaserfeld (1989) describes constructivism as a theory of knowledge with roots in philosophy, psychology and cybernetics. In the constructivist perspective, knowledge is constructed by the individual through his/her interactions with his/her environment.

According to Murphy (1997), how we perceive knowledge and the process of coming to know provides the basis for educational practice. If we believe that learners passively receive information then priority in instruction will be on knowledge transmission. If, on the other hand, we believe that learners actively construct knowledge in their attempts to make sense of their world, then learning will emphasize the development of meaning and understanding.

Constructivists generally claim that knowledge is not discovered and that the ideas teachers teach do not correspond to an objective reality.

Elgedawy and Summers (2001) identify two schools of thought in constructivism; social constructivism and radical constructivism. Social constructivism stresses the social context within which knowledge is to be constructed through discourse. Knowledge is not to be constructed autonomously but socio-culturally through interrelationships among people within a particular community and with the use of language as a medium. Social constructivism places the locus of knowledge not on the minds of single individuals but in collectivity. According to Elgedawy and Summers (2001), it is not the internal processes of the individual that generate knowledge, but a social process of communication. It is through the process of social interchange that rationality is generated.

Radical constructivism advocates an individualistic construction of knowledge (Elgedawy and Summers (2001)). It starts from the assumption that knowledge, no matter how it is defined, is in the mind of the person and that the thinking subject has no alternative but to construct what he/she knows on the basis of his/her experience.

### **2.3.2. Constructivist Learning Theory**

Murphy (1997), states that whether knowledge is seen as socially situated or considered to be an individual's construction, it has implications for the way in which learning is conceptualized. Constructivists view learning as a process not a product. How one arrives at a particular answer, and not the retrieval of an 'objectively true solution', is what is important. Learning is a process of constructing meaningful representations, of making sense of one's experiential world. In this process, students' errors are seen in a positive light and as a means of gaining insight into how they are organizing their experiential world (Murphy, 1997). According to Education Broadcasting Corporation (2004), John Piaget believed that human beings learn through the construction of one logical structure after another. He asserted that the logic of children and their mode of thinking are initially entirely different from those of adults. He articulated how knowledge is internalized by learners and proposed that through the processes of accommodation and assimilation, individuals can be able to construct new knowledge from their experiences.



When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding; for example, they may not notice events, may misunderstand input from others, or may decide that an event is unimportant as information about the world. In contrast, when individuals' experiences contradict their internal representations, they may change their perceptions of the experiences to fit their internal representations.

John Dewey, who contributed greatly to the development of progressive education, insisted that meaningful education is grounded on real experience. He advocated for sustained enquiry which requires one to study, ponder, consider alternatives and arrive at beliefs grounded on evidence. He emphasized on the instrumental nature of human thought especially its grounding in actual human purposes, goals and objectives (Education Broadcasting Corporation, 2004).

In his discussion on constructivism, Bruner (1973) views learning an active process in which learners construct new ideas or concepts based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e. schema, mental models) provides meaning and organization to experiences and allows the individual to "go beyond the information given".

As far as instruction is concerned, the instructor should try and encourage students to discover principles by themselves. The instructor and student should engage in an active dialogue. The task of the instructor is to translate information to be learned into a format appropriate to the learner's current state of understanding. Curriculum should be organized in a spiral manner so that the student continually builds upon what they have already learned.

### **2.3.3 Constructivist Learning Principles**

As a theory of learning, constructivism consists of a set of principles whose practice makes it distinct from other learning theories.

### ***2.3.3.1 The learner as a unique individual***

According to Wikipedia, the online encyclopedia and the Education Broadcasting Corporation (2004), constructivism views each learner as a unique individual with unique needs and backgrounds. The learner is also seen as complex and multidimensional. Social constructivism not only acknowledges the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards it as an integral part of the learning process.

### ***2.3.3.2 The importance of the background and culture of the learner***

Scheurman (1997) emphasizes on the important role played by the social background of the learners. Constructivism encourages the learner to arrive at his or her own version of the truth, influenced by his or her background, culture or the prevailing world view. Aspects such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and these are learned throughout the learner's life. The interaction of the learner with knowledgeable members of society is stressed on. This is because it is through social interactions that social meanings are acquired. Young children also interact with other children, adults and the physical world and in the process the children are able to acquire meaning of their experiences.

From the social constructivist viewpoint, a teacher needs to take into account the background and culture of the learner throughout the learning process, because this background helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process (Education Broadcasting Corporation, 2004).

### ***2.3.2.3 The responsibility for learning***

It is argued that the responsibility of learning should reside increasingly with the learner (Von Glasersfeld, 1989). Constructivism thus emphasizes on the importance of the learner being actively involved in the learning process. This is unlike the previous educational viewpoints where the responsibility of teaching rested with the instructor while the learners played a passive role. In constructivist learning, learners construct their own understanding and do not simply reproduce what they read.

#### ***2.3.2.4 Motivation for learning***

According to Von Glasersfeld (1989) sustaining motivation to learn is strongly dependent on the learner's confidence in his/her potential for learning. These feelings of competence and belief in the potential to solve new problems are derived from first-hand experience of mastery of problems in the past and are much more powerful than any external acknowledgement and motivation. By experiencing the successful completion of challenging tasks, learners gain confidence and motivation to embark on more complex challenges.

#### ***2.3.2.5 Instructor as a facilitator***

According to Broadcasting Corporation (2004), constructivist approach requires instructors to adapt to the role of facilitators and not teachers. The emphasis turns away from the instructor and the content towards the learner. The facilitator helps the learner to get to his/her own understanding of the content. This dramatic change of roles implies that a facilitator needs to display a totally different set of skills as a teacher. In describing the main differences between teaching and learning, Wikipedia states that the teacher tells, a facilitator asks; a teacher lectures from the front, a facilitator supports from the back; a teacher gives answers according to a set curriculum, a facilitator provides guidelines and creates an environment for the learner to arrive at his/her own conclusions. The teacher is also in continuous dialogue with the learners. Constructivist approaches require the teacher to relinquish his/her role as the sole information-dispenser and instead to continually analyze his/her curriculum planning and instructional methodologies. Perhaps the best quality for a constructivist teacher to have is the instantaneous and intuitive vision of the learner's mind as it gropes and fumbles to grasp a new idea (Brooks and Brooks in Hansley, 1994). Clearly, the constructivist approach opens new avenues for learning as well as poses challenges for the teacher trying to implement it.

#### ***2.3.2.6 The nature of the learning process and collaboration***

Von Glaserfeld (1989) goes further to say that constructivists view learning as an active process where learners should learn to discover principles, concepts and facts for themselves. To social

constructivists, reality is not something that we can discover because it does not pre-exist prior to our social intervention of it. Individuals make meanings through interactions with each other and with the environment they live in.

Constructivists stress on the need for collaboration among learners in contrast to traditional competitive approaches. Jaworski (1993) feels that the social environment of the classroom is good at throwing up constraints which challenge individual perceptions. People often have different views of a situation. If these views seem incompatible, there is a need for reconciliation which can lead to the social mediation of individual knowledge. Through discussion or argument, the participants negotiate new positions which lead to shared meanings developing. Such negotiation is not bargaining, but a genuine offering of individual perspectives and meanings for consideration by others. It involves making an effort to listen to and understand other perspectives. As a result common or shared meanings are developed.

### **2.3.3 Constructivist Teaching and Learning Approaches'**

According to Omestein and Levine (2000), constructivist learning theory favors an activity centered curriculum in which the students actively interact with the knowledge and with each other to construct meaning and new knowledge for themselves. According to the writers, learners do not passively receive and store information in their minds but rather they actively create meaning from their own construction of concepts about reality.

Constructivist approaches require that the learners continually reconstruct their own knowledge based on their experiences. This implies that knowledge is continuously being modified by the learner and that knowledge is not static. Constructivism also holds the belief that the construction of new knowledge or new concepts is located in the social situations and interactions in which it is acquired.

Use of constructivism teaching approaches is dependent on many factors. Lucas (2005), in discussing how teachers beliefs influence adoption of technology, indicates that the use of a particular teaching method, teaching approach or teaching style may be dependent of some intrinsic variables within the teacher rather than resource based barriers. The use of any

pedagogical approach can be said to be dependent on intangible variables within the school such as the organizational climate, the principal's instructional leadership, teacher's beliefs about the nature of learners and the nature of knowledge.

In describing the characteristics of constructivist teaching, Hansley (1994) says that it offers a bold departure from traditional objectivist classroom strategies. The goal is for the learner to play an active role in assimilating knowledge onto his/her existing mental framework. The ability of students to apply their school-learned knowledge to the real world is valued over memorizing bits and pieces of knowledge that may seem unrelated to them.

According to McDonald (2010), constructivist classrooms have four main characteristics; First students gain knowledge by building on prior experiences and by actively engaging with others to explore new ideas to develop conclusions. In a constructivist classroom, both theory and experience are incorporated into the learning process.

Secondly, in constructivist classrooms teaching is student centered with the teacher acting as facilitator and guide. The teacher assists student learning but does not give lectures or tell students how to approach problem solving. The teacher uses guided discovery by giving students a problem and allowing them to work individually or in groups to find patterns and solve the problem. Teachers may listen and offer advice or additional resources, but ultimately allow students to form their own conclusions.

The third characteristic of constructivist classrooms is the brainstorming that takes place in order to help in the formation of opinions or finding solutions to problems (McDonald. 2010). Discussion and cooperation are crucial to constructivist learning as students build upon prior knowledge by incorporating new ideas into their existing worldviews.

Fourthly, the learning process is also an important characteristic of constructivist teaching. McDonald (2010) says that the unfolding of the problem is as important as the solution. Students become immersed in the process in the constructivist classroom as they engage in inquiry, research, social interaction, discovery and ultimately personal reflection.

The last characteristic given by McDonald (2010) is that of positive reinforcement in a non-judgmental atmosphere. Getting an answer wrong is only a step in the ultimate goal of finding the solution and is never the focus of negative attention in constructivism.

Thus, we can sum up the characteristics of constructivist teaching and learning by stating teachers are valuable asset which enables both parties to play an active role in the acquisition and dissemination of knowledge.

Elgedawy and Summers (2001) describe the various classroom practices that are characteristic to constructivism. Radical constructivists advocate self-independent learning, where learners are engaged in problem-solving. Constructivists do not recommend any specific way of learning, but rather the best way of learning is what suits the learner's learning style. The learning strategies to be utilized in the classroom should be learner-centered such as comparing, contrasting, recognizing, identifying similarities and differences.

Elgedawy and Summers (2001) go on to assert that since learning involves independent construction of knowledge, there is no correct answer or solution. There is no standardization of right and wrong. As long as the outcome of learning tasks brings viable solutions to our problems, then they are to be accepted. In such learning environments, students do not need extrinsic rewards as they are better motivated when they achieve viable solutions. Teachers should encourage their students to talk about and reflect on their thoughts. Lastly, constructivist learning is achieved through negotiation of meaning and the sharing of multiple interpretations through group work and collaborative learning. Problem-solving is to be used to develop learners' critical thinking skills and to maintain a non-authoritarian, harmonious and productive model of relationship between the teacher and the learner.

#### **2.4 Constructivist Pedagogical Approaches and the Development of Critical Thinking and their Challenges**

Russo (1997) states that educators are in agreement that there is a need for students to learn to think critically and to argue and persuade others as well as to listen carefully to diverse points of views. This means that the task of the educator is to facilitate the intellectual growth of students

by establishing a classroom climate conducive to critical thinking and reflection. Russo (1997) goes further to say that in recent years there has been a discernible shift in thinking and practice about teaching the skills of critical thinking. This is reflected in the growing interest in the strategies that facilitate critical thinking and reflection skills among the students. This emphasis has seen critical thinking skills taught in an isolated manner.

However, new instructional approaches to critical thinking have been offered that focus on the entire experience of the learner. These approaches hold the view that learners bring their experiences to the classroom, and that both in class and out of class experiences contribute to development of critical thinking. According to Scheurman (1997) critical thinking abilities seem to be best fostered in a climate of interdisciplinary inquiry. This re-conceptualization of constructivism seems to reflect current interest in constructivist approaches to learning. According to Russo (1997), the interrelationship of factors between the learners' past experiences and values, current beliefs about oneself and the subject matter seem to suggest that critical thinking and reflection cannot be effectively taught as a set of isolated skills. Rather, a more holistic, developmental and constructivist perspective needs to be employed in order to entertain multiple sources of influence and outcomes. Russo (1997) suggests that the emerging constructivist approaches reflect a significant shift away from controlling the learning experiences by reducing the need for pre-ordered boundaries and categories. Critical thinkers argue that critical thinking is best developed in an intellectual atmosphere that values dialogue and intellectual exchanges. Constructivist approaches to development of critical thinking attempt to engage students in the process of learning how to learn. This leads to a shift in focus from teaching critical thinking to facilitating development of emerging critical thinking abilities in learners.

However, the effectiveness of constructivist approaches in the development of critical thinking remains to be established. Does the use of constructivism in the classroom lead to critical thinking?

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## CHAPTER 3

### METHODOLOGY OF THE STUDY

#### 3.1 Introduction

Various approaches have been adopted in attempts to develop critical thinking in learners. The constructivist approach has been offered as one of the approaches that can help learners to not only develop autonomy in the acquisition of knowledge but that can also develop critical thinking in learners. This study examined the constructivist philosophy in order to assess whether its use in the teaching learning process actually led to critical thinking. This involved looking critically at the various principles and practices of constructivism. It also required that the meaning of concepts and terms be re-examined in order to understand how concepts related to critical thinking and constructivism were understood by the learners, the teachers and by other stake holders. In order to do this, two methods of enquiry were used: the critical method and the analytic method.

#### 3.2 Critical Method

The critical method is a dominant method of philosophical enquiry and is characterized by reflective thinking. Reflective thinking refers to the process of looking for reasons for believing one thing instead of another while taking nothing for granted. This kind of thinking is constantly aware of what may be or what is taken for granted. . The critical method has been historically associated with philosophy and traces its roots to the ancient Greek Philosopher Socrates.

The critical method is also characterized by openness and attentiveness. It discourages people from jumping to quick conclusions and aims at clearing any confusion. The critical method depends heavily on skepticism or intellectual doubt. It requires one to be on the lookout for assumptions and being aware of the values being appealed to and paying attention to one's own prejudices and biases. Thinking critically requires one to read between the lines and ask whether what one is reading, observing or thinking makes sense. It also involves setting standards for deciding the basis of judging someone.

According to Njoroge and Benaars (1986), to be critical requires one to be skilled in judgment. Thinking critically liberates us from dogmatic assertions or premises. It entails making claims based on reason and argument. Njoroge and Benaars (1986) go on to state that the critical method is characterized by reflective thinking which involves looking for reasons for believing in one thing instead of another while taking nothing for granted. The critical method is also characterized by openness and attentiveness. It thrives through the process of asking questions out of great curiosity. It requires one to think between the lines and decide on what basis one is going to judge someone else and setting the standards of objective judgment.

A philosopher using the critical method is required to adopt a critical attitude leading to positive evaluation and judgment of things in the light clear and distinct ideas. According to Njoroge and Benaars (1986), a philosopher's critical attitude points to positive evaluation; it seeks to evaluate, to judge things in the light of clear and distinct ideas. In order to arrive at a rational judgment, the philosopher uses critical questioning as a means to an end, the end being to liberate human beings. The end result of the critical thinking processes may be that the philosopher will recommend prescriptively in a normative manner what ought to be done.

Critical method was used in this study to launch a critique on the constructivist pedagogical approaches. The critical method helped the researcher to question classroom practices that are assumed to help in the development of critical thinking. This helped to unearth and to examine underlying assumptions made while using certain pedagogical approaches. The method also helped in evaluating and arriving at a judgment on classroom practices and their effectiveness in developing critical thinking.

An objective of this study was to recommend how current classroom practices can be made more effective. The critical method is prescriptive in nature and through its use; it was possible to come up with recommendations for the improvement of current pedagogical approaches.

The critical method was also appropriate for this study as it was easily combined with the analytic method.

### **3.3 Analytic Method**

The analytical method, also referred to as conceptual analysis, is a method used by philosophers to analyze or break down crucial concepts for the purpose of understanding them (Sifuna, Chege and Oanda, 2006). Human experiences are usually stored in our minds as ideas and concepts (abstractions from the actual experiences). To reach those experiences and try to understand them, philosophers must analyze the concepts in which they are stored. Analytical procedures aim at revealing the nature of something by breaking up the matter in question into constituent parts. According to Sifuna, Chege and Oanda (2006), the first stage of philosophical thinking is analytical. A philosopher tries to clarify an issue by breaking the concept into smaller ideas which are easier to work with.

The analytic method mainly concerns itself with analysis of concepts and arguments in order to arrive at logical efficacy. Akinpelu (1981) states that philosophical analysis can help us to see through conflicting arguments and be able to decide what is reasonable and justifiable and support the most reasonable point of view. This can help to lead and guide others to the most rational option. Akinpelu (1981) sees philosophical analysis as important in the critical analysis of any problem in order to arrive at an effective solution to a problem.

The analytic method recognizes the close relationship between language, concepts and reality, especially reality that has to be communicated and shared. It requires that one should be acutely aware of language and its potential. In fact, Benaars, Otiende and Boisvert (1994) believe that all educational problems are as a result of confused language, warped or unclear meanings and conceptual confusion. Philosophical analysis helps us to adopt critical attitudes towards language and meaning. Rather than accept ready made answers, cliches and slogans as solutions to education and social problems, analysts prefer approaches that assert that ideas and issues should be examined every step of the way.

Philosophical analysis also recognizes that logical arguments may be mistaken. We can construct fallacies in the course of creating arguments. This makes it necessary to have a logical analysis of arguments in order to ascertain that we reason correctly and adequately. In order to do this.

analytic philosophy applies a criterion for evaluating and clarifying statements and judging arguments.

The analytic method was used to clarify the meaning of the concepts of constructivism and critical thinking. Such a clarification was necessary before attempts were made to establish the relationship that may exist between the two concepts. Using the method, it was possible to understand the meaning of learning experiences in the classrooms in order to assess the impact they had on the development of critical thinking. The analytic method also helped in defining other educational concepts related to constructivism and critical thinking such as pedagogical approaches, the teacher's roles in the classroom and even the teaching and learning process.

The analytic method was also used for testing the validity of the assertion that constructivism promotes critical thinking. This was done by breaking down the various components of constructivist pedagogy such as its principles and approaches used in the classroom, the role of the teacher in a constructivist learning environment. This enabled the researcher to understand how learners' autonomy develops and how it is exercised in the classroom.

Combined with the critical method, the analytic method helped in launching a critique on constructivist approaches and their effectiveness on developing critical thinking.

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## **CHAPTER 4**

### **CONSTRUCTIVIST PEDAGOGY AND CRITICAL THINKING**

#### **4.1 Introduction**

This chapter presents the findings on the relationship between the use of constructivist pedagogy and the development of critical thinking. The findings are discussed in relation to the research objectives raised in chapter one.

The main aim of this study was to establish why the use of constructivist pedagogical approaches did not lead to development of critical thinking. It is largely assumed that learner autonomy and the flexibility of constructivism make learners to take control of their learning, leading to the development of critical thinking. However, literature reviewed revealed that increased use of constructivism has not been commensurate with development of critical thinking.

In order to understand the relationship between critical thinking and constructivism, this study tried to meet the following objectives: identifying the principles of constructivism and the main features of a constructivist learning program; examining the role of the teacher in constructivist environment in the development of critical thinking; assessing the pedagogical practices that make the current application of constructivism problematic to critical thinking and identifying factors that may hinder the development of critical thinking while using constructivist approaches in the teaching and learning process and learning strategies that can be used to improve the current constructivist practice and making recommendations on how current classroom practices can be improved in order to make them more effective.

#### **4.2 Identifying the Principles of constructivism and the Main Features of a Constructivist Classroom**

To understand the concept of constructivism, the study set out to establish the principles of constructivism and the distinguishing characteristics of constructivist classrooms. A basic assumption made in this study was that the best way to learn was to have learners construct their own knowledge instead of having someone else construct it for them. This is based on the

constructivist belief that learners learn better when they do something as opposed to someone telling them how to do it. This belief is supported by Brooks and Brooks (1993) who consider the constructivist learning as an active process of creating meaning from different experiences.

Principles of constructivism revolve around the above view about learning. In describing Brunner's constructivist theory, Cherry (2004) states that constructivism postulates that learning should be an active process in which the learner uses sensory input and constructs meaning out of it. This idea can be traced back to John Dewey's concept of active learning where the learner is expected to do something, to engage the environment in the process of acquiring knowledge. According to Cherry (2004), Dewey was totally opposed to the idea of passive learning where the learner plays the role of a receptor of information. In line with the above thinking, we can say that constructivist learning must involve the construction of knowledge by the learner as he/she interacts with the environment.

Constructivism views learning as a process of learning to learn (Gray, 1997). Thus learning is a process rather than a product which should involve both the construction of meaning and the construction of systems of meaning. This implies that as the learners go through the learning process, they develop the ability to learn more.

Constructivists also believe that construction of meaning takes place in the mind. However, it is the physical actions and hands-on experience that provide activities that engage the mind. As Bruner (1973) states the use of sensory organs is important in constructivist learning as they provide the mind with data from which to construct meaning.

Constructivism emphasizes the importance of language in learning. This was clearly brought out by Vygotsky, one of the constructivist theorists, who asserted that learners must be engaged in discussions and dialogue and must interact with others in the process of knowledge construction (Gray, 1997). The learners must be conversant with the language being used to take part in discussions with confidence. This is closely tied to the principle which states that learning is a social activity. Learners must establish connections with the teacher and peers in the process of constructing knowledge. In opposing traditional approaches to education, Dewey pointed out most of that learning was directed towards isolating the learner from all social interaction and



towards seeing education as a one-to-one relationship between the learner and the objective material to be learnt (Gray, 1997). In addition, constructivist approaches recognize the social aspects of learning and consider the use of conversation, interaction with others and the application of knowledge as an integral aspect of learning.

Constructivism emphasizes on the importance of learning within a context. This means that when facts and theories are taught and learnt in an abstract way, learning is isolated from the learners' lives. They will not be able to see the relevance of the knowledge learnt to what they experience daily. It also involves learning in relation to what else they know, what they believe, their prejudices and their fears. This makes clear the view that learning is active and social.

To constructivists, learning is not instantaneous; rather it takes time for one to learn. According to Mimbs (2006), for learning to take place, a learner needs to develop a structure based on previous knowledge. This enables the learners to revisit ideas, ponder them and try them out, play with them and use them. This implies that for anything to be learnt, it must be the product of prepared exposure and thought. Learning environments must be thoughtfully prepared in order to ensure that the intended learning will take place.

A key component to learning, according to constructivists, is motivation. Learners need to be motivated to learn so that they can participate actively in the learning process and so that they can make use of the knowledge they have been involved in constructing.

The application of constructivist principles leads to classrooms that can be distinguished by certain characteristics. These characteristics make it possible for one to distinguish constructivist classrooms from the traditional classrooms. One characteristic is the amount of control over learning enjoyed by learners. According to Cornu and Peters (2005), learners in constructivist classrooms are in control of their own learning. Constructivist teachers believe that learners need to be empowered to think and learn for themselves. Fosnot cited in Cornu and Peters (2005) describe an empowered learner as one who is autonomous, inquisitive, one who questions, investigates and reasons.

In constructivist classrooms, the teacher encourages learner participation by setting up structures that provide clear expectations for how learners should participate in a lesson. Learners are involved in decision making and negotiation which in return helps them to participate more actively in the learning process. Learners are also taught skills such as how to rephrase, question and clarify. The learners are thereafter given opportunities to practice these skills with their peers.

Constructivist learning also involves the learners and the teacher engaging in reflective discourse. This involves conversations between the teacher and the learner and between the learners themselves. During such dialogue, teachers make their thinking processes known and they encourage the learners to do the same. The learners are also encouraged to share their personal opinion with others and elaborate their responses. They are also expected to listen and make sense of their peers' explanations about things (Cornu and Peters. 2005).

Closely related to the above characteristic is the fact that constructivist classrooms use a responsive interactive style. According to Cornu and Peters (2005), this interaction style emphasizes on the importance of relationships in teaching and learning. Learners are required to construct appropriate responses that acknowledge and value the learning that takes place in each individual at any point in time. This interaction style requires teachers to establish clear expectations regarding behavior in the classroom and to establish mutual respect as a mode of interaction in the classroom. Teachers are expected to spend time teaching the learners various communication skills and processes that enable them to communicate with others effectively. These include skills of speaking clearly, listening, asking questions, responding, negotiating and cooperating.

Constructivist classrooms are also characterized by a lot of team work. Learners see themselves as part of a team, making contributions to each other's learning as well as their own. However for teamwork to result in learning, the teacher is expected to give clear and consistent messages to the learners that will help them develop reflective attitudes and skills.

Gray (1997) summarizes characteristics of constructivist classrooms as: the learners are actively involved; the environment is democratic; the activities are interactive and student-centered; and

the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous.

### **4.3 Examining the Role of the Teacher in a Constructivist Environment in Developing Critical Thinking**

The role of the teacher in constructivist classrooms has for long been a topic of discussion, with some taking the stand that the teacher abdicates his/her role by allowing the learners learn according to their whims. The other view is that the teacher continues, just like in traditional classrooms, to play a central role in facilitating learning in the constructivist classroom. It is the teacher who ensures that the classroom environment is conducive and that tasks are arranged in such a way that they lead to learning. This study held the view that the teacher plays a crucial role in constructivist classrooms especially in the development of critical thinking by learners.

For teachers to effectively help learners to develop critical thinking, they need to be competent in the use of critical thinking. According to Mimbs (2005), teachers need to be competent enough in the use of higher order thinking which implies that the teacher must be prepared during pre-service training on the use of critical thinking skills.

Teacher behavior in the classroom also plays a role in the development of critical thinking. A teacher using constructivist approaches should also think of how he/she ought to behave if the learners are to develop critical thinking. Mimbs (2005) identifies modeling as important teacher behaviour in this process. He describes modeling as behaving in a manner that suggests that one believes what he/she teaches. This implies that if the teacher is not comfortable in the use of critical thinking skills, then it is difficult to make the learners confident users.

Constructivist teachers are also expected to be flexible. Mimbs (2005) holds the view that flexibility is constructivist in nature and is important in the development of critical thinking. When the teacher practices flexibility, he/she plays the role of a facilitator while the learners are the active participants in the teaching and learning process. When a teacher is flexible, he/she is willing to try new things, is open-minded, takes time before jumping in and does not give too

much help. Such an approach encourages the teacher to allow opportunity for discovery and surprise.

Constructivist teachers should also assist in the development of reflective attitudes by the learners. Dewey cited in Cornu and Peters (2005) identifies three attitudes that are prerequisites for reflective teaching; open-mindedness, responsibility and wholeheartedness. Open-mindedness refers to an active desire to listen to more sides than one. Responsibility refers to the ability of the teachers to ask why they are doing what they are doing in the classroom. Wholeheartedness entails taking risks and acting. To develop reflective attitudes in learners, Cornu and Peters (2005) recommend that the teacher should share his/her own learning experiences and learning processes with the learners. The teachers also need to be quite upfront with the learners about the fact that in many situations they learn alongside their learners, especially when it comes to implementing new ideas.

Seaver, I.eflore and Smith (2006) view the teacher playing a very crucial role in the development of critical thinking. The teacher must not only be open to the learners' ideas and accept them, but must also provide an environment that enables them to come up with ideas of their own. The teacher should begin the process of learning to think from where the learners are at the time and what they already know. This way, the teacher can try to create an environment where learning to think critically is encouraged as a natural process. They recommend that if learners are to think critically, teachers must give them not only opportunities to do so, but also the reason to do so.

Teachers should also be familiar with teaching and learning approaches that tend to promote critical thinking. Mimbs (2006) feels that the use of questions can play an important role in development of critical thinking. Questions allow students to think about what they are learning and reflect on the information, making it relevant. This does not happen overnight. It involves the teacher consistently teaching using process questions i.e. questions that guide the learners and encourage them to construct knowledge. To Mimbs (2006), the use of questioning as a learning method helps the learners to formulate critical questions themselves.

Teachers should also use problem-solving approach which requires learners to actively interact and use knowledge in real-life situations. This way, the teacher can be able to engage the learners in critical higher order thinking as they examine the rich context of problems and address consequences of choices. According to Mimbs (2006). when the problem-solving approach is used, the learners are able to make wise decisions and practice transferable critical thinking and problem-solving skills. The approach gives the learners tools with which they can make responsible choices and take action when dealing with practical problems within their own lives as members of families and communities.

#### **4.4 Assessing Pedagogical Practices that make the Current Application of Constructivism Fail**

The use of constructivist approaches is not always successful in the development of critical thinking. There are certain impediments to the development of critical thinking. The way subject content is presented can prevent learners from seeing how they can be able to construct knowledge. Bentley, Fluery and Garrison (2007) state that when the school curriculum presents content in the humanities, social sciences and sciences as objective and beyond question, it is de-contextualized and learners fail to see the contingent circumstances of its construction. Such de-contextualization makes the school curriculum to lose contact with the context of the learners' every day life. Bentley, Fluery and Garrison (2007) assert that when such an approach is employed, it makes the learners to think that knowledge is simply the property of the sages, rather than the revisable social product of humankind. Teaching of abstract concepts makes the learners not to be related to the concepts, leading to failure to develop essential skills such as critical thinking.

Another problem closely related to the presentation of content are the expected learning outcomes. The curriculum objectives may deal with only lower order thinking and fail to require the teachers and the learners to get to higher order thinking. The structuring of the curriculum objectives determines the learning activities in the classroom and even the learning approaches to be used (Bentley, Fluery and Garrison, 2007).

The evaluation of the curriculum is important as a way of establishing the extent to which the learning objectives and the desired outcomes have been achieved. However, if assessment procedures require learners to memorize concepts through rote learning and to simply reproduce them, the learners do not get the much needed opportunities for critical thinking. Martina et al. cited in Bentley, Fluery and Garrison (2007) condemn the oppressive nature of the testing and standards as they tend to narrow down the curriculum, pushing instruction towards lower cognitive skills.

In the learning process, the organization of tasks and assignments plays a big role in determining whether learning will be constructivist and whether these activities and assignments will lead to critical thinking. Constructivism requires tasks and assignments to be carefully arranged around the learners who are to play an active role. When teachers fail to plan carefully and assume that involving learners in tasks and assignments will automatically lead to critical thinking, they fail to achieve what they set out to achieve. Teachers must deliberately choose tasks and assignments and arrange them in such a way that as the learners go through them, they are able to develop critical thinking.

Learners also need to be motivated to learn through constructivist approaches. This is especially the case with learners who are used to the traditional infusion method of learning and Nitske in Vlinibs (2005) asserts that learners who are used to simple solutions or projects that do not require much effort require motivation to change the way they learn so that they can engage in critical thinking.

Lester and Onore in Gray (1997) indicate that teachers' personal beliefs about teaching may also influence how teachers think and act. For example, the teachers' definition of knowledge and how it is acquired may determine the extent to which teachers involve the learners in the process of knowledge acquisition.

There are also individual and group factors that may hinder the development of critical thinking. Conceicao (2005), in a study of factors that hinder the development of critical thinking in online courses discovered that individual factors such as learner's ability, learner's motivation and the individual learning style all influence the use of critical thinking approaches used by the teacher.

Group factors would include the way the groups are formed for various tasks and assignments and also the combination of learning styles within the group. The roles assigned to group members could also affect the learning process aimed at developing critical thinking. For example, group leadership goes a long way in creating conducive environment for discourse.

#### **4.5 Identifying Factors that may hinder the Development of Critical Thinking**

Critical thinking and knowledge construction have become essential competencies for people in the new Information Age (Wang, Woo and Zhao, 2007). The rapid growth of information and communication technology has made increasing amounts of information to be available. However, to effectively use this readily available knowledge requires people to use critical thinking skills so that they can analyze and compare information, construct arguments, respect diverse perspectives and view situations from different points of view. Wang, Woo and Zhao (2007) further point out that the complex nature of real life problems requires a variety of knowledge, requiring people to learn how to work together so that they can solve the problems and construct meaningful knowledge.

According to Kurfiss (1988), the critical thinking process of inquiry involves the interplay of knowledge, skills, attitudes, beliefs and conditions directed towards forming an understanding of complex problems, questions or issues. The outcome of this inquiry is well-reasoned, well-supported arguments, interpretation or other product that reflects a disciplined pursuit of the question. Ennis (1997) views critical thinking as reasonable and reflective thinking that focuses on deciding what to believe or do. Critical thinking involves a set of skills such as analyzing, arguing, synthesizing, evaluating and applying and the use of these skills to guide behaviour.

Wang, Woo and Zhang (2007), consider knowledge construction to be a personal process of accommodating information into existing cognitive structure. This is based on cognitive constructivism. Knowledge is also a social process of information sharing, negotiating, revising and agreement, achieving based on social constructivism

On the relationship between critical thinking and constructivism, Wang, Woo and Zhang (2007) believe that there is a close relationship between the two concepts. This is because critical

thinking plays an important role in the process of knowledge construction and knowledge construction mostly occurs as a result of critical thinking (Dirks, 1998).

Constructivism views education as the result of children learning by resolving cognitive conflicts through experiences, reflection and meta-cognition. According to Seaver, Leflore and Smith (2000), critical thinking is very central in this kind of teaching and learning process as it involves looking at events, experiences, assumptions and conclusions such that the status quo is challenged, alternate and creative solutions to problems are considered and communication is reasonable, meaningful and thoughtful. Seaver, Leflore and Smith (2000). go further to state that critical thinking basically involves being able to understand or figure out what the problem is, directing thinking to the specific purpose of solving the problem, understanding the frames of reference or the points of view involved, identifying and understanding the basic concepts and ideas that are being used, citing evidence and reasons and their interpretations and understanding inferences, implications and consequences.

To the constructivist teacher, critical thinking would involve interacting with materials and data in such a way that the learner comes to a deeper understanding of the basic ideas that drive the theories leading or that create new concepts and make relevant to one's life the concepts learnt. Critical thinking ensures that education becomes a way of life rather than a set of facts to be memorized, retold and forgotten after fulfilling a certain prescribed set of steps over a prescribed length of time (Seaver, Leflore and Smith. 2000). Smith in Seaver, Leflore and Smith (2000) holds the view that for learners to think critically, they must have the authority to do so, and that it must be important for them to do so. Accordingly, children must be given opportunities and reason to think in critical ways. These may include seeing or hearing others engaged in critical thinking and being involved in arguments, challenges and debates based on respect rather than power.

Seaver, Leflore and Smith (2000). see an interrelationship between constructivist approach and critical thinking in the methods embraced by both; constructivists emphasize on reflection upon experiences and data while critical thinking involves dialogue, questioning and reflection. Such approaches facilitate both critical thinking and construction of knowledge.



However, before critical thinking can be developed by learners, Kurfiss (1988), believes that there are certain prerequisites; First, the learners should possess knowledge of the subject content. The learners ought to possess the mastery of basic ideas and relationships pertinent to a field of enquiry e.g. terms, concepts, definitions, principles, rules, causal relationships, theories, people, ideas, products, models, chronologies and causal relationships. Some of this knowledge may be acquired or strengthened in the inquiry process itself.

Secondly, it is important for learners to possess discipline-related intellectual skills. These deal with how knowledge is obtained, used and evaluated to formulate and solve problems, gather information, evaluate evidence and arguments, present ideas persuasively, design or create objects etc. Thirdly, learners should have control of mental processes or meta-cognition. They should be able to set goals, and direct mental processes towards definite ends. They should be able to set goals, formulate plans, direct attention, exercise patience, concentrate, monitor comprehension in reading or cohesiveness in writing, verify a solution, organize information, monitor progress and revise goals or plans to reflect changing circumstances.

Fourthly, the learner should possess a theory of knowledge and beliefs about self as knower. Kurfiss (1988) explains that this helps the learner to understand that knowledge is context-bound and therefore inherently uncertain and the related perception of the self as an active participant in construction of knowledge. Many learners tend to equate learning to acquiring factual information, perceive expertise as the possession of great quantities of knowledge rather than the ability to obtain, use, and make sense of information and ideas. For learners to become critical thinkers, they must replace these theories of knowledge with respect for reason, evidence and personal responsibility for knowledge. Lastly, learners are more likely to engage in critical thinking when they are enthusiastic or motivated. As stated earlier, motivation of the learner is a basic characteristic of constructivist learning and as Kurfiss (1988) states learners need to be motivated to learn so that they can participate actively in the learning process and so that they can make use of the knowledge they have been involved in constructing.

Since many teachers have no formal training in how to teach critical thinking, they require support in developing effective learning activities to cultivate the critical thinking skills of their learners (Bowers, 2006). Bentley, Fluery and Garrison (2007) acknowledge that the way pre-service teachers are trained determine to a great extent their adoption of critical constructivism and they suggested that teachers need to experience something different while dealing with different forms of knowledge. They suggest that the strategies the teachers are exposed to should enable them to understand and relate to knowledge and meaning-making.

Teachers also need to change the instructional approaches they use in class in order to ensure that the approaches used encourage critical thinking in learners. Such approaches would include the development of study skills, use of creative and critical thinking skills (e.g. problem solving, exploration), meta-cognition, inquiry training, and the asking of higher-order questions (Cotton 1991). However, we need to note that change in the way teachers teach requires time, continued commitment, retraining, reflection, and practice. The goal is for the teachers to reach a level of transformative learning which, leads to some type of fundamental change in the learners' sense of themselves, their worldviews, their understanding of their pasts, and their orientation to the future. For this to happen, Cotton (1991) thinks that it is necessary that teachers are provided with continued professional development

Teachers also need pedagogical support as suggested by Bowers (2006). This support can come from professional bodies that are committed to the promotion of critical thinking or from the school community. Such professional bodies can offer instructional support or access to critical thinking materials.

In discussing how teachers can become constructivist, Brooks and Brooks in Lunenburg (2011), suggest a number of strategies whose adoption can help teachers become facilitators of learning and empower the learners to construct their own understanding of content: First, teachers should encourage and accept the learners' autonomy and initiative. Autonomy and initiative makes it possible for learners to seek connections among concepts. Learners are also able to formulate questions and then go on to answer and analyze them. In doing so, the learners take responsibility for their own learning and become problem solvers as well as problem finders.

Secondly, the use of raw data and primary sources, manipulative and interactive materials is can be used in order to ensure that learning becomes the result of research related to real problems. Learners should be given a chance to make inferences from social issues and problems. This will enable the learners to construct their own understanding of issues. In framing tasks. Brooks and Brooks in Lunenburg (2011) recommend that teachers can use cognitive terms such as "classify", "analyze", "predict" and "create". Such tasks require the learners to engage in higher order thinking as stipulated in Bloom's taxonomy of learning. Formulating tasks around cognitive activities such as analysis, interpretation, classification and prediction, fosters the construction of new understandings about content.

Thirdly, teachers should allow learners' responses to drive lessons, shift instructional strategies and alter content. It is important to note that this does not mean that learners' interest or lack of interest in a topic should determine whether the topic will be taught or that whole sections of the curriculum should be eliminated. Rather it implies that teachers should try to take advantage of "teachable moments" when the learner's interest, knowledge and enthusiasm interact and transcend a particular lesson.

Fourthly, it is necessary for the teacher to establish the learners' understandings of concepts before sharing their own understanding of those concepts. Brooks and Brooks in Lunenburg (2011) warn that when teachers share their ideas before the learners have an opportunity to formulate their own, the learners' examination of their own ideas is eliminated. In such situations, most students stop thinking about the concept and wait for the teacher to provide the "correct answer". Consequently, the learners are prevented from constructing their own ideas and theories. Lunenburg (2011) also suggests that the curriculum should address the learners' suppositions. The teacher should play an important role in helping the learners build their own bridges from present understandings to new, more complex understandings. When teachers fail to address students suppositions explicitly, most students find lessons devoid of meaning, regardless of how charismatic the teacher is or attractive the materials used. As much as the teacher will structure the opportunity, it is the learners' own reflective abstractions that will create new understanding.

Fifth, dialogue is an important aspect of knowledge construction. The teacher should encourage the learners to engage in dialogue both with the teacher and with one another. Such dialogue allows the learners to change or reinforce their ideas and theories through social discourse. Learners feel empowered when they are given an opportunity to present their own ideas and hear and reflect on the ideas of others. According to Brooks and Brooks in Lunenburg (2011), this process helps the learners to construct new understandings or reflect on existing ones.

Lastly, Brooks and Brooks in Lunenburg (2011) recommend that in order to encourage learners' inquiry, teachers should ask thoughtful, open-ended questions and encourage learners to ask questions amongst themselves. These are complex, thoughtful questions that have more than one response, which challenge the learners to delve into issues deeply and broadly and to form their own understandings of events and situations. Brooks and Brooks in Lunenburg (2011) think that it is also important that teachers seek elaboration of the learner's initial response. This is because the learner's initial response is not necessarily their final thoughts, or their best on a topic. As the learners elaborate on their initial response, they are able to re-conceptualize and assess their own errors and in the process, construct their own understanding of issues, concepts and theories.

Constructivist teacher who hopes to encourage critical thinking in the learners should seek and value the learners' points of view, Lunenburg (2011) cautions. The learners' points of view are avenues into their reasoning. When the teacher is aware of the learners' points of view, then he/she can be able to challenge learners, which makes the school experience both contextual and meaningful. When teachers fail to understand the learner's points of view, they often take the learners through "dull", "irrelevant" experiences which often lead to failure on the part of the learner to achieve the set objectives.

Teachers should also encourage cognitive growth of the learner. This will enable the learners to reformulate their current perspective. Learners are also able to formulate and refine ideas about phenomena and then resolutely hold onto these ideas as eternal truths. Teachers can do this by engaging learners in experiences that provoke contradictions to their initial hypotheses and then encouraging discussion. This helps to weaken the learner's original ideas, causing them to rethink their perspectives and formulate new understandings.

In classrooms where some learners are not prepared to respond to questions or other stimuli immediately, the teacher needs to allow more time after posing questions so that they can process information. When teachers require immediate responses, they prevent these learners from thinking through theories and concepts thoroughly, forcing them to become spectators. Such learners learn quickly that there is no point in mentally engaging in teacher-posed questions (Lunenburg, 2011).

Teachers should also provide time for learners to construct relationships and create metaphors. This requires the teacher to restructure and mediate classroom activities and provide enough time and materials for learning to occur. This will enable the learners to construct patterns, relationships among concepts and theories for themselves. The use of metaphors helps the learners to understand complex issues in a holistic way and to reflect on the parts of the whole in order to determine whether the metaphor works.

Lunenburg (2011) suggests that teachers the need to nurture the learners' natural curiosity through frequent use of learning cycle model. This involves discovery, concept introduction and concept application. First the teacher should provide an open-ended opportunity for learners to interact with purposefully selected materials (discovery). Next, the teacher should provide lessons aimed at focusing the learners' questions providing related and new vocabulary and framing with the learners their own experiences (concept introduction). Finally, the learners should engage in one or more interactions of the discovery-concept introduction sequence. Learners then work on new problems with the potential of evoking a reflective, new look at the concepts studied previously (concept application)

Another approach suggested by Bowan (2005) is blending traditional curricular approaches of reading, writing and speaking with critical thinking. This integration produces students who are competent and prepared to not only enter the workforce, but also succeed as a part of the workforce. Bowan (2005) also suggests the integration of critical thinking into all courses in all curriculum areas as opposed to teaching it as a separate set of skills. Critical thinking should be part of classroom activities such as lectures, discussions, homework, writing assignments and examinations. Bowan (2005) goes further to suggest that for learners to be successful critical

thinkers, they must be proficient in certain cognitive skills such as interpretation, analysis, evaluation, inference, explanation and self-regulation.

In discussing classroom practices that lead to critical thinking, Lunenburg (2011) further suggests that teachers should pose problems that are relevant to the students. This helps the learner to attach importance to what he/she is learning thus creating an interest in the learning. In using the problem-solving approach, attempts should be structured around primary concepts. In the process of curriculum development, Lunenburg (2011) suggests that information should be organized around conceptual clusters of problems, questions and discrepant situations. This is based on the belief that students are most engaged when the problem and ideas are presented holistically rather than separate, isolated parts. This approach contrasts the traditional education where knowledge is broken into parts and then focuses separately on each part. As discussed earlier on in this study, the desegregation and compartmentalization of knowledge makes it hard for the learners to build concepts and skills from parts to wholes.

Lastly, students ought to be assessed in the context of teaching. Student assessments and tests should be structured in such a way as to determine whether the students know information related to a particular body of knowledge. Rather than the assessment focusing on what the learners know, it should focus on analytic thinking on performance. Lunenburg (2011) recommends the use of norm-referenced, standardized tests focuses on low-level rote skills.

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## CHAPTER 5

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary of the Study

This study set out to establish the relationship between constructivism and critical thinking in view of the belief that use of constructivist approaches leads to development of critical thinking. It is often assumed that learner autonomy resulting from the use of constructivism promotes critical thinking. Research findings, however, revealed that use of constructivist pedagogy did not seem to have improved the development of critical thinking by learners. Instead, critical thinking skills, though required more than ever before in view of the changes taking place in the knowledge world, continue to be the concern of both educators and other stakeholders.

In order to investigate the research problem of the study, five objectives were generated;

1. Identifying the principles of constructivism and the main features of a constructivist learning program.
2. Examining the role of the teacher in constructivist environment in the development of critical thinking..
3. Assessing the pedagogical practices that make the current application of constructivism problematic to critical thinking.
4. Identifying factors that may hinder the development of critical thinking while using constructivist approaches in the teaching and learning process.
5. Recommending learning strategies to improve the current constructivist practice.

Literature on the development of critical thinking was reviewed. Specifically, the study reviewed literature on the development of critical thinking from a historical perspective. Starting with the Greek Philosopher, Socrates emphasized on the importance of developing critical thinking in people in order to understand the deeper realities, to think systematically, and to trace implications broadly and deeply. In the middle ages the tradition of critical thinking was emphasized by scholars such as Thomas Aquinas. During the Renaissance, scholars in Europe began to think critically about religion, art, society, human nature, law and freedom

In the 18<sup>th</sup> century, the concept of critical thinking was extended further; scholars of this period developed our sense of the power of critical thought and of its tools. It is during this time that scholars such as Adam Smith applied critical thinking to problems of economics. Kant on his part tried to make a case for pure reason as a way of arriving at the truth.

In the 19<sup>th</sup> Century, critical thought was extended further into the domain of human social life by Comte and Spencer. They applied critical thinking to the problems of capitalism and this produced the social and economic critique of Karl Marx.

Literature on the link between constructivism and critical thinking was reviewed. Literature revealed that though constructivism has been adopted in many classrooms, no conscious effort had been made to ensure that constructivist approaches led to critical thinking. Few researchers had attempted to establish the relationship between the two. Factors that hinder the development of critical thinking in constructivist classroom set ups needed to be investigated.

Investigation of the research problem was done using two philosophical approaches, the critical method and the analytic method. Critical method was used in this study to launch a critique on the constructivist pedagogical approaches. The method also facilitated evaluation and judgment of classroom practices that aim at developing critical thinking. The critical method was also appropriate for this study as it was easily combined with the analytic method.

The analytic method was used to arrive at a better understanding of educational concepts such as appropriate pedagogical approaches, constructivism and critical thinking. The method was also appropriate for testing the validity of the assertion that constructivism promotes critical thinking

Research findings of this study revealed that attempts were being made to ensure that learners develop critical thinking. Constructivist pedagogical approaches were also being used in schools. However, the adoption of constructivism had not led to development of critical thinking. Lack of development of critical thinking by learners despite the autonomy acquired from constructivism continued to raise concerns among learners.

## 5.2 Conclusions

The research problem addressed in this study was the paradox that the use of constructivist approaches and its resultant learner autonomy does not lead to development of critical thinking. From the research findings of this study, various conclusions were arrived at in an attempt to explain the paradox.

The principles of constructivism and their application in classroom environments need to be deliberately organized in such a way that they lead to the development of critical thinking by learners. When constructivism is used without due consideration of the desired outcome, it may lead to learner's autonomy where learners are not challenged to develop higher order thinking.

The study also concluded that a link exists between constructivism and the development of critical thinking. Constructivist classroom environments are more likely to promote the development of critical thinking than traditional classroom set ups because in constructivist classrooms the learner is encouraged to think independently and construct his/her own knowledge based on experience or mental processes that one undergoes. However, this relationship can be weakened if deliberate efforts are not made to ensure that learner autonomy leads to the development of critical thinking.

It was however concluded that for constructivist pedagogical approaches to be successful in developing critical thinking, the teacher must ensure that learning activities do not only dwell on lower order thinking but also proceed to higher order thinking where the learners acquire analytic, synthesis and evaluation skills. The teacher ought to play an instrumental role in the organization of learning activities aimed at developing higher order thinking.

The study also concluded that the use of constructivist approaches do not always lead to critical thinking because of factors which operate against it. These factors include; teacher's preparedness for use of constructivism in the teaching and learning process, the objectives of the curriculum, the choice of tasks and assignments for the learners by the teacher, the testing procedures adopted by the curriculum and the motivation of the learners.

The selection of learning activities by the teacher determines whether learners will develop critical thinking. Challenging activities that promote learners to think helps learners to reflect. Constructivist learning environment should be organized around real life problems so that in the process of looking for solutions to the problems, the learners acquire knowledge that they connect to. In the process, the learners are able to develop critical thinking skills.

### **5.3 Recommendations**

From the research findings of this study, the following recommendations on ways of improving use of constructivist pedagogical approaches in order to ensure that learners develop critical **thinking:**

1. Teachers need to be trained on the use of constructivist approaches to learning in order to that they use these approaches appropriately.
2. Teachers need to deliberately organize tasks and assignments in such a way as to encourage higher order thinking which would eventually lead to critical thinking in learners.
3. The curriculum should be organized in such a way that they encourage critical thinking.
4. Teachers should ensure that constructivist learning environments do not allow permissiveness in the classroom but that learners' autonomy helps them to think independently, eventually leading to critical thinking.

### **5.4 Suggestions for further studies**

From the findings of this study, the following suggestions were made for further research:

1. Since this study did not cover a specific level of education, research can be conducted to find out the extent to which constructivist pedagogical approaches are being used and whether these approaches led to development of critical thinking by learners
2. Research can also be done on factors such as teachers' beliefs and professional preparedness and their influence of use of constructivist approaches.

### 3. Research thinking

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