The study at hand stems from my felt desire to give a contribution to the enhancement of quality education in Rwanda. It was undertaken in order to understand how secondary school teachers implement high cognitive activation by complex tasks as a teaching method. The latter has proven to be an effective teaching approach likely to produce tangible results in students' learning outcomes. Similarly, this approach fits well in the current trends where educational systems are called to produce competent graduates who are expected to deal with the requirements of the current challenging environment. Moreover, the research project was undertaken in a critical moment where the Rwandan educational system is transitioning from "knowledge-based" to "competency-based" teaching. To this end, the research assesses teachers' readiness to implement this approach in their teaching practices. Research findings show that teachers in Rwandan secondary education lack a clear understanding of high cognitive activation by complex tasks as an approach to competence-based teaching.

The monograph provides teachers and teacher educators with insights on improving their practices to align it with the requirements of the current moment. By the same token, it serves as a source of motivation for education stakeholders who are interested in the idea of teachers' professional development.

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High Cognitive Activation by Complex Tasks in Schools

Brot für die Welt

New Perspectives on Quality Education in Sub-Saharan Africa

Edited by Christine Nyiramana, Susanne Ress, Tharcisse Gatwa, Susanne Krogull, Annette Scheunpflug, and Penine Uwimbabazi

High Cognitive Activation by Complex tasks: An Instructional Approach for Quality Improvement in Rwandan Secondary Schools

Charles Gahutu

PIASS PUBLICATION SERIES N°23

High Cognitive Activation by Complex Tasks

New Perspectives on Quality Education in Sub-Sahara Africa

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Over recent decades, national and international policy actors together with teachers, parents, community leaders, and faith-based organizations have made great progress in providing access to education. Today around the world, more children are in school than ever before. Yet being in school is not enough. These exceptional improvements in expansion of access to schooling require a sustained effort to ensure the quality of education provided in schools. This series presents new findings on dimensions of quality education in the context of Sub-Sahara Africa. The authors in this series have conducted their research in the context of the *International Master Program of Educational Quality in Developing Countries* (IMPEQ) at the University of Bamberg in partnership with the Protestant University of Rwanda, the Free University of the Great Lakes Region in the Democratic Republic of Congo, and the Evangelical University of Cameroon. The research was made possible through the funding from Bread for the World – the Development and Relief Agency of the Protestant Churches in Germany. The monographs in this series highlight the importance of continuous teacher education and, most importantly, the centrality of efficient leadership for fostering educational policies and practices that meet the needs of all students.

To my beloved parents; the late Amos and Scolastique for their inspiration.

To my darling wife Clementine for all the comfort and understanding.

To my little children Winner and Lana.

To Liane Staehle for her support and encouragement.

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ABBREVIATIONS

CBE	:	Competency Based Education
CBT	:	Competency Based Teaching
MINEDUC	:	Ministry of Education
OECD	:	Organization for Economic and Co-operation and Development
PISA	:	Programme for International Student Assessment
TVET	:	Technical and Vocational Education and Training
UNESCO	:	United Nations Educational Scientific and Cultural Organization

SERIES EDITORS' PREFACE

Beyond the fact that the completion of compulsory education has substantially improved over the past twenty years, achieving educational quality for all continues to be a major challenge in Sub-Sahara Africa where many children do not reach basic skills in reading and numeracy by the end of primary school (UNESCO, 2014). A focus on quality education is thus paramount to improve the overall performance of educational systems and to support students' academic achievement. High quality education requires high quality research that combines sophisticated knowledge of educational theories, adequate research methods, and contextualizing sensibilities for local realities as they intersect with global political, economic, social, and historical forces. Every educational dimension imaginable – school access, didactics and pedagogical approaches, academic content and competences – if approached with such a notion of high-quality research presents itself as a challenge that poses many questions and few certain answers. To nonetheless forge pathways towards much needed answers requires a sturdy intellect, diligence, creativity, and a supportive community of scholars engaged in critical feedback. Monographs in this series carefully investigate educational concepts and theories as they pertain to quality education in Sub-Sahara Africa. They cover many topics ranging from leadership skills, competence-based and learner-centered pedagogies, cognitive activation, critical thinking skills, and socially responsive and inclusive approaches to teaching. The monographs go beyond theory in that they reflect on the practical implications of the research findings. The authors provide in-depth analyses grounded in a deep knowledge of and experiences in the context in which the research was

conducted. They articulate recommendations that touch on the macro-, meso-, and micro-levels of schooling. In this way, the series provides a collective space for emerging African scholars to discuss their research on education to impart lessons for mastering 21st century challenges in education everywhere.

One of those crucial contributions is shown in this volume High Cognitive Activation by complex tasks: An instructional approach for quality improvement in Rwandan secondary schools: Practice and Challenges. It shows that high cognitive activation by complex tasks is an important indicator for educational quality. Implementing it in the context of Rwandan secondary schools serves as an important step in the development of quality education and in raising competences among students for lifelong learning.

Therefore, the author, Charles Gahutu, examines thoroughly how secondary school teachers in Rwanda understand and realize high cognitive activation by complex tasks considering that this teaching approach has not yet been fully introduced in Rwandan teaching.

On that account Mr. Gahutu introduces literature-based evidences depicting the context of Rwandan education and the problems it faces linked to cognitive activation. Based on this context and linking it to the global education framework, the author describes the international state of research on cognitive activation, firstly setting the topic in the general discourse of educational quality and competency-based education, and secondly defining it from a variety of perspectives such as cognitive learning strategies and learning theories, as well as introducing the concepts of cognitive activation and complex tasks.

Through a controlled intervention followed by a qualitative study with semi-structured interviews, analyzed with content analysis, the reader gets to experience Mr. Gahutu's great knowledge of the procedures of data collection and analysis at close quarters.

Linking a one-day training workshop for teachers of two secondary schools in rural Rwanda on cognitive activation by complex tasks to educational quality provides an insight on students' engagement and activation, preparation of tasks, complex task-based teaching in Rwandese secondary schools, competency-based teaching, understanding of high cognitive activation by complex tasks and nonetheless the challenges emerging from it. Each one of these aspects is supported by sections of interview transcripts that tangibly show the main results to teachers' incomplete understanding of cognitive activation as well as teachers' general approach to teaching. Additionally, some challenges from the perspective of the teachers are identified, which the author links to abstract concepts of competency-based teaching. Mr. Gahutu discusses the results of his research study in regard to the discourse on professional development and conceptual change and concludes that the implementation of high cognitive activation by complex tasks in Rwanda needs more professional development for teachers, more quality in-service trainings as well as a paradigmatic shift in regards to teachers' conceptualization of quality teaching.

High Cognitive Activation by complex tasks is not only well described and reviewed in an international context. It is also a remarking stepstone for raising awareness in respect to different understandings of cognitive activations concepts. With the utilization of a precise language and an adequate

level of abstraction Mr. Gahutu encourages the reader to broaden their perspective on the educational approach of high cognitive activation while he simultaneously sharpens the focus upon circumstances and challenges as well as chances that come with its implementation and open the field for further exploration.

PREFACE AND ACKNOWLEDGEMENT

This publication is a reworked version of my master thesis, which was written in the framework of International master's program for educational quality (IMPEQ) organized by Otto Friedrich Universität Bamberg in deep partnership with the Protestant Institute of Arts and Social Sciences. It describes the research carried out in Rwanda under the supervision of Dr Suzanne Krogull. It is a qualitative research, which addresses the topic of high cognitive activation by complex tasks in Rwandan secondary schools. The idea of doing this research was motivated by my passion for deep learning as enabled by new pedagogy approaches.

The requirements of 21st century call upon changes in the teaching practice. High cognitive activation by complex tasks has been recognized as a teaching approach, which is associated with positive learning outcomes. The approach helps students to develop their learning abilities and acquire the competencies likely to help them to cope well with the requirements of the 21st century. Furthermore, this approach fits in the modern teaching paradigm of constructivism. The point is that learners are allowed to construct their own knowledge through their contact with the experiences of daily life. The purpose of this study is to understand how this approach is implemented in Rwandan secondary schools and identify related challenges. In the process of research, training on high cognitive activation by complex tasks was done and it mirrored a quality teaching in regards to cognitive activation. The training was conceived as a step of research.

This research is an independent work but I recognize that it could not have been completed without the support of others. First of all, I am indebted to Professor Annette

Scheunpflug who helped me to learn the theories of quality teaching. Secondly, many thanks go to Dr Suzanne Krogull for introducing me into research methodology and supervising the whole research process. Similarly, I thank Dr Marina Wagener who took her time to read my work. Her comments allowed me to go deeper in my reflections. Thirdly, I thank Mr Claude Njoya and Ms Christine Nyiramana for the guidance I got from them. Also special thanks go to madam Liane Staehle who kept encouraging me during the whole process of research. Moreover, special thanks go to the leaders of the Presbyterian Church of Rwanda. As my employers, without their facilitation and good will, this project could have remained a dream. Similarly, I would like to express my gratitude to my co-workers at IPK (Institut Presbytérien de Kirinda) for their willingness to support me in this challenging journey. My absences at workplace were always supplemented by their teamwork spirit. Last not the least, I thank my wife Clementine Uwayesu for all the support and comfort she offered to me. She showed me love and understanding while working under pressure. Without her willingness to help me, this project could not have succeeded.

Finally, I am grateful to Bread for the world for all the support offered. Their financial support is well acknowledged.

Charles GAHUTU

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1

INTRODUCTION

We live in a challenging world with frequent innovation, change and invention. People need to be able to apply a variety of knowledge so as to tackle new problems and challenges (Barron & Hammond, 2008, para. 1). It is against this background that schools are requested to develop lifelong learning culture in students (Bidokht & Assareh, 2011, p. 1449). Schools must equip students with skills and competences likely to help them take ownership of their learning and become lifelong learners. The systemic philosophy makes task-based learning a suitable choice for that so-called lifelong learning since it provides a platform for learners to face daily-life problems and reflect on their learning (Bidokht & Assareh, 2011, p. 1446). Educators, governing bodies, accreditation bodies and other education stakeholders recognize lifelong learning as one of the most important competencies that people must possess (Collins, 2009, p. 613). It is argued that to meet the challenge of lifelong learning, there is a need to change the way teachers teach and learners learn. Teachers are expected to take on a more facilitative role and learners must take more responsibility for setting goals, identifying resources for learning and reflecting on and evaluating their learning (Collins, 2009, p. 613).

The context plays an important role in shaping education system. In the context of a challenging environment, schools are expected to prepare students to cope well with daily life challenges. There is a need to provide students with opportunities to learn from challenging situations. Educational reforms have been undertaken in most of the countries all over the world but there are always questions about their achievements. The claim is that they miss the point because if one looks at their results, one will always find a teacher with black-or whiteboard talking to a number of students. A number of those reforms did not yield expected results since they invested largely in textbooks and very little in teachers' capacity building (UNESCO, 2002, p.11). With regards to educational quality, its improvement requires efforts on many fronts (Dunlosky, 2013, p. 4). Policy makers are expected to play a role in improving education outcomes by setting appropriate aims and creating the conditions to be met by teachers and other practitioners. Similarly, researchers in the field of education must develop and test the theories about quality in education, the intention being to establish a theory likely to enhance students' learning outcomes. Finally, the theory generated is to be used by policy makers in their endeavor to face challenges in education and also by practitioners in order to improve the practice in class and school settings (Creemers & Kyriakides, 2012, p. 2).

To get the expected results in education, there is a need to reflect and work on teaching and learning processes. The bottom line of this is to help students to learn to better regulate their learning through the use of effective learning strategies (Dunlosky et al., 2013, p. 5). To do so, there is a need to change perspectives by moving away from traditional thinking of education towards the modern one. The traditional classroom is depicted as a hall where

teachers and books provide information and knowledge to students who are passive sponges absorbing what they are told and learning by rote memorization of facts, rules and procedures. Contrary to this, in the modern understanding the class is presented as an open space where the teacher creates and provides opportunities to learn using a task-based approach and an interdisciplinary curriculum, which is relevant to the world (Echazarra et al., 2016, p. 7). The reforms undertaken must help to change the paradigm; there is a call for transformation from schools that mostly are based on knowledge acquisition to a school aimed at empowering learners to cope with complex and challenging real-life situations (Esongo, 2017, p. 82). To be successful in life and cope well with its challenges, young people need not only to have specific knowledge but also to be able to apply that knowledge to solve complex problems in an efficient way (Winheller, Hattie&Brown, 2013; Mazman& Altun 2012; Araz& Sungur, 2007; Dochy, Segers, Van den Bossche, & Gijbels, 2003). Therefore, the school needs to help them develop such aptitude through task-based teaching. Actually, evidences show that this teaching approach is associated with students' self-efficacy and thus, helps to enhance students' interests and enjoyment of the subject matters (OECD, 2004, p. 136-141).

Research in effective teaching has largely focused on investigating three interrelated perspectives. Firstly, the research is concerned with teachers' perspectives and the point here is to understand how teachers view teaching and learning and get to know their perspectives about what seems to work best and why. The second concern is students' perspective and the focus is to look at how students' view teaching and learning, their motivation and strategies they use to learn. The third one is the activities perspective. At this level the research interest is to identify

and understand some activities, which are more effective than others. Not only that, but also to understand the factors, which make it possible that some activities are more effective than others (Kyriacou, 1997, p. 2). My study is embedded in the last perspective.

With regards to characteristics of a quality teaching, researchers have identified a number of features, which can be synthetized as: efficient time management, content knowledge and structure on the knowledge, high cognitive activation by complex tasks, making use of a variety of repetitions, good learning environment and providing individual support (Kunter, Baumert, Blum, Klusmann, Krauss & Neubrand, 2013; Winheller, Hattie & Brown, 2013; Muijs & Reynolds, 2010; Dozier, 2009; Atkins et al., 2002; Kyriacou, 1997). In the framework of this research, I don't intend to go through all those indicators, rather the focus will be on the cognitive activation and my objective is to understand how it is implemented in secondary schools of Rwanda and to identify related challenges.

1.1 Context and problem

With this study I am going to address the issue of high cognitive activation by complex tasks. My research is contextualized in the Rwandan educational system. The Rwandan educational system knows a differentiation of schools run by different institutions by their administrative status (public schools, private subsidized schools and private schools). The system is organized in the following way: Pre-primary education lasts 3 years, primary education lasts 6 years, secondary general education lasts 6 years. Parallel to secondary general education, there is technical and vocational education and training (TVET). The period of training varies from one institution to another. Some TVET offer short courses and trainings, others cover a period of

3 years. In addition, there are higher learning institutions and adult literacy education. Compulsory education lasts 12 years from age 7 to age 18. It covers primary, lower and upper secondary education and is commonly known as Twelve Year Basic Education (MINEDUC, 2015, p. 9). I will focus my research specifically on secondary schools. The Rwandan Ministry of education gives account of details about the Rwandan education system. The gross enrolment rate in primary education was 135.3% in 2015, while the net enrolment rate was 96.9% in 2015. With regards to secondary education, gross enrolment rate was 38.0% in 2015 and net enrolment rate was 28.3% in 2015. The enrolment rate in secondary education is somehow high if one considers what the situation looked like before the year 2000. According to MINEDUC (2015, p. xii), there is an increase of 450% since the year 2000.

Performance levels in the Rwandan education system continue to be low. This points to quality and equity as major areas of concern for the system. Children get enrolled in the school system levels but they are not helped to stay and reach the completion. Details about indicators such as drop-out, repetition and completion rates speak more about this issue. By the end of the 2015 school year, the completion rate in primary schools was 60.5% and the repetition rate was 18.4%, 11.5% and 6% respectively in primary, lower secondary and upper secondary education. Similarly, the drop-out rate was reported to be 5.7%, 6.5% and 2.5 respectively in primary, lower secondary and upper secondary education levels (MINEDUC, 2016, p27-31). It is worth noting that, in Rwandan context, completion rate is understood as “the number of new entrants in the last grade for each level in a given year, expressed as a percentage of the total number of population having official age for being in the last grade of each level” (MINEDUC

2016, p. 11). It is expected that the educational quality improvement can help to solve those problems and consequently there is a need to focus on improving quality teaching within school settings. Besides educational quality related problems, improvement in teaching quality is likely to support solving economic problems as well since evidence shows that cognitive skills of the population are powerfully related to individual earnings and economic growth (Hanushek & Wößmann, 2007, p. 2). Particularly in Rwanda, improvement in quality teaching is expected to help to promote the newly undertaken policy of "Made in Rwanda," which consists of promoting home-made products. The main reason is to address the problem of a large gap between import and export, which is the basis of the economic decline in Rwanda. Measures to reach this achievement include upgrading technology, developing agriculture and other commodities including adding values through agro-processing, developing the manufacturing and human skills development (Republic of Rwanda, 2010, "Increased productivity ", para. 1). It's obvious that education at all levels – from basic primary education to higher level education or vocational trainings – is expected to play a vital role in that policy.

In today's world one of the important aims of education is to encourage the development of scientific thinking in students. This can be achieved by creating a rich and task-based learning environment where students are given real-life problems to solve, which require the same cognitive processes as used by scientists (Araz & Sungur, 2007, p. 292). In my study, I am going to consider the practice of implementing high cognitive activation by complex tasks, as an indicator of quality teaching, in secondary schools and explore the challenges, which are likely to hinder this implementation in Rwanda. In regard to every day practice

in the context of Rwanda it is evident that the specification and better knowledge of this specific approach would greatly influence the quality of teaching and the learning outcomes in regard to the current status quo.

I don't miss to reveal the failures I've noticed during class visits since the latter are part of my professional responsibilities. With regards to teaching methods, teacher-centered approaches are still prevailing. Telling from my experiences, the teacher keeps on talking to students who are seated in rows, which prevent them from enjoying the free movement within the classroom setting. High cognitive activation by complex tasks is absent in teachings or is implemented at the lowest level. With regards to the content, students record in their notebooks and keep on reading and memorizing. Even the assessments done do not call upon students' critical thinking; most of questions asked address students' superficial knowledge. That kind of teaching is unlikely to help students develop critical thinking abilities. Similarly, this kind of teaching brings about students 'disengagement, which subsequently leads to students drop out. It is worth noting that the latter is currently the main concern of Government of Rwanda in regard to education.

The topic of my study, in view of the whole theme that I have chosen, is linked to the reflection of competency-based teaching. The essence of teaching and learning is to organize teaching in such a way to help students acquire intended competences (Malan, 2000, p. 22). There is effective teaching when there is effective learning. There would be no justification of educating in general and teaching in particular if people could not learn (Rwanamiza, 2009, p.1). Education is expected to equip mankind with competences to make use and manage environment

at its best (Mbarushimana, 2016, p. 7). Rwanda is an ambitious country, which is determined to transform itself into a regionally competitive country (Republic of Rwanda, 2012, p. i). The majority of population in Rwanda is young with one in two persons being under 19 years old (NISR, 2012, p. 3). The Government has the vision of building a knowledge-based economy and to achieve this, education system has an important role to play. It will help to develop a productive and efficient workforce (Republic of Rwanda, 2012, p. 10). To achieve this, there is a need to address the challenges of educational quality; to reflect education in a way to meet the needs of labor market and entrepreneurial spirit. The education is expected to transform the youth into productive citizens who have the requisite skills for the local and global market, who are innovative and able to solve the problems of a rapidly changing world. It is in this regard that an educational reform was undertaken and implemented respectively since 2016 and 2017 for general and technical education. It is expected to bring change in teaching paradigm from knowledge-based to competency-based teaching. It is an important change, which requires efforts from all educational stakeholders and particularly teachers who implement it (REB, 2015, p.23). As they have been using traditional teaching approach, they need to change their understanding of education and their practice in regards to teaching strategies.

Following this, the topic of my study can be embedded in the discourse of quality teaching as the discourse on teaching quality makes it clear that high cognitive activation by complex tasks is one of the indicators to reach higher levels of competences among students. When students are provided with opportunities to learn from complex tasks, they learn experientially (Dozier, 2009, p. 4), they learn effectively and they become critically reflective (Mezirow, 1997, p. 6).

Since the beginning of the third millennium and in reference to the Jomtien declaration and the Dakar framework, efforts have been made all over the world and reforms have been undertaken in order to improve educational quality. Those efforts paid off with regards to access to education. However, in some areas, the education outcomes did not keep the pace (UNESCO, 2014; UNESCO, 2013). In this study, I would like to confront the experiences I have access to with this global references in order to develop a more precise idea of what my efforts mean in this general context of the global community.

Besides, it is worth noting that some steps have been undertaken with regards to the implementation of high cognitive activation by complex tasks. A number of secondary school teachers have already been trained in this particular field. The training was carried out by researcher and it is discussed in details in chapter 4 of this monograph. Therefore, this study provides me with opportunity to show how those steps have started to modify the point of departure.

1.2 Research question

Considering the facts stated, my topic developed above and the concept on which my topic is based, I am going to address the following question: how do trained secondary school teachers implement high cognitive activation by complex tasks?

My research interest is articulated in three parts with the following sub-questions:

1. What is the understanding of trained secondary schools teachers with regards to high cognitive activation by complex tasks?

2. How is the practice of trained teachers related to the high cognitive activation by complex tasks?
3. What challenges do trained teachers face in implementing high cognitive activation by complex tasks?

1.3 Structure of the book

Beside the introduction, my book is organized in seven chapters. The second chapter deals with the state of research. In this chapter I discuss the issue of high cognitive activation by complex tasks as an indicator of quality teaching. Similarly, I reflect on quality teaching in line with competency-based teaching and establish the link to educational quality. In chapter three, I describe the methodology used in my research. I discuss my research approach and the methods used in data collection and data analysis. For the sake of a smooth flow of my research, I decided to do a training workshop as intervention. This is discussed in detail in chapter four. The research findings are then displayed in chapter five. Here, first of all, the data are described and then synthetized as results. The sixth chapter deals with the discussion of the findings. The findings are discussed in line with the already existing discourse and practice. In the seventh chapter I present the conclusion of my research by giving explicit answers to my research questions and issuing new perspectives and recommendations. Finally, the book is wrapped up by the presentation of used references.

2

HIGH COGNITIVE ACTIVATION AND EDUCATIONAL QUALITY

This chapter serves the purpose of reviewing the existing literature on high cognitive activation and its relation to educational quality. It is worth noting that the idea of competency development is substantial in quality assurance. An important portion of this chapter is dedicated to the reflection of competency-based education. Despite the variety of opinions on educational quality, there is a common understanding that cognitive skills are a key dimension of schooling outcomes (Hanushek & Wößmann, 2007, p. 7). From this perspective, there is a compelling need to rethink the learning environment while reflecting educational quality. Thus, a glance at quality teaching is an aspect of this particular chapter. I look at the evidence-based features of a quality teaching with a special emphasis on high cognitive activation by tasks. Ultimately, the idea of complex tasks as a tool of high cognitive activation is discussed in this chapter as well.

2.1 Revisiting the discourse on educational quality

Historically speaking, the main goal of education has always been allowing people to enjoy universal participation in schooling however rudimentary (Hughes, 2013, p. 38). One understands that the focus within this context was on making education accessible and consequently the

majority of efforts were channeled to establishing basic infrastructures likely to provide people with opportunities to enjoy education. In the aftermath of World War II, world leaders were convinced that the provision of quality education was key to peace building, to the protection of human rights as well as to freedom and democracy (Hughes, 2013, p. 64). During this period of time a special emphasis was put on extending school access to a complete primary education (Hughes, 2013; Acedo, Adams & Popa, 2012). However, the access is not enough and it does not guarantee quality. Many countries have witnessed the development of school infrastructures and exponential school enrolments but without the expected improvements in pupils' performances (Adams, 1993, p. 2). In 1990, the World Declaration for Education for All reiterated the priority of education as a central human right and set targets to achieve universal primary education by the year 2000 (Acedo et al., 2012, p. 10). In 2000, in UN millennium development summit, heads of states and governments agreed that the universal access to quality basic education and empowering girls and women through education are key to the eradication of poverty and sustainable development (Hughes, 2013, p. 64). This historical perspective shows how this issue of educational quality is not new as one can think; it is an age-old concept (Pond, 2001, p. 185).

It is important to note that there is no common understanding about the definition of educational quality in the international debate (Adams, 1993, p. 7-9). The efforts to agree on a common definition to quality education have always been limited by the purposes of education in different areas and the aspirations of the population to whom the education was provided (Hughes, 2013; Acedo, Adams & Popa, 2012). Therefore, the notion of educational quality is always

functional in the context to which is applied. The quality is deeply enshrined in cultural, local, national cultures, conditions and contexts. It is also linked to the educational beliefs and values of a particular population (Ehlers, 2013, p.124). In practice, the definition of educational quality depends on various additional choices including the level of education under consideration, the question of who defines the quality and who participates in policy making (Acedo et al., 2012, p.1). Moreover, it is important to note that, as contexts and conditions are not static, educational quality is not static as well; since they change over time, educational quality concept is likely to change over time as well (Ehlers, 2013, p. 128).

Most of the attempts to define educational quality are driven by a couple of principles: on one hand, the learners' cognitive development is identified as the major objective of education, and on the other hand, the role of education in promoting values of responsibility and nurturing creative and emotional development is insisted upon (UNESCO, 2004, p. 17). Those principles influence the understanding of educational quality and the act of setting benchmarks to evaluate educational quality.

In addition, it has been observed that there are not only different interpretations, which make it difficult to define educational quality but also different stakeholders' perspectives as well. Those who are likely to hire graduates from education have divergent interests and differing understanding and interpretation of educational quality (Ehlers, 2013, p. 128). Therefore, Ehlers (2013, p. 127) identified three aspects, which influence the understanding associated with the concept of educational quality: different meanings of quality, different perspectives and different levels of quality.It is worthy to note that the 21st century and

related conceptualizations of development and globalization provide the new context for, and give a new impetus to the struggle of defining and achieving educational quality (Acedo, Adams & Popa, 2012; Pond, 2001). Internet, for instance has opened up new opportunities of learning, new education-related challenges and new perspectives with regards to educational quality. Currently geographical boundaries and the traditional mainstays of quality assurance such as physical attendance, contact hours, formal credentials of instructors, library holdings and other factors do no longer apply to education and are somehow irrational in today's education reality (Pond, 2001, p. 187). Consequently, Pond (ibid.) goes on to advocate for a shift of paradigms with regards to not only the accrediting body but also to whom and to what is accredited; the idea is to accredit learners instead of accrediting institutions.

The understanding of Adams (1993, p. 9) about educational quality looks more inclusive and explicit as far as the practice is concerned. He states that the concept of quality may be defined as outputs, outcomes, process and inputs. And he goes on to say that: "Quality has both descriptive and normative characteristics. Thus, quality may be an attribute or an intrinsic characteristic of an individual or organization, e.g. a school is an organization, which has teachers. Quality may also refer to status or relative degree of worth, e.g., schools A and B are good schools; or school A is a better school than B. In the context of educational reform and innovation, most discussions of quality assume or imply a normative usage of the term" (ibid. p. 4). In line with this understanding and in endeavors to make things easy, UNESCO developed a framework of understanding educational quality. The framework includes a number of aspects one needs to consider when he/she wants to look at educational quality. Those aspects are learners'

characteristics dimension, enabling inputs dimension, contextual dimension, teaching and learning dimension and outcomes dimension (UNESCO, 2004, p. 35). Those are factors, which are reportedly expected to affect educational outcomes. They are interlinked and their advantage is that they do not only facilitate the understanding of educational quality but they lay a foundation for its practice and its evaluation as well.Despite a variety of perspectives and interpretations with regards to educational quality, the bottom line is fundamentally about assuring that all children acquire necessary competencies likely to help them to deal with daily life and play a role as responsible citizen (UNESCO, 2004, p. 28). Thus, it is not easy to discuss the concept of quality in education without reflecting the idea of competency-based education.

2.2 Competency-based education

The aim of education is mainly the development of individuals, their integration into society and their preparation for the active participation in economic life of their societies and the wide world (Hughes, 2013, p. 166). This responsibility has been entrusted to schools, thus the role of the school has always been to prepare the young generation to be active members of society. Similarly, today ‘s schools must prepare students participation in the particular society of 21st century, which is very demanding in terms of knowledge, skills and competences. The school has always taught thinking and it has always provided people with literacy, knowledge and skills. The way forward is to remember that knowledge, literacy and skills are not everything. The challenge of schools is not whether learners have certain knowledge or certain skills but what they can do with them. Thinking is good but it is not everything. It is what people do with their thinking that matters (Hughes,

2013, p. 210). In sciences, for instance, the idea is that students must not only learn to understand the concepts of sciences, rather to use the scientific inquiry to develop the ability to think and act in a way that is in compliance with the inquiry (Aidoo, Boateng, Kissi & Ofori, 2016, p. 103). In his reflection about schools 'achievements, Wagner noticed a gap between what schools teach and what students need in the current global knowledge economy (Wagner, 2008 cited in Yeping et al., 2014, p. 154). He said that students are not learning the skills that matter for the current century and went on to argue that curricula and teaching methods being used today were created in a different century to serve the needs of another era (ibid.). Bearing this in mind, Wang (2015, p. 4) suggests a reform of education, which must address a variety of factors including time spent in schools, flexibility of curriculum, new learning methods and ensuring that outputs have labor market value. He goes on to argue that as an alternative, new framework of competence-based education (CBE) is likely to live up to the expectations.

The approach is suitable in that it measures students' progress by having them demonstrate proficiency in subject matters rather than time spent in the classroom. Similarly, it has the merit of helping students to learn at their own pace while equipping them with career-ready skills (ibid.). Educational experts argue that competency-based teaching must target students' cognitive, psychomotor and affective domains. In this regard, this teaching approach is expected to produce competent individuals who possess a combination of skills, knowledge, attitudes and behaviors requisite for effective performances in daily life (Sullivan & Burce, 2014, p. 71).

Those who advocate for competency-based education argue that schools should provide students with

competencies such as critical, independent and rational thinking, problem solving, collaborating, adaptability, initiative and entrepreneurship, effective communication, information analyzing, curiosity and imagination (Yeping et al., 2014; Bidokht & Assareh, 2011). Wagner insists that those are competencies requisite for children's survival within 21st century (Wagner, 2008 cited in Yeping et al., 2014, p.154). It is important to note that those skills are not only needed for the sake of employability but also for global goals such as becoming responsible, active and well-informed citizen as well (Mezirow, 1997, p. 8). To be successful, those skills must be learnt in a real context. The idea is to design the curricula, which respond to the needs of students, their families and their communities (UNESCO, 2004, p. 31). Evidences from America and Canada made it clear that adolescents are not satisfied with what they learn at school and find little curricular relevance to their lives and aspirations. This phenomenon is associated with a number of problems namely drop out and low level of engagement for those who stay in schools (Mckeown &Nolet, 2013, p. 3). This shows the necessity of rethinking the teaching process and linking it to students' real life.

From the literature, learning is recognized as the only sustainable answer to an ever-and fast-changing environment (Dochy et al., 2003, p. 534). For education to bring answers to the challenges of life, there is a need for change. Students are not expected to be good encyclopedia; rather they are expected to have critical and creative thinking skills. Education must help them to become problem-solvers and self-directed learners. In this case, they will keep the passion of learning and will become life-long learners (Bidokht & Assareh, 2011, p.1447). A suggested alternative type of education is

outdoor education where the student is taken to the real environment to learn how to solve real problems. However, in most of the cases this is not easy; thus the suggestion is to bring outdoors inside the classroom with music, art, visioning and real life problems (Mckeown & Nolet, 2013, p. 284). In practice, what is needed is a shift from artificial tasks with the purpose of covering the content to more authentic tasks with the purpose of enhancing the learning of the content and the ability to learn (Marzano, 1992, p. 13).

With regards to the understanding of competency-based education, it is not easy to find an agreed-upon definition to the concept. However, scholars agree on its core features: students advancing upon mastery instead of seat time, competencies expressed in an explicit and measurable way, assessment as a meaningful and positive learning experience, matching what students know to what they are able to do, emphasis on relevant and demonstrable skills (Wang, 2015; McClarty & Gaertner, 2015; Pace & Worthen, 2014; Creemers, Kyriakides & Antoniou, 2013). In its essence, this approach ensures that all students advance at individual pace and graduate with requisite knowledge to be successful in life (Pace & Worthen, 2014, p.4). Its novelty is that it measures results according to the mastery of skills (Wang, 2015, p. 5) and that particular aspect is in contrast to traditional educational systems, which advance students based on seat time often resulting in significant gaps in learning (Pace & Worthen, 2014, p. 4). Another aspect worthy to be considered is the idea of reducing the gap, which has always been claimed to be between education and outside-school life. Competency based education is daily life-oriented since it focuses on the final product within the professional context (Albanese, Mejicano, Mullan, Kokotailo& Gruppen, 2008, p. 254).

Competency based education is a solution not only to the problems of today's society but also for the future. Students are educated to become citizens and leaders of tomorrow–a very different society where people will have to be more with less resource (Mckeown & Nolet, 2013, p. 11). Critical thinking and problem solving skills are and will always be a necessity for survival. The major question that the contemporary education has to address is how to educate for an uncertain future? There is a need for change. The undertaken educational reforms must be taken to another level with an emphasis on the shift of current learning designs (Mckeown & Nolet, 2013, p. 13). However, this change is not an easy task. A research carried out in Tanzania revealed a number of challenges, which impede the implementation of competency-based teaching (CBT). The challenges are: lack of in-service teachers training on CBT, insufficient teaching and learning resources, CBT in overcrowded classrooms, low ability of students joining secondary education and students' readiness to accept learner-centered teaching approach (Makunja, 2016, p.32-33). Those challenges are common to the majority of African education systems; they need to be addressed and taken into consideration in all change efforts undertaken to improve education quality by implementing competency-based teaching.

As far as learners are concerned, they have a positive opinion with regards to competency-based education as it has been evidenced by data collected from qualitative research. They appreciate its flexibility and the idea of progressing at individual pace. Similarly, surveyed students believe competency-based education is better at workforce preparedness than the traditional system (Wang, 2015, p. 13). These beliefs are consistent to the findings from a comparative study carried out in Ghana

where it was revealed that the employment rate for students from a CBE-program is higher as compared to the one for their counterparts from normal TVET-programs. It was therefore found out that this teaching approach improves job accessibility (Acakpovi & Nutassey, 2015, p. 68). For the sake of effectiveness, it was argued that education practitioners must take into consideration the affective domain as well (Bandaranaike & Willison, 2015, p.229). Affective domain has historically been neglected but it is claimed to be important because it is associated with the right hemisphere of the brain where emotions are engaged and the deepest levels of learning occur (Mckeown & Nolet, 2013, p. 282).

Competencies are necessary for the survival within the challenging world. The point is that competences can be improved and new ones gained through learning. However, the learning, which is likely to develop competencies is the one that takes place in authentic situations (Ehlers, 2013, p. 58). In his reflection on the characteristics of competency-based environment, Ehlers (2013, p. 59) came up with a key assumption that such learning has to be active and participative. Thus, there is a compelling necessity to rethink the teaching strategies and the teacher has an important role to play in that learning paradigm (Kunter et al., 2013, p. 7). That is what is discussed in the following section.

2.3 High cognitive activation: A key to quality teaching

The development of this sub-chapter discusses the understanding of high cognitive activation by complex tasks, its link to students' performances and underlying learning theories. Similarly, the discussion reaches out to the cognitive strategies of learning and the idea of complex tasks.

2.3.1 Cognitive activation and quality teaching

Teaching and learning are considered to be like two sides of the same coin and they are seen as the core business of the schools (Kunter, Baumert, Blum, Klusmann, Krauss, &Neubrand, 2013,p.4). Considered independently, teaching and learning are both complex and they become further complex when they are seen as interacting with each other and also with curriculum materials and with classroom setting (Yeping et al., 2014, p.3). Reflecting quality teaching entails the reflection of quality learning as well. It is obvious that there is teaching when there is learning. However, Harries mentioned (1988, p.179), the effective learning can take place in the absence of effective teaching. Yet best results happen when both are taken into consideration. When it comes to describing the quality of instruction, various approaches are possible. On one hand the point is to ask whether the practice of teaching corresponds to specific standards – this is a good teaching; on the other hand, there is a need to examine whether students have achieved the desired learning outcomes – this is termed as effective teaching (Berliner, 2005 cited by Kunter et, al. 2013, p. 99).

The empirical literature has identified a number of characteristics that are associated with positive learning outcomes in students. Those characteristics include maximizing the time available for learning through good organization and rule setting, formulating ambitious expectations, setting challenging tasks, providing appropriate feedback, presenting information in clear and well-structured way, engaging in meaningful and sophisticated discourse, promoting practice and application, teaching learning strategies, providing support when comprehension difficulties arise and offering supportive

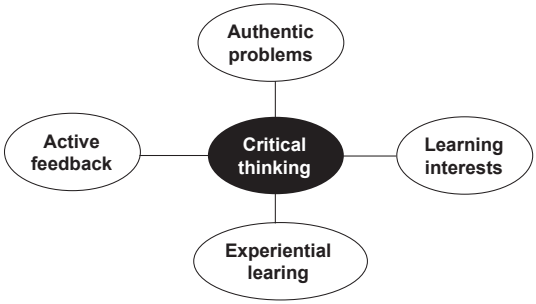
learning environment and positive climate (Kunter et al., 2013, p.7). All efforts intending to appreciate quality teaching and improve it must take into consideration all those mentioned indicators.

The debate on quality teaching has always been dominated by three approaches: teacher-directed instruction, active learning, and cognitive activation. There is a plenty of empirical data, which show that cognitive activation strategies that stimulate students critical thinking, problem solving and decision-making skills are linked to higher students' performances (Echazarra, 2016; OECD, 2016; Burge et al., 2015; Kunter et al., 2013). Studies have revealed that pupils who are frequently given tasks that are cognitively activating in their math lessons have higher mean math scores in Programm for International Students Assesment (PISA) (Echazarra, 2016; Burge et al., 2015). However, it is not explicit whether these achievements are the results of the use of cognitive activation strategies or students' higher ability (Burge et al., 2015, p. 11). Whatever the case, the belief that cognitive activation is associated with students' high achievements does not change because, in its essence, the approach helps students to develop their learning abilities. Another study found out that while there is an overall positive association between the use of cognitive activation strategies and students' performances, the association is even more positive and stronger for students admitted in advantaged schools than students from disadvantaged ones (OECD, 2016, p. 9). This may imply that students who come from advantaged backgrounds benefit more from cognitive activation strategies than their counterparts from disadvantaged backgrounds. Whatever the case the research has revealed that cognitive activation is a teaching strategy,

which is positively associated with achievements across all groups of students regardless of their ability and socio - economic status (OECD, 2016, OECD, 2004).

The literature shows that cognitive activation strategies are underpinned by constructivist perspective of learning (Kunter et al. 2013, p. 101). Additionally, as it has been revealed by research, cognitive activation lays foundation for students' self-efficacy by helping them to overcome learning difficulties and to be proud of their abilities to master specific learning tasks (OECD, 2004, p. 136). Similarly, research findings have shown that cognitive activation is positively related to students' intrinsic motivation, based on students' interests and enjoyment, and instrumental motivation, where learning subject is seen as useful for daily life (Burge et al., 2015, p. 13). This understanding was endorsed by Huang, Kinshuk & Spector, (2013, p. 26) when they summarized aspects of effective learning in the following figure. It shows elements of authentic learning as it is driven by cognitive activation strategies.

Figure 1: The five conditions of effective learning activities



Source : Huang et al. 2013, p. 26

The figure displays five conditions requisite for effective learning. The idea is that authentic problems are likely to arouse learning interests and learners' willingness to

embark on experience of learning that is considered as explicit behavior while critical thinking is considered as implicit behavior. Similarly, the teacher is expected to provide tutoring and active feedback as external support (Huang et al., 2013, p. 26).

When people reflect quality teaching, what comes in their mind is the role of the teacher. That is unquestionable since there is now a strong body of evidences, which show that the role of teacher is instrumental to the students' outcomes. The teacher has been identified as the source of variance in students' performances (Rivkin, Hanushek and Kain, 2005 cited in OECD 2016; Hattie, 2009; Hattie, 2003, Guskey, 2002). Among all factors that influence the learning, the most prominent are related to the teacher (Hattie, 2009; Gauthier & Demélé, 2004; Hattie, 2003). The teacher style of class and teaching managements has an impact on the academic performances of all students and the research has shown that among the latter, the low performing are the largest beneficiaries of effective teachers (Gauthier & Dembélé, 2004, p. 6).

Several decades of research have revealed that what teachers perform in classroom is the key factor of students' outcomes (Gauthier & Dembélé, 2004, p. 1). Yet, quality teaching is not solely dependent on the teacher; students have the responsibility to learn as well and these responsibilities need to be made explicit (Hattie, 2009; Atkins, Brown & Brown, 2002). As teaching has been described as providing opportunities for students to learn, the powerful way to improve teaching is to improve the way students learn (Atkins et al., 2002, p. 1). Thus, the quality teaching is the one that provides students with multiple and various opportunities to learn responsibly. The point is that students do not passively receive and process the

information as they used to in traditional education (Yeping et al., 2014, p. 39). Rather, they participate actively in their learning and construct meaning in a way shaped by their prior knowledge and new experience (Hattie, 2009; OECD, 2004; Mezirow, 1997). The quality teaching must get students fully engaged in the learning process and allow them to take ownership of their learning.

Research has attempted to explore the understanding and nature of the concept of being actively engaged. It is argued that being on task in the sense of listening to teacher and performing tasks does not necessarily take account of the nature of being actively engaged in the fullest sense. The idea of being actively engaged represents a move away from keeping students busy view of being on task towards the idea of creating and sustaining the appropriate mental engagement with the learning activities likely to bring about sustainable learning outcomes (Kyriacou, 1997, p. 16). From 1970s onwards, the educational research community has witnessed a paradigm shift in thinking about education from instruction to construction. The currently accepted view is that the knowledge cannot be transmitted from teachers to learners.

The latter have to play an important role in constructing their own knowledge (Yeping et al., 2014; Gauthier & Dembélé, 2004). This idea of students constructing their own knowledge calls for cognitive activation strategies. Cognitive activation, in its essence, refers to the use of practices and strategies likely to challenge students and stimulate their higher order skills such as critical thinking, problem-solving and decision making (OECD, 2016; Senn & Marzano, 2015). This strategy does not only encourage students to find creative and alternative ways to solve problems but enables them to reflect and communicate

their thinking processes and results to their peers and teacher (OECD, 2016, p. 6). Explicitly speaking, those strategies encourage students to think more deeply in order to find solutions and to focus on the methods and strategies they use to reach the answer rather than focusing on the answer itself. Additionally, in most of cases, those strategies require the learner to link the new information with the information they have already acquired before (Burge, et al. 2015, p. 2).

2.3.2 Cognitive strategies of learning

As OECD (2004, p. 110) put it, most of children come to school ready and willing to learn. The function of the school is to foster and strengthen this predisposition and to ensure that, by the time the students will leave the school, they will have developed the motivation and capacity to continue learning throughout the whole life. OECD (2004) continues to argue that without the development of these skills and attitudes, students will not be prepared to acquire new knowledge and skills necessary for their successful adaptation in the challenging world. Three kinds of learning: surface, deep and conceptual understanding have been insisted upon by Hattie (2009, p. 28-29) and they are respectively associated with content knowledge, intention to understand the meaning and constructing knowledge. Depending on the strategies used by the teacher in classroom every teaching is expected to end up in one of those kinds of learning. The claim is to have the right balance: surface knowledge is needed to have deep knowledge and understanding and both are needed to have the conceptual understanding (ibid.).

In schools, teachers manage most of students learning, yet the learning gets enhanced when students can

manage it by themselves (OECD, 2004, p. 110). Hattie (2009, p. 22) made it clear when he said that the impact on students learning is likely to occur the moment teachers learn from their teaching and when learners become their own teachers. Research suggests that students are most likely to initiate high quality learning if they can use a number of cognitive strategies such as planning the learning, establishing goals, anticipating, questioning (OECD, 2016; Burge et al., 2015; Kunter et al., 2013). Some of these strategies require students to summarize the information (Salovaara, 2005, p. 23), to link the new knowledge to the already existing one and to apply the pattern of reasoning to a new different context (Salovaara, 2005; OECD, 2004; Mezirow, 1997). Those have been referred to as elaboration strategies and they involve the processes by which learners attempt to make the content more meaningful (Weinstein & Mayer, 1986 cited by Salovaara, 2005, p. 23).

Similarly, metacognitive strategies such as monitoring learning progress, evaluating learning process, adjusting learning strategies and self-questioning are needed for quality learning (Salovaara, 2005, p. 33). The idea is that students should observe their learning as looking over one's shoulders (Yeping et al., 2014, p. 32). It has been revealed by research that learners, who apply metacognitive strategies of learning and take conscious steps to understand what they do while learning tend to be the most successful learners (Rahimi & Katal, 2012, p. 73). Creating such kind of learning environment is a delicate task for teachers. They must take time to reflect and come up with cognitively activating teaching strategies. To do so, they must set and present to students engaging and challenging tasks. Those complex tasks must be presented in different contexts and call upon a number

of competencies from students. Students must reflect on their learning process and it is up to teacher to help them to learn from the mistakes they make (OECD, 2016, p. 6).

Two main requirements have been identified for successful students' high cognitive activation: first of all, the teacher must be able to set cognitively activating tasks which are likely to establish links with students' prior knowledge by challenging and testing their preexisting ideas and beliefs. Secondly, high cognitive activation can be achieved in instructional discourse when students are encouraged to look at their works and examine the soundness of their answers and strategies used to reach those answers (Kunter et al. 2013, p. 9). Against this background, high cognitive activation by complex tasks proves to be the appropriate approach to engage students in quality meaningful learning.

2.3.3 High cognitive activation by complex tasks

As it has been discussed above, high cognitive activation strategies are associated with the use of tasks in teaching and learning process. A number of concepts namely student-centered, enquiry learning, task-based learning, authentic learning, meaningful learning, discovery learning, intrinsically motivated learning, have been used to mean the use of tasks in classroom setting and as, argued by Hattie (2009, p. 26) they mean the same thing. In the framework of this study, the task is defined as "a meaningful-focused activity related to the real world that has an outcome to be assessed" (Abbu-Ayyash & Assaf, 2016, p. 33 citing Skenah, 1996, p. 53). To make it clearer, the term task is used to refer to "information that serves as the prompt for students works, presented to them as questions, situations and instructions that are both the

starting point and the context of their learning" (Sullivan, Doug & Barbara, 2013, p. 13).

There is a general assumption that the choice of task and associated pedagogies are conducive to quality teaching and learning, and there is a substantial research-based support to this view (Aidoo et al., 2016; Anthony & Walshaw, 2009; Cobb & McClain, 1999; Hierbet & Wearne, 1997; Christiansen & Walther, 1997; Stein & Lane, 1996 cited in Sullivan et al. 2013). It is argued in these studies that by selecting appropriate tasks and using them in teaching, the teachers provide students with opportunities to learn. Kunter et al. support this view (2013, p. 4) when they say that tasks provide a structure and a framework within which the learning occurs. They go on to argue that for the task to foster the quality learning, it must have the potential for cognitive activation (Kunter et al. 2013, p. 102).

A task's potential for cognitive activation depends on the level of its complexity. A complex task is a task, which is cognitively demanding and in which learners have to organize a number of different types of cognitive processing. In most of cases, this task does not allow to make an automated or standardized response to a situation. Similarly, the task requires some predicting and planning skills so as to choose a sequence of activities since there are usually several goals to be met (Bainbridge, 1997 cited by Mazman & Altun, 2012, p. 2). For a task to be considered as a complex task with potential of cognitive activation, it must meet a number of requirements:

It must be self-directed (Senn & Marzano, 2015; Yeping et al., 2014; Marzano, 1992), the learner working autonomously (Senn & Marzano, 2015; Yeping et al., 2014;Williams, 2002); it must be realistic (Sullivan et al., 2013; Dozier,

2009; Carless, 2007; Marzano, 1992), context-sensitive (Sullivan et al., 2013; Carless, 2007), challenging (Sullivan et al., 2013; Hattie, 2009) and leading to a wide range of solutions (Yeping et al., 2014; Van Merriënboer, Kester & Paas, 2006), in some cases, it requires resources and guidance (Senn & Marzano, 2015, p. 10). Additionally, the literature reveals that those tasks cannot be mastered in a single session and pose a very high load on learners' cognitive system (Van Merriënboer et al., 2006, p. 343). In brief, the best task provides appropriate context and complexity, stimulates construction of cognitive networks, thinking and creativity (Sullivan et al., 2013, p. 14). The general assumption is that complex tasks allow learners to integrate knowledge, skills and attitudes necessary for effective task performance. Moreover, those tasks provide students with an opportunity to learn to coordinate the requisite skills that make up complex task performance and eventually enable them to apply what is learnt to their daily life or work setting (Van Merrienboer, Kirschner & Kester, 2003, p. 5). Empirical data indicate that efforts to increase teachers' awareness and understanding of these various facets of tasks will avail much and will directly benefit students (Kunter et al., 2013, p. 141).

2.3.4 High cognitive activation by complex tasks and learning theories

Literature shows that high cognitive activation finds its place in learning theories. Psychological research and theory suggest that when students are confronted with problems and learn through problem solving, they learn both content and thinking strategies (Hmelo-Silver, 2004, p. 235). This is important as the current trend in teaching aims at developing students' critical thinking skills in order to help them live up to the challenges of daily life. The idea

of cognitive activation fits well in cognitive psychology, which views learning as interactive process between learner's prior knowledge, context and new knowledge. Actually, cognitive psychologists consider that learning occurs when the learners construct their meanings from the information available and learning situation and then integrate that information in the repertoire of what they already know to create a new knowledge (Marzano, 1992, p. 15)

The idea is termed as subsumption or assimilation in Ausubel's learning theory (Ivie, 1998, p. 37). This theory suggests that when a new idea is learnt and gets into the consciousness, it is processed and categorized under one or more inclusive concepts already existing in the learner's cognitive structure and becomes incorporated into this structure. "The cognitive stability provided by anchoring ideas helps to explain why meaningful learning is retained longer than rote learning. Meaningful learning is anchored; rote learning, is not ". (Ivie, 1998, p. 38).

In the broadest sense, cognitive activation can be related to both cognitive and socio constructivist theories of learning. On one hand cognitive psychology emphasizes the need of triggering cognitive conflict that, in turn, furthers cognitive development. On the other hand, socio constructivist perspective of learning considers that the knowledge is constructed in interaction with others (Kunter et al., 2013, p. 102). From constructivists 'perspective, the knowledge is not taught by the teacher rather it is acquired by learners in certain socio-cultural contexts with the help of others as well as necessary learning materials (Huang, et al. 2013, p.13).

Confronting learners with different opinions and enabling them to deal with contradictions is considered as one way of fostering deep understanding (Kunter et al., 2013, p. 102).

2.4 Conclusion of the chapter

The purpose of this chapter was to review the state of research on high cognitive activation as an approach to quality teaching and link it to the discourse on educational quality. To achieve this the literature on educational quality was visited; the historical perspective of educational quality was traced and its understanding highlighted. The notion of educational quality is always functional of the context to which it is applied. That is the reason why there is no common understanding about the definition of quality in education (Ehlers, 2013; Hughes, 2013; Acedo, Adams & Popa, 2012). However, two principles namely learners' cognitive development and the promotion of values such as responsibility and nurturing creativity drive all attempts to define educational quality (UNESCO, 2004, p.17).

As education prepares citizens and leaders of today's and future society, it must equip young people with competencies to live up to the challenges of daily life (Hughes, 2013, p. 98). Those necessary competencies include critical thinking, problem solving, collaborating, adaptability, initiative and entrepreneurship to mention but a few (Yeping, 2014, p. 156). Those competencies are improved and gained through learning. To achieve this, there is a need to rethink the teaching strategies with a focus of helping students feel and take the ownership of their learning. Researches have revealed that cognitive activating strategies are associated with learning outcomes (Echazarra, 2016; OECD, 2016; Burge et al., 2015; Senn

& Marzano, 2015; OECD, 2014; Kunter et al., 2013; Hattie, 2009). The idea is that those strategies call upon students' critical thinking, decision making and problem solving skills and place the learning into real context. Similarly, the advantages of those strategies are underpinned by psychological learning theories. In classroom setting, high cognitive activating strategies are implemented through the use of complex tasks.

3

METHODOLOGY

In this chapter, the methods used in the study are described. Since the research question of this study is associated with the understanding and practice of high cognitive activation by complex tasks as an approach to quality teaching, the study has been conceptualized as a controlled intervention followed by a research. Firstly, the methodology of intervention is described (chap. 3.1) and secondly the research design is presented (chap. 3.2). In the latter section, the methods used for data collection and data analysis are discussed.

3.1 Intervention: A training seminar on high cognitive activation by complex tasks

As an intervention, I decided to do a training seminar for secondary school teachers on high cognitive activation by complex tasks. As shown in the introduction of this study, cognitive activation is a challenge for schools in Rwanda. To overcome these challenges, it is necessary to equip teachers with requisite competences. With my intervention I wanted to give a clear example of how this challenge could be handled. The intervention was conceived as a step of research. Secondary school teachers were trained in high cognitive activation by complex tasks and the training mirrored a quality teaching with regards to

cognitive activation. During the whole development of the training, complex tasks were brought to trainees for them to solve. After the training, there would be a follow up and the expectation was that from that follow up, new knowledge would be acquired.

The intervention is a suitable method for situations in which one wants to know “how” a change could take place. The intervention has to be developed according to the criteria of the teaching quality discourse in order to serve as a model. The process of the intervention itself needs to be documented in order to lead to transparency and to allow for an added value for the conceptual discourse.
As shown in chapter 2, cognitive activation is a key factor in improving educational quality. Yet, the teaching in Rwanda misses that particular point. The intervention finds its rationale in that background. The objective of the intervention was therefore to contribute to the improvement of the quality however small this contribution may be in the overall quality context. But in order to strategically reach this goal, it is necessary to operationalize the great theme of quality into small steps. In further steps of this study, I show how a small intervention as this can be included in a systematic approach.

In order to reach that step and to change the concept of learning, it was important that the training confronts the teachers with their proper practices and eventually with the mediocre results of their practices. Within the training workshop, I made them perceive the alternatives demonstrated. Similarly, I made them predict the changes in educational quality linked with the acquired knowledge and new techniques in regard to the objective of improving the teaching quality in our zone of intervention.

Due to the intervention, teachers were expected to get an understanding of the concept of high cognitive activation by complex tasks. Similarly, they were able to reflect the concept of competencies in quality teaching. For the sake of practice, trained teachers would learn how to formulate adequate complex tasks in different subject matters. A training workshop of teachers on high cognitive activation by tasks does not only include information about cognitive activation by complex tasks; rather the trainer must confront the trainees with complex tasks for them to solve during the whole process of the training. Within this framework, the trainer models a quality teaching with regards to high cognitive activation by complex tasks and the participants get insight with regards to how to implement it in their daily teaching. Therefore, in my position as school headmaster and in agreement with all concerned educational responsible individuals in my area, I have decided to gather teachers from two neighboring secondary schools for a one-day workshop in order for them to discover the deficit in our teaching quality, its causes and the means to change this situation by using techniques that are globally known to be efficient to improve the conditions and the results in our professional environment.

Due to the means available, only 14 teachers from two secondary schools and one headmaster were involved in the training. They teach different subjects and they are expected to share the new knowledge with their colleagues who did not participate. The impact of the training is expected to be big since both schools involved in the training have a total number of 713 students (436 girls and 277 boys) and 23 teachers. The workshop has been an opportunity for the participants to reflect on the concept of educational quality, competency-based education, quality teaching and high cognitive activation as an indicator of

quality teaching. The training took place on 25th of January, 2017 from 8:00 am up to 5:15 pm and it was conducted by two trainers.

The training I did has twofold aims: Firstly, it equipped trained teachers with requisite knowledge about high cognitive activation by complex tasks and showed them how to implement it in their respective teachings. Basically, during the whole training, teachers got a room to reflect on their practice and analyze it in line with the dimensions of educational quality. Secondly, as the training is followed by a control, it is an opportunity for me to get knowledge about how trained teachers implement cognitive activation by complex tasks in their teachings and the challenges they face. It is noteworthy to underline that knowledge acquired is only on a small scale and cannot be generalized.

3.2 Research methods

This section discusses methodological considerations of this study. It describes the research approach and methods used in data collection and data analysis. Similarly, the details about sample and sampling techniques used are discussed in this portion. In brief, it is a matter of the whole logic to go about in order to find answers to my research questions (Mason, 2002, p. 30).

3.2.1 Qualitative approach

Two approaches namely quantitative and qualitative researches are available for researchers in their attempts to understand various aspects of the world. Considering the overall design of this research, a qualitative approach was chosen in order to achieve its objective. Attempts have been done to define qualitative research in the social sciences but there is no consensus on definitions (Savin-

Baden& Major, 2013; Mason, 2002) and there is no single accepted way of doing qualitative research (Ritchie & Lewis, 2003, p. 1); rather there are a number of diverse methods, different approaches and various strategies (Savin-Baden & Major, 2013, p. 11). The reason behind this diversity in regards to definitions is that qualitative research has grown out of a wide range of intellectual and disciplinary traditions (ibid.). However, some aspects are agreed on in those definitions especially with regards to the aims and methods of qualitative research. Qualitative research attempts to deepen our understanding about how things and phenomena came to be the way they are in social environment (Hegde, 2015; Hancock, Windridge & Ockleford, 2009). Qualitative research is claimed to help the exploration of a wide array of dimensions of social world meaning that it has unrivalled capacity to help people understand how things work in a particular context (Mason, 2002, p. 1). Additionally, qualitative research is important in that it is used for pre-/post-understanding of a problem in depth and for subsequent generation of hypothesis for the problem under investigation (Hegde, 2015, p. 125). In the effort to differentiate both research approaches, Hegde (2015, p. 125-125) make it clear that contrary to the quantitative approach that refers to count and measure of things, qualitative research refers to the meanings, definitions, characteristics, metaphors, symbols and descriptions of things.

In brief, it is not easy to find a precise definition to what is meant by qualitative research nor to design a recipe of how to use it. Rather how researchers use it depends on a wide range of factors including their ontological and epistemological positions, the purpose and goals of research, the characteristics of research participants, the environment of research to mention but a few (Ritchie &

Lewis, 2003, p. 1). It is worthy to remind that the overall purpose of this study is to understand the practice of high cognitive activation by complex tasks in Rwandese secondary schools. With this study, I want to understand how Rwandese secondary school teachers conceptualize and implement high cognitive activation by complex tasks. Furthermore, this study will help to produce ideas for improvement of the practice and suggestions for further studies. Basing on all those theoretical considerations, the purpose of the study and research questions, qualitative approach has been chosen as the appropriate approach to help carrying out this study.

3.2.2 Data collection method: Semi-structured interview

Interviews are claimed to be the mainstay of qualitative research and are considered to be the central method of data collection (Savin-Baden & Major, 2013, p. 357). The use of interview as method of data collection in qualitative research is embedded in the ontological perspective, which holds the reality to be multiple, individually interpreted and socially constructed (Cropley, 2015, 11). Interviews range through a continuum from structured through semi-structured to unstructured interviews (Edwards & Holland, 2013, p. 2). In regards to the latter type of interview, Mason (2002, p. 62) prefers to term it loosely structured form of interview instead of unstructured interview since, from his understanding, no research interview can be completely lacking in some form of structure. Semi-structured interview involves a number of open-ended questions formulated around the aspects of the topic area, which the researcher wants to cover. The nature of open-ended questions addresses the topic under investigation and provides interviewer and interviewee with opportunities to

go deeper into discussion (Hanckock et al., 2009, p. 16). In practice, the researcher not only follows some pre-set questions but also brings in more additional questions in response to interviewee's comments and reactions. The interviewer relies on an interview guide asking questions and covering the aspects of the topic under investigation (Savin-Baden & Major, 2013, p. 367). To be effective, the interviewer is required to have a number of competencies and skills including active listening, interpreting what is said, checking whether what is said is related to the topic under investigation, identifying changes in interviewee's behaviors and interpreting them, time management, dealing with distractions, to mention but a few (Mason, 2002, p. 74).

Within the framework of this study I used semi-structured interview as a tool of data collection. Semi-structured interview was identified as appropriate method of data collection since it allows a deep exploration of the topic under investigation. This kind of interview requires the researcher to come up with an interview guide, which is designed in a way to explore a variety of aspects related to the topic under investigation. To do this, I identified a number of key topics and I set my interview guide basing on those topics. However, as it has been argued by Savin-Baden and Major (2013, p. 359), the researcher does not only rely on the questions set in interview guide, rather he/she must capitalize on interviewee's comments/answers and ask more questions for better exploration and understanding of the topic. Three interviews were separately carried out with three teachers from one secondary school as the other involved school is the workplace of researcher. Before engaging in interviews, teachers were explained the whole process of interview and were ensured that their revelations will be kept anonymous.

For the sake of comfortability, the interviews were conducted in mother tongue and the agreement was made as to the audio-taping. Interview guide served as a guideline but interviewees got enough flow to give account of their teaching experiences in regards to high cognitive activation by complex tasks. Similarly, they were able to bring answers to probing questions. All three interviews lasted respectively 33, 30 and 42 minutes. To conduct the interviews, a quiet place was used neither in my office nor my home but another safe and quiet room outside the school. Bearing in mind the whole understanding of qualitative research, during the process of interviews, attention was paid to both verbal and non-verbal communications.

3.2.3 Method of data analysis: Content analysis

Data analysis is an important step in qualitative research where the researcher is confronted with the data he/she generated with his/her sample. It is necessary to come up with an appropriate strategy to handle those data (Savin-Baden & Major, 2013, p. 419). After data collection, data are stored and filed in a well-organized and systematic way. It is important to argue that sources generate data in various shape including videos, audios, pictures, diagrams and so on. To analyze them, most of time, there is a need to translate them into text format and this is a challenging exercise since the researcher must be careful in order to achieve consistency between the collected data version and the translated one (Dey, 2005, p. 78).

Qualitative data analysis is a process, which consists of breaking data into meaningful parts in order to examine them. In this process, researchers break data apart, then examine them and eventually bring them back together in a way that makes sense. A wide array of analytical

approaches from which qualitative researchers may choose in order to handle their data is suggested (Savin-Baden &Major, 2013, p. 435). In the framework of this study, I used the content analysis so as to analyze my data.

Researchers described content analysis as "[a] research technique for making replicable and valid inferences from texts (or other meaningful matter) to the context" with the purpose of providing knowledge, new insights and representation of facts (Krippendorff, 1980, p. 18). As a technique, it involves specialized procedures and provides new insights and increases researcher's understanding of particular phenomena (ibid.). Using content analysis as analytical method is a challenging task since it requires the researchers to pay attention to all kinds of messages, communication's symbols and properties, which show up in the data collection exercise. One can understand that, in some cases, those properties, symbols and behaviors reveal information and properties, which cannot be caught by superficial observation (Krippendorff, 1989, p. 404). The most obvious data appropriate for content analysis are texts to which meanings are assigned (Krippendorf, 1989, p. 404). Actually, in content analysis, the text is analyzed at its most fundamental level (Savin-Baden & major, 2013, p. 438). Practically, the process of content analysis develops in inductive way and includes a number of main steps namely selecting unit of analysis, coding, grouping, categorization, abstraction and model or conceptual system. Those steps are brought together and make three main phases of content analysis process namely preparation phase, organizing phase and reporting the analyzing process and results (Elo & Kyngas, 2008, p. 109). Basically,. the interviews have been recorded using audio recorder, then filed and properly stored in the computer and a safe copy was kept aside as a backup. After the interview recording,

data were transcribed. As the interviews were carried out in the mother tongue (Kinyarwanda); another important activity namely translation into English followed. Then the data were broken apart and organized in compliance with the key topics identified while setting my interview guide. However, during the analysis, predefined key topics proved insufficient and other sub-topics were developed for a better understanding. The key topics and sub-topics helped to categorize and group the data while analyzing them. Attention was paid to all kinds of messages (pauses, gestures, eye movements) collected during the interview exercise, and the core ultimate task has been to assign meanings to those data.

3.2.4 Description of the sample

Definition of the study sample is an important step in qualitative research. In the broadest definition, "sampling and selection are principles and procedures used to identify, choose, and gain access to relevant sources from which data will be generated using one's chosen methods" (Mason, 2002, p. 120). It is important to remember that the overall aim of qualitative research is to understand the phenomena under investigation. Thus, the idea is to meet the reality in its environment to see how it is experienced; and this requires a careful sampling. Actually, in qualitative research, sampling can occur at several steps including while collecting data, interpreting and reporting on them (Hanckock et al., 2009, p. 21). Sampling at different stages of research means to make choice about the kind of data to collect from specific sources and to be clear about the data, which really need to be analyzed and interpreted. There is a variety of qualitative sampling techniques. In the framework of this study the purposeful sampling technique was used. Purposeful sampling is a technique, which is

widely used in qualitative research for the identification and selection of data sources (Palinkas, Horwitz, Green, Wisdom, Duan, Hoagwood, 2013, p.1). Purposeful sampling is understood as "the selection of specific data sources from which data are collected to address the research objectives" (Gentles, S. J., Charles, C., Ploeg, J., & McKibbon, K. 2015, p. 1775). It is important to remind that, in qualitative research, data sources are not only human beings; rather settings and events can inform the researcher as well. From this understanding, a sample can be described as a portion of units (individuals, group of individuals, institutions, particular settings, events), which are selected basing on specific purposes associated with answering research study's questions (Teddlie &Yun, 2007, p. 77). In this regard, data sources are selected based on knowledge, experience and richness about the information needed. Similarly, they must be available and willing to provide researcher with the information about the topic under investigation. In contrast with sample in quantitative research, which is associated with the desire to achieve statistical generalizability, sample in qualitative research helps to reach in-depth insight and understanding about issues of central importance to the purpose of research (Gentles et al., 2015; Hegde, 2015).

My sample consists of three teachers from a secondary government- aided school located in Rwandan rural area. They have been anonymized as A, B and C with respect to the chronological order of their interviews. Two of them have studied education and have graduated from Rwandan higher learning institutions. The other one is a graduate of a Rwandese university from the faculty of technology and sciences. However, he studied education in postgraduate training. They are all males, single and their teaching experience varies from two to six years. They teach general

sciences in lower and upper secondary education. They are proud of being teachers and are satisfied with the results their students get in National exams. However, they strive to help their students to reach high levels of excellence in those exams. They attended and appreciated the training on high cognitive activation by complex tasks. They were chosen because it was easy to reach them and they were willing to share their teaching experiences. As mentioned before, the training was attended by teachers from two secondary schools. Yet the reason behind choosing a sample from one school was in line with the idea of avoiding any bias in data collection process. Actually, teachers from the other school were not chosen because they came from the same workplace with the researcher. The point was to avoid carrying out interviews with workmates. This narrowed the sampling process as, on one hand, the sample was to be picked from one single school and, on the other hand, all participants making the sample came from almost the same educational background. Moreover, the researcher was not responsible of choosing people who participated in training workshop. The consequence of this was the absence of diversity in sample in terms of gender, age and educational background.

4

THE TRAINING ON HIGH COGNITIVE ACTIVATION BY COMPLEX TASKS

As said in chapter 3, my intervention consisted in organizing a training workshop on high cognitive activation by complex tasks. The training workshop took place on 25th of February 2017. The training brought together 14 teachers and one headmaster from two secondary schools located in a rural area in Rwanda. The teachers who participated in the training came from different academic backgrounds. Barring two participants who graduated from secondary schools, the remaining graduated from different higher learning institutions in Rwanda. Among all participants, only five of them had done education in universities, one had done education as post graduate training and the remaining had done different studies including technology, economics, development, accounting and humanities. In the following sub-chapters, I describe the objectives, didactical planning and development of the training seminar.

4.1 The objectives of the training

As it has been discussed in the second chapter of this paper, there are plenty evidences, which show that high cognitive activation by complex tasks is a key to quality

teaching. Researches have revealed that it is one of the main indicators of quality teaching (Kunter, Baumert, Blum, Klusmann, Krauss & Neubrand, 2013; Dozier, 2009; Kyriacou, 1997). With this framework in mind the training was undertaken in order to enhance quality teaching in secondary schools by the use of high cognitive activation by complex tasks. The training workshop was guided by threefold objective: As the concept of high cognitive activation by complex tasks was new to the majority of the participants, the first objective was to understand this teaching approach and its necessity for educational outcomes. Obviously, the concept of high cognitive activation by complex tasks is linked to the competency-based education. In this regard, another objective of the training workshop was to reflect the issue of competencies in education. Lastly, for the sake of practice, the third objective was to learn how to formulate complex tasks in participants' respective subject matters.

As it has been early discussed, teachers' practices in Rwanda do not meet the standards of quality teaching as they have been identified by researches. Teaching practice is still content-based and in most cases teacher-centered. Even the national standardized examinations don't meet the qualities of complex tasks. Therefore, the objectives of that training workshop fit well with the global idea of improving teaching practice in Rwandese education.

4.2 The didactical planning

To meet the assigned objectives, the training was expected to reflect the quality teaching because the idea was to provide participants with knowledge and competences about high cognitive activation by complex tasks but also to model a quality teaching. The main aspects addressed in the whole session of training are educational quality,

competency-based teaching, quality teaching, high cognitive activation by complex tasks as indicator of quality teaching and features of a complex task. Participatory and activating methods were used in the sense that participants were confronted with their practice and were asked to reflect it in line with the standards of quality teaching. The didactical planning was developed in a way to fit into the time available from 8:00 am up to 5:15 pm. Due to the shortness of time at hand, the allocation of time to different activities was done meticulously. The maximum and minimum of time allocated to one activity was respectively 45 minutes while setting complex tasks in groups and 3 minutes while achieving the transition between two activities. The majority of activities were planned for participants to perform, supported by two trainers through constructive feedback. Active and participatory methods were planned to be used where participants were asked to work on tasks in groups or individually. Only four PowerPoint presentations were planned as trainer inputs to be presented to the participants.

4.3 The development of the training workshop

Quality teaching is embedded in the broad idea of educational quality. That is the reason why the first step of the training was dedicated to the aspects of educational quality as defined by UNESCO. Just for reminding, those aspects include learners' characteristics, enabling inputs, context and outcomes (UNOSCO, 2004, p. 35). It was an opportunity for teachers to reflect their role in the global framework of educational quality. Bearing in mind the requirements of the current century in terms of skills and competencies, the next topic to be reflected upon was competency-based teaching. The point was quite in line with the new teaching curriculum recently introduced by

the government of Rwanda, which claims to implement competency-based education in primary and secondary educational system levels. The topic was quite exciting since for most of participants, it was the first time to get an opportunity to reflect the concept of competencies in education as goals of teaching. Of course the emphasis was put on that idea of competencies as they are revealed through educational outcomes.

Participants got an opportunity to reflect high cognitive activation by complex tasks as an approach to teaching. Before arriving there, there was a necessity to reflect the concept of quality teaching and its evidence-based indicators. The whole discourse focused on the use of complex tasks as a way of activating students cognitively. More examples of complex tasks were available to be discussed. They helped to deepen the understanding of features of complex tasks. It was noticed that the implementation of high cognitive activation by complex tasks needs a change in regards to teachers 'understanding of teaching. Teaching needs to be understood as providing students with opportunities to work on tasks. In the framework of this training workshop, teachers got an opportunity to reflect on national examinations papers and appreciate them in line with the perspectives of competency-based teaching.

As the training mirrored a quality teaching in regards to high cognitive activation by complex tasks, participants were provided with occasion to work on tasks including the formulation of complex tasks in their respective subject matters. That was done in groups and then individually. In either case, the work done was presented to the colleagues for them to give feedback. The development of the training followed all steps planned in the didactical planning; only

one scheduled activity did not take place. It was planned that participants would be able to watch a 20 minutes movie on complex task teaching but it did not happen due to the lack of time. The training was a success in all regards. The didactical planning was almost executed as planned, the participatory methods were implemented and a good learning climate was experienced. The participants were satisfied as they expressed it during the evaluation time. They are expected to share the knowledge they got with their colleagues who did not attend the training. From this perspective, the training will benefit 23 teachers and a total number of 713 students (436 girls and 277 boys) from both schools involved in the training. However, considering the complexity of the topic at hand and the whole theory of in-service teacher professional development, a one-day training workshop proved to be insufficient. Notwithstanding this consideration, it gave a starting point to further related initiatives.

5

DATA DESCRIPTION AND ANALYSIS

In this chapter findings of my study are displayed. To collect data, three interviews were carried out with three secondary school teachers. Semi-structured interview was used as a tool of data collection. As it has been discussed in chapter three, all my interviewees have a characteristic in common; having participated in a workshop training on high cognitive activation by complex tasks. In the following paragraphs, data are described (chapter 5.1) and the results of the study presented (chapter 5.2).

5.1 Data description

In the following paragraphs, data are organized in topics including students' engagement and activation, preparation of tasks, complex tasks–based teaching, competency–based teaching, understanding of high cognitive activation by complex tasks and challenges met in implementing high cognitive activation by complex tasks.

5.1.1 Students engagement and activation

All interviewees were asked to describe their teaching experiences to see at which level they use high cognitive activation strategies in their teachings. In general, when teaching, they said that they refer to the curricula set by the Government. The interviewees teach mathematics,

physics and chemistry; however, in their teachings, they focus on theories and the reason behind, as they say, is that they lack requisite materials to make their teaching more practical (Teachers A & B). “For instance, in physics, I talk about transistor but I cannot show it to students; I talk about electricity installation just in theory” (Teacher B, p. 4). However, they declared that with the means at hand, they try to put theories into practice. Teacher A made it clear when he said: “mathematics teaching in Rwanda is done in a theoretical way, it is not easy to put it into practice. But I (pause) try to put it into practice in order to help students better understand” (Teacher A, p. 1). When they prepare their teachings, they have a number of teaching documents to fill in and this process takes enormous amount of time. They say that it is just a requirement they have to comply with. Teacher A emphasized this when he said “Ok we are asked to hold teaching documents; of course I have some of them but for others I don’t just due to the problem of lack of time” (Teacher A, p. 4). They said that they use active and participatory methods in their teachings. To do so, as they say, they prepare exercises and assignments, organize students in groups and ask them to work on assignments and then present their works in front of their colleagues (Teachers A, B & C).

However, in most of cases, those assignments are done not as a part of teaching but for evaluation sake. This has been underlined by teacher A when he said: “The aspect which I focus on in my teaching is exercises. It can even be just one single exercise but my lesson has always an evaluation as a part of it. That evaluation helps me to check the progress of my lesson. Regardless of the length of the lesson, there is always exercises for evaluation” (Teacher A, p. 4). Teacher B has the same understanding as well, when he was asked about how he sets exercises he replied:

"You know me; I studied education in university so I know how to evaluate. Ok before I set my evaluation, I (pause) I have already set my objectives; then after , I look at the objective I set and I check in books to look for exercise which is likely to match with that particular objective" (Teacher B, p. 3). Interviewed teachers mentioned that there exists a variety of teaching methods and it is up to the teacher to pick the appropriate method basing on the topic at hand and teaching conditions. Interviewees A and B underlined the role of individual support, which must be given by the teacher in a bid to help students overcome challenges met in learning. Interviewees B and C mentioned the need to bring in the lesson the jokes in order to keep students awake, focused and motivated. Still in line with teaching methods, teacher C revealed the necessity of developing students' critical thinking by helping them reflecting deeply on the details of the topic learnt.

He said that he does it by asking them challenging questions and by organizing the lesson in way that makes students eager to know more from the topic through their own discoveries. He added that he encourages them to reflect deeply on the tasks given. Similarly, teacher B subscribes to this idea particularly in regards to mathematics teaching: "especially in mathematics I give them exercises, which call upon their deep thinking skills. I set questions, which are related to their daily life. So when they are working on such exercises I notice how they engage in deep thinking. So I think such thinking exercise can even help them to cope well with the requirement of their daily life" (Teacher B, p. 3). In regards to the activating strategies used while teaching, all interviewees underlined the idea of organizing students in groups where the latter are required to work on tasks and subsequently present their results to their colleagues and teacher. Besides, teacher A revealed that

he arranges his lesson in a way to help his students link the new information to prior knowledge. He said: “When I arrive in class, basically, I start by recalling what they already know. Actually, I start by asking questions related to the previous lesson and, then after, I embark on the topic of the day” (Teacher A, p. 1). However, he does not make it clear whether he capitalizes on prior knowledge to help them acquire new one or whether he does it just to remind them what they learnt previously. As far as teacher C is concerned, he said that he deepens his teaching by just attempting to relate different knowledge in a bid to help students get better understanding of the topic. Another activating strategy, which is used is asking students to summarize what has been learnt. Teacher B stressed this when he said: “So I do the presentation in front of the students but at the end I ask one student to do a summary of the presentation” (Teacher B, p. 1). He argued that he uses another engaging strategy when he said: “They have to show me the process to the answer. Definitely, they must come up with a result and they have to show me the strategies they used to get the results” (Teacher B, p. 4).

In general, interviewed teachers revealed that they engage their students by providing them with exercises to work on mainly in groups. Besides those exercises, every teacher has his additional strategies of getting his students engaged in the lesson.

5.1.2 Preparation of tasks

All interviewees were able to describe the way they prepare their lessons and the purpose was to check whether they dedicate an amount of time to the preparation of complex tasks. One of them (Teacher A) revealed that preparing

lesson consists of preparing requisite teaching documents and setting exercises to be done by students. He made it clear that the teachers are required to avail a number of teaching documents for the sake of administrative use. Furthermore, Teacher A talking about teachers' lessons preparation, said: "There is something I want to tell you. When you are an experienced teacher, it is not necessary to take time to prepare lesson. Because you have content you prepared before, you have requisite documents, you have resources (pause) it does not make sense to bother yourself preparing lessons" (Teacher A, p. 4). He went on to say that, basing on teachers 'workload in Rwanda, the latter cannot get time to prepare their lessons. He argued that a Rwandan teacher has to teach more than 37 hours a week almost 8 hours every day from Monday up to Friday. When they go home, they feel so exhausted that they cannot take time to prepare their lessons.

Two remaining interviewees (B and C) argued that when they prepare their lessons, they just try to understand the topics they intend to teach. They said that it is not a good idea for a teacher to go in class when he/she does not master the content to be learnt. Teacher C added that when he notices that he masters the content to be taught, he tries to look at his students, the content complexity and teaching time whether in the morning or afternoon; eventually he comes up with an appropriate strategy to teach them effectively.

During interviews, teachers revealed that they don't have time to prepare their lessons. When they get time to work on lesson preparation, they focus on filling in requisite teaching documents, looking for exercises to present to students and mastering the topic to be taught.

5.1.3 Complex task–based teaching is Rwandan secondary schools

All interviewees stated that students must play an active role in their learning. To help them achieve this, they said that they prepare exercises, which call upon students' understanding not just reproducing what they learnt (Teachers A, B & C). Two interviewees (Teachers A and B) revealed that they take all exercises from books. When asked why they don't set own exercises they said that setting exercises requires efforts from teachers and students don't like it because they say teachers set difficult exercises. Teacher C stated that he sometimes sets his own exercises but students keep on asking him why he does not take exercises from books, which they are familiar with. When they were asked how they relate their teachings and assignments to students' daily life, teacher A revealed that it is not an easy task for both teachers and students. He said: "Talking about the contextualization (pause) I don't know, relating exercises to the context of students [hmmm]; Ok I don't really do it frequently. Ok yeah I noticed that when I set my own exercises I bring in more reasoning and now I avoid it. So I use common exercises found in books and, you know, we teach students to help them succeed in national exams so most of time when I teach I focus on how my students will be examined" (Teacher A, p. 5).

This teacher added that teaching in a way to develop students' reasoning fits with grown-up students. He said: "I noticed that contextualizing mathematics in a bid to help students develop their reasoning depends on students' age" (Teacher A, p. 6). He went on saying that he, sometimes, brings in exercises where students are required to work on common objects like eggs, fishes,

meat, animals and so on. Teachers A and B mentioned that, to relate the topic to students' daily life, they keep on telling them its importance in regards to the real life. Teacher C revealed that, in his teaching, he thrives to help students develop their reflection. "Whatever topic I teach, it's not just a matter of transmitting knowledge to students but I just try to help students reflect on it. In every single teaching, I ask students: How do you understand this and that? I try to help them think critically because I know that some teachers can teach for just rote learning and that is not helpful to students" (Teacher C, p. 1).

Additionally, teacher C stressed that when students are learning and when they are working on exercises, he asks them questions to help them reflect deeply on what they learn. He said that he always organizes students and provides them with group works where they are asked to work on tasks and present their results to the whole class. When they are working on those tasks and when they are making presentation in front of the class, the teacher said that he keeps on asking questions to help students reflect deeply and check their understanding as well as their reasoning. He revealed that the purpose of exercises, for him, is "to help students raise their thinking levels and achieve factual outcomes" (Teacher C, p. 6). Likewise, when students work on tasks, teacher B does not want them to just come up with final results; he wants them to go further. "They must come up with a result and they have to show me the strategies they used to get the result" (Teacher B, p. 4).

He added that in a bid to get students motivated, he lets them know that if they manage to solve particular mathematic problems, they will be able to solve daily life challenges as well. Additionally, he underlined that he likes to remind

them the reason why they are learning. All interviewees mentioned that the knowledge and skills they got from training workshop on high cognitive activation by complex tasks were helpful to them especially in their attempts to put theories into practices. Teacher B clearly revealed that he started using complex tasks in his teaching. “In the school where I teach, we currently use complex tasks especially in physics and chemistry where the practice is needed. The colleagues who did not participate are surprised to see our performances. Sometimes they wonder where we got the skills from but they know that we participated in the training” (Teacher B, p. 5). However, interviewed teachers said that the implementation is difficult because it needs time from teachers (Teacher A & B) and students are not familiar with the culture of critically thinking. The latter hindrance has been clearly insisted upon by teacher C when he said: “[…] using complex tasks is not quite easy for teachers because (pause) you need to relate a variety of knowledge from different fields. So if students’ critical thinking has not been developed since early, it will be difficult for them to link all those knowledge and aspects from different fields. Right. If students are familiar with critical thinking, it will be easy for them because they can link aspects to each other, bring in different elements, work on them and come up with a synthesis. But if a student is just familiar with rote memorization and reproduction of knowledge, he/she will not manage to work on complex tasks” (Teacher C, p. 8).

Interviewed teachers showed that, in their teachings, they use exercises taken from books as tasks. In regards to the use of complex tasks, teacher B argued that he uses them while the remaining teachers revealed that the implementation of complex task-based teaching approach is difficult for them.

5.1.4 Competency-based teaching

The interviewed teachers indicated that they are familiar with the idea of competency-based teaching and they said that it is a new trend in Rwandan educational policy. They stressed that the ultimate goal of their teachings is to help students get knowledge and understanding. One of them, teacher C underlined the need to focus on deep understanding rather than superficial knowledge. He said:" I, in my teaching, I don't want my students to get superficial knowledge but to get deep understanding and develop their reasoning. That is my particularity" (Teacher C, p. 1). Another interviewee said that he is satisfied with his teaching when, at the end of the lesson, students are able to verbalize what they learnt. "For me the objective I set either for a chapter or a single topic (pause) I teach is to help students get knowledge and understand. At the end of the lesson students must able to say: today we learnt this or that" (Teacher A, p. 4). Teacher B subscribes to this point of view as he said: "Good! I, when I teach, my purpose is not to prepare students to get good results in tests as some teachers do. Me when I teach, my intention is to help students to understand the topic in a way that they can explain it properly to one another" (Teacher B, p. 2). Yet he does not really reject the idea of teaching to help students get good results in exams since he revealed: "[…] it happens, in some classes I have the target to help students get good results. In those classes I can say that I want my students to get good results likely to help them to move to further educational levels" (Teacher B, p. 2).

Another common understanding, they stressed is that they teach in order to help students get good results in national examinations. One interviewee said: " […] So I use common exercises found in books and, you know, we

teach students to help them succeed in national exams; so most of time when I teach I focus on how my students will be examined" (Teacher A, p. 5). And he went on to say: "Sometimes teachers have a certain reputation and students know. When you teach, for instance, a subject and, at the end, students get good results in national examinations (pause); Ok you have such reputation and this helps students to like that particular subject" (Teacher A, p. 4). This point of view was endorsed by teacher B when he said that he focuses on helping students to get results requisite for them to move to higher levels of education.

All interviewed teachers made it clear that they teach in a bid to help their students get knowledge and understanding about the topic at hand. When asked what it means to get understanding about the topic, teacher A said: "It means [Eeeeh] not getting just theory alone but (pause) understanding the lesson and make it your own and being able (pause) I don't see how to explain it more. But I am talking about mathematics; it means being able to put it into practice" (Teacher A, p. 3). However, teacher B said that he goes further in terms of competencies. "Something else I want to share; I can get an exercise from book in a bid to help students get knowledge according to six levels of Bloom taxonomy. When setting my exercises, I like to use those levels in order (pause to reflect) to help my students get more knowledge and understanding" (Teacher B, p. 3).

Interviewed teachers revealed that they teach in order to help students get knowledge and deep understanding in regards to the topic at hand in a way that they are able to reproduce, verbalize what they learnt and explain it to one another. At a certain extent they mentioned the idea of knowledge application.

5.1.5 Understanding of high cognitive activation by complex tasks

All interviewed teachers underlined the idea that students must play an active role in their learning and they said that, in order to help students in that regard, they use active and participatory methods. When asked how they can describe quality teaching they came up with a number of opinions. Teachers A and C said that there is a quality teaching when the teacher does no longer work as a key in teaching but when he/she works to facilitate the learning and students are active responsible of their learning. All interviewed teachers mentioned that they consider the teaching to be effective when, at the end of the lesson, students get a new understanding of the topic and are able to explain it to one another as teacher does (Teachers A, B & C). They underlined the necessity for a good teacher to prepare his/her lessons effectively and cooperate with students while teaching.

They argued that, in order to teach effectively, the teacher must have clear knowledge about the subject he/she teaches (Teacher A, B & C). To underline this idea, one of them declared: “Normally it is said that when you want to teach the content which is as big as the nail you need to have the knowledge which is as big as the arm” (Teacher A, p. 2). It was claimed that the quality teaching occurs when the teacher is able to make his/her lesson more attracting (Teacher B). In addition, teacher C brought in a new concept the moment he said that there is a quality teaching when the teacher teaches in a way to help students to learn more on their own. He said: “That is the quality lesson from my understanding; it is taught, understood and students can go deeper in their understanding and discover other related aspects not discussed in classroom

because they have developed their reasoning skills. A good lesson to me must be given in that way" (Teacher C, p. 2). Within this framework, interviewed teachers were asked to describe a quality teacher and they said that from their understanding, he/she must work hard, get students work hard as well (Teacher B) and help them develop their knowledge (Teacher C). Self-disciplined (Teacher A), a quality teacher must model his teaching by walking the talk (Teacher A). Additionally, it was revealed that the quality teacher must behave as a model to students with regards to behaviors. From this perspective, while teaching he/she must rely on curriculum as set by the government (Teacher A) but he/she must take into consideration the hidden curriculum as well (Teacher A). It was added that a quality teacher must have not only requisite knowledge but also professional ethic and deontology (Teacher A). He/she needs to be good in time management (Teacher B) and lesson plan (Teacher B) and he/she must create good learning climate by collaborating with students and developing good relationship with them (Teacher A, B & C). Furthermore, a good teacher is the one who sets clear teaching objectives and strives to reach them (Teacher B). He/she must teach the subject matter in compliance with government policy (Teacher A & B).

Similarly, a quality teacher must be able to do research and update the content he/she teaches (Teacher B). One interviewed teacher came up with another idea when he said: "A quality teacher is not the one who knows much but the one who knows how to teach whatever he/she has. He teaches little but he/she provides students with requisite skills to go deeper and learn by their own. That is the description of a good teacher from my perspective. A quality teacher is not the one who fills students' notebooks with content but the one who teaches little and provides

students with skills to learn on their own" (Teacher C, p. 7-8). The teachers who participated in interviews made it clear that for a quality teaching to happen, students need to play an active role in their learning. To do so, they revealed that teachers must help by delivering the content they master and by establishing good relationship and cooperation with students.

5.1.6 Challenges

All interviewed teachers were asked to discuss the challenges they met in their attempts to get students cognitively engaged in learning. Thus, a number of challenges were identified. First of all, teachers said that they face a challenge related to the lack of requisite documents and materials (Teachers A, B &C). The point was made clear by teacher B when he said "The new curriculum, which we are using requires the teacher to give books to students and the latter are expected to learn on their own. Nevertheless, we don't have those books" (Teacher B, p.2). Teachers said that they try to cope with it but they teach just in theory (Teacher A and B); it is not easy for them to make their teaching more practical (Teacher A, B & C). Secondly, they stated that there is a big number of students in classroom. It does not make it easy for teachers to organize students in groups of works (Teachers A, B & C). Similarly, the big number of students does not make it easy for teachers to provide the necessary individual support (Teacher A, B & C).

The third challenge mentioned by interviewees is related to the quantity of content to be covered within the academic year (Teacher A & B). The interviewed teachers made it clear that they have to teach around 40 weeks a year however the quantity of content to be covered within that

period of time is too vast (Teacher A, B & C). Teacher A went on to say that the individuals who elaborated curricula and syllabuses are, seemingly, not teachers because they don't take into consideration the situation on ground. Thus when teaching, interviewed teachers revealed that they always feel the pressure of time and this makes it difficult for them to set tasks that can take enough time for them and students to work on. They announced that there is a pressure of covering the entire program as set by the government (Teachers A, B & C). Besides this, the interviewees revealed that the amount of time spent in classroom with students is not favorable to the use of time-demanding tasks (Teacher A, B & C). Teachers A and C revealed that they, most of time, spend 50 up to 100 minutes in a class per day and that time is not enough for them to work with students as expected. In this regard, teacher C said that he understands the necessity of helping students to develop their critical thinking however the time at hand does not allow it.

Another revealed challenge, which brings about hindrance to quality teaching in general, is the fact that teachers don't earn enough money in Rwanda (Teacher B). The interviewee takes this like a serious challenge because teachers are busy with other businesses to earn their lives. Therefore, he said that they don't have enough time to work on preparing their teachings. Still talking about teachers–related challenges, teacher C revealed another aspect in regards to helping students develop their critical thinking. He mentioned that not all teachers are interested in that approach of developing students' critical thinking. He went on to argue that even a number of teachers are not able to think critically. Similarly, students who are taught by those teachers are not familiar with that culture of critically thinking. Thus, he declared that it becomes difficult for the

one who is willing to teach in that particular way. He/she shows up like a voice preaching in the wilderness (Teacher C).

He went on to mention another challenge, which is related to students. According to him, some students have a negative attitude in regards to educational outcomes. They argue that education is not everything, it does not bring richness and they say that there are other alternative ways of making one's life. He said that those students are not interested in learning and they don't like to engage in hard working and critical thinking. Interviewed teachers said that all those challenges constitute serious hindrance to the implementation of high cognitive activation by complex tasks and they need a particular attention within efforts undertaken to reflect educational quality in Rwanda.

5.2 Summary of findings

Basing on the data described above (5.1), this subchapter presents the main findings of this study. The findings are not generalizable to teaching practice in Rwandan secondary education. Rather, they are linked to how interviewed teachers perceive high cognitive activation and complex tasks, and they are also related to their understanding of teaching and learning in general.

The first result of my data is that interviewed teachers don't have a clear understanding about high cognitive activation by complex tasks. They talk about the necessity to present students with tasks and make them work on their own; however, they don't underline the features of complex tasks. The interviewed teachers are not able to differentiate the idea of keeping students busy with works and engaging them cognitively, instead teachers are satisfied with the idea of providing students with a lot of

tasks to work on; yet they don't consider the potential of those tasks to engage them cognitively. It was revealed by data that tasks, which are presented to students miss key elements including link to students' real life and levels of competencies. Tasks are taken from books and when they manage to set own tasks, they bring in some objects, which students are familiar with but this is not enough to ensure that students work on real-life tasks. Besides, the data showed that working on tasks is not really done as an integral part of teaching; rather it serves the evaluation purpose to check the lesson progress and understanding for instance. Again data unveiled that teachers use a number of methods to facilitate the learning including questioning, linking knowledge, group working and asking students to summarize, nevertheless, they don't have enough options in regards to strategies likely to activate students cognitively.

As far as the practice is concerned, the data revealed that teachers' approach to teaching is not competency-based. The data made it clear that teachers focus their teachings on helping students acquire knowledge and deep understanding about the topic at hand. By doing so, they consider one component of competency–based teaching (knowledge component) but they ignore others (behavioral and value components). It was learnt from data that, in their teachings, teachers want their students to be able to reproduce the knowledge they get and to explain it to one another. But, they don't reach the level of knowledge application. When they attempt to work on knowledge application particularly in physics and chemistry, they are hindered by the lack of requisite materials. By the same token, it was learnt from the data that teachers put emphasis on time spent in classroom, the content to be covered and they don't have enough consideration of

students' proficiency and mastery of the subject matter. Similarly, students learning at their own pace is not respected, rather the rhythm is orchestrated by the time. By the way, the data showed that interviewed teachers focus on teaching and don't pay enough consideration to students' learning process. In their teaching, they don't pay attention to educational outcomes; what matters for them is preparing students for them to get good results in national examinations. Besides those main results presented above, a number of challenges likely to hinder the implementation of high cognitive activation by complex tasks have been identified. Those challenges have been grouped in two categories: some are related to teachers' understanding of high cognitive activation by complex tasks, others are linked the organizational level.

5.2.1 Understanding–related challenges:

Data have allowed identifying a number of aspects, which are claimed by the interviewees to likely hinder their efforts to implement high cognitive activation by complex tasks. Those include the big number of students in classroom, the big amount of content to be covered in academic year, working under time pressure and the lack of requisite materials. Looking at all those challenges, they are not hindrance to the implementation of high cognitive activation by complex tasks as it is claimed; rather, well implemented, this approach can be a solution. The effective implementation of this approach is likely to help teachers come up with effective strategies to manage classes with big number of students and save time. Therefore, the data made it clear that the problem is not the number of students in classroom, the amount of content and time pressure but the understanding of high cognitive activation by complex tasks. Similarly, teachers don't need to wait for requisite

materials to come from the Government, rather they have to reflect and come up with strategies to find some from their environment.

5.2.2 Organizational–related challenges:

This category involves challenges, which are related to the way how teachers' work is organized and supported in Rwanda. It is learnt from collected data that the work load of Rwandan secondary schools' teachers is heavy. "Teachers work so many hours. For instance, we are expected to teach more than 37 hours. This has an important impact on lesson preparation" (Teacher A, p. 8). It has been shown by data that, with this workload, teachers don't get enough time to work on lessons and tasks preparation. In addition, they have to deal with other business as well to earn their lives and nurture their families. Teachers who have the will to engage students in working on tasks, they are hindered by the lack of requisite technical resources. This is claimed to be the case, as showed by the data, especially in chemistry and physics where practices need to be done in laboratory. Teachers can find some in the local environment, but they need others to be provided by the school administration or government. This applies as well to the availability of resources such as books and Internet because some complex tasks require students to search in books and on internet.

In sum, the collected data from interviews revealed that, even though, teachers talk about some aspects of high cognitive activation by complex tasks, they don't have a clear understanding about it. Similarly, their approach to teaching is knowledge–based not competency-based. Data have helped to identify twofold challenges, which are likely to impede the implementation of high cognitive

activation by complex tasks in Rwandan secondary schools. Those include challenges, which are related to teachers' understanding about this approach and others linked to the organization of educational system in Rwanda. In the following chapter, those results are discussed in line with the discourse.

6

DISCUSSION

In the following reflections I am going to discuss the contribution of my intervention and my research in relation to the topic and problem of this study. My research findings are discussed in the context of the scientific discourse on educational quality. Furthermore, I'm going to reflect the results of chapters 4 and 5 in light of the discourse presented in chapter 2 of this book. With the results of this study I was able to look at how Rwandan secondary school teachers implement high cognitive activation by complex tasks. To deal with this core research question, other sub-questions related to teachers' understanding and practice of high cognitive activation by complex tasks in Rwanda as well as the related challenges have been addressed.
I start by recalling an aspect of this study, my intervention.

The intervention was based on the concept of high cognitive activation by complex tasks. During the intervention, I tried to harmonize the content of the training with the training methodology. This means that during the training, the criteria for good teaching had to be respected, especially high cognitive activation by complex tasks. Therefore, while developing my didactical plan, I paid attention to this aspect by presenting the participants with complex tasks to be dealt with. The development of the seminar showed that teachers' in-service training is needed not only to

develop their competences in a particular domain but also as an opportunity to look at their teaching and reflect it in line with the requirements of best practice. Similarly, my research showed that trained teachers don't have a clear understanding about high cognitive activation by complex tasks. Moreover, it was revealed by this research that the teaching, as implemented by trained teachers, is not competency-based. These findings are discussed more in the following subchapters.

6.1 Teachers' Professional development as a key to their understanding of high cognitive activation by complex tasks

The findings of this study revealed that trained teachers understand the idea of facilitating students' learning. To do so they use active and participatory methods. To activate students, they provide them with tasks to work on. However, those tasks don't have the potential to activate students cognitively. It has been indicated in chapter 2 of this book that high cognitive activation is made possible by the use of complex tasks in teaching; and the starting point for teacher to implement that teaching approach, is to set those challenging tasks (Kunter et al., 2013, p. 349).

Moreover, the literature suggests a number of characteristics to be met for a task to be considered as a complex one. This task must have the potential of activating cognitively the students. Actually it must be self-directed (Senn & Marzano, 2015; Yeping et al., 2014; Marzano, 1992), the learner working autonomously (Senn & Marzano, 2015; Yeping et al., 2014;Williams, 2002); it must be realistic (Sullivan et al., 2013; Dozier, 2009; Carless, 2007; Marzano, 1992), context-sensitive (Sullivan et al., 2013; Carless, 2007), challenging (Sullivan et al., 2013; Hattie, 2009) and leading to a wide range of solutions (Yeping et

al., 2014, p. 44), in some cases, it requires resources and guidance (Senn & Marzano, 2015, p.10). The tasks used by interviewed teachers miss some key requirements of complex tasks including relation to students' daily life and engaging different levels of competencies. Although they participated in a one-day training workshop, teachers do not use complex tasks as integral part of their teaching. When they use tasks; those are not complex ones and are just used for evaluation purpose. Their practice, as revealed by this finding, is not in consistency with the discourse on high cognitive activation by complex tasks, which assumes that the frequent use of challenging tasks and associated pedagogies is conducive to quality teaching and learning in classroom (Aidoo et al., 2016; Echazarra, 2016; OECD, 2016; Burge et al., 2015; Kunter et al., 2013; and Anthony & Walshaw, 2009; Cobb & McClain, 1999; Hierbet & Wearne, 1997; Christiansen & Walther, 1997; Stein & Lane, 1996 cited in Sullivan et al. 2013). This problem of teachers' understanding in regards to the implementation of high cognitive activation by complex tasks goes back to the theory of teachers' professional development.

A one-day training workshop cannot bring about expected change in teaching approach. A change of this magnitude requires a great deal of learning on the part of the teachers (Ball & Cohen, 1999; Putnam & Borko, 1997; Wilson & Berne, 1999 cited by Borko, 2004). Scholars have identified a number of elements of teachers' professional development that are associated with students' outcomes. Those include providing sufficient time for extended opportunities to learn, focusing on engaging teachers in the learning process, challenging prevailing discourses, providing opportunities to interact in communities of professionals, engaging external expertise, ensuring the consistency of the content with a wider policy trend, in-

school based initiatives, having leaders actively leading the professional learning opportunities (Timperley, Wilson, Barrar & Fung, 2007, p. xxvi). Within this framework, more suggestions in regards to teachers' quality in-service training are given. They include focusing on a single topic, concentrating on participants needs, being ongoing and sustained, providing participants meaningful engagement, helping participants to develop collaborative relationships and encouraging participants to reflect on their teaching (Mustafa, 2010, p.11). Threefold goals of teachers' professional development are suggested. Those include change in classroom practices of teachers, in their attitudes and beliefs and change in learning outcomes of students (Guskey, 2002, p.381). Evidences have shown that teachers' practices shape their attitudes and beliefs. Thus, a model likely to help the initiatives in regards to effective teachers' professional development was suggested. The model implies that "Evidence of improvement or positive change in learning outcomes of students generally precedes and, may be pre-requisite to significant change in the attitudes and beliefs of most teachers". (Guskey, 2002, p. 384).

This understanding has implications on implementation of teachers' in-service training. The main considerations in this regard are that, firstly, teachers' professional development requires both time and efforts. Secondly, to sustain new practices and changes, teachers need regular feedback on the effects of their efforts. Thirdly, continued follow-up, support and pressure following the initial training is crucial to the success (Guskey, 2002, p. 388). Against this background, it is noticed that a one-day training is not sufficient for teachers to develop a clear understanding about high cognitive activation by complex tasks.

For Rwandan secondary school teachers to get a clear understanding in regard to that teaching approach, there is a need to train them effectively and take into consideration the requirements of an effective professional development. To expect good results in future, the approach would be integrated in teachers' initial training in Universities and teachers training colleges as well. It is a change which requires time as the system needs to produce competent trainers who are able not only to organize and deliver trainings but provide teachers with needed feedback as well. Training is not enough, teachers need to engage in communities of practice as well. Communities of practices facilitate the transfer of best practices and, thus, help to develop competencies (Wenger & Snyder, 2000, p. 141). The communities of practices are expected to be active at school level yet the network of neighboring schools is needed as well.

6.2 Competency-based teaching: Need of conceptual change

Data revealed that, despite the competency–based curriculum newly introduced in Rwandan secondary schools, teachers' approach to teaching is knowledge–based. Teachers emphasize knowledge acquisition and understanding and don't consider the application of knowledge. It was revealed by data that, in their teaching, they don't consider the psychomotor and affective components of competency-based teaching. Similarly, data showed that their teaching is not focused on educational outcomes rather educational outputs: they teach to help students succeed in national examinations. Emphasis is put on covering the planned content in due time at the expense of students' proficiency and mastery of subject matter.

This is not in line with the already existing understanding of competency-based education, which focuses on the idea of students to demonstrate the mastery and proficiency in subject matter, rather than time spent in classroom (Wang, 2015; Pace & Worthen, 2014). The available literature suggests that the aim of education is the development of individuals, their integration into society and their preparation for the active participation in economic life of their societies and the wide world (Yeping et al., 2014; Hughes, 2013; Bidokht & Assareh, 2011; Mezirow, 1997). Getting knowledge and understanding is not everything; the point is not whether learners have a certain knowledge or certain skills but what they can do with them (Hughes, 2013, p. 209).

A new competency-based teaching curriculum was officially launched in 2016, yet it is not implemented. The theory on change is used to shed light on this phenomenon. The interviewed teachers mentioned that they have been implementing a competency-based curriculum since 2016. Some of teachers have attended a couple of trainings related to this teaching approach but they still have problems in regards to the understanding and implementation of competency-based teaching. Change is conceptualized as journey not an event or a blueprint (Fullan, 1994, p. 37). Change takes time and it follows a number of steps (Smith, 2006, p. 110) and at every step there are lessons to be learnt. Conceptualizing change as a learning process gives opportunities to reframe and look at results differently (Fullan, 1994, p. 38).

People play an important role in change management; they are source of and vehicle for change. Their readiness needs to be checked before any action to change is undertaken. Changing teachers' approach to teaching

cannot happen easily because it requires beliefs change. This change cannot happen unless there is a conceptual change in regards to the relationship between teaching and learning (Hewson, 1992, p.5). Findings from this study revealed that teachers focus on teaching as they want to cover the planned content in due time, they transfer knowledge and ultimately students get good results in national examinations. However, they don't consider learning outcomes. This has been referred to as a good teaching not a quality teaching (Berliner, 2005 cited by Kunter et, al. 2013, p. 99). There is a need of conceptual change; quality teaching occurs when there is a quality learning and improving teaching to achieve the quality means improving students' learning (Mezirow 1997, Harris, 1988).

Changing teaching approach from knowledge-based to competency-based is a long journey. It takes time, requires patience and needs to be looked at in a systemic way. When initiating this kind of change, there is a need to consider the aspect to be changed but also the relationship it has with other aspects within educational setting (Fullan, 1994, p.38).

In sum, the implementation of high cognitive activation by complex tasks in Rwanda needs more in terms of teachers' professional development. More quality in-service trainings are needed as well as a conceptual change in regards to teachers' conceptualization of quality teaching.

7

CONCLUSIONS

This study addressed the issue of implementation of high cognitive activation by complex tasks in Rwandan secondary schools. The main research question of this research was to look at how secondary school teachers in Rwanda implement high cognitive activation by complex tasks. In a bid to work on this question, other associated sub questions were developed and were related to teachers' understanding of high cognitive activation by complex tasks, the practices of this teaching approach and challenges likely to hinder its implementation. The data of this study have been collected using semi-structured interviews and they have been analyzed using content analysis method. In the framework of this research, a training on high cognitive activation by complex tasks was done as an intervention. It was an opportunity to confront participant teachers with their practice and reflect the way forward.

With my study, I was able to show that trained teachers do not have a clear understanding in regards to high cognitive activation by complex tasks. They understand that students need to play an important role in their learning process and similarly they recognize the role of the school in helping students to develop their critical thinking skills. However, there are still areas of improvements in regards to the understanding of the theory underlying the

practice of high cognitive activation by complex tasks. Similarly, the research at hand revealed gaps in trained teachers' understanding and practice of competency-based teaching. From trained teachers understanding, the ultimate aim of teaching is to help students get knowledge and understanding and subsequently get good results in national exams. The idea of educational outcomes is not understood; rather what matters for them is educational outputs. As far as the practice is concerned, trained teachers don't have enough knowledge in regards to cognitive activating strategies. They think that they can get students engaged just by keeping them busy working on tasks. By the same token, the tasks they present to students are not complex tasks with the potential of cognitive activation and they are not used as integral part of teaching, but they serve other purposes like evaluation for instance. This research revealed that teachers' lack of clear understanding in regards to high cognitive activation by complex tasks is a challenge, which needs to be addressed if ever the approach is to be implemented in Rwandan secondary education. It is on the strength of this evidence that the following recommendations have been suggested.

7.1 Recommendations

Basing on the findings of this study, which prove that trained teachers don't have a clear understanding about high cognitive activation by complex tasks and their approach to teaching is knowledge – based, it is suggested to provide teachers with more opportunities of professional development. Government, churches and other bodies responsible of teachers' professional development in Rwanda needs to prepare effective in-service trainings in an ongoing way. Similarly, schools' principals and other

individuals involved in education monitoring need to carry out regular class visits accompanied by constructive feedback. Moreover, schools' principals must ensure that communities of practices are established and are functional in their respective schools. Additionally, to support teachers to implement high cognitive activation by complex tasks, the Government of Rwanda needs to review the workload of secondary schools teaching staff. In view of the context in which this study was performed, there are other areas, which may be interesting for future studies. Considering that the research has focused on the practice of high cognitive activation by complex tasks as implemented by teachers, further research could look at the potentialities of Rwandan students to engage in cognitive learning strategies. Furthermore, other studies may be interested in investigating the quality of initiatives of teachers' professional development and their impact on students' outcomes. In the same line, considering the number of educational reforms undertaken in Rwanda since recently, it is a good idea to investigate the impact of those reforms on educational outcomes.

A remark should be done in regards to the limitations of this study. The results here displayed are not generalizable to the teaching practice in secondary schools of Rwanda; rather they are contextual. However, they have important implications to educational practitioners and researchers. The whole development of this study shows that high cognitive activation by complex tasks is an approach, which is associated with learning outcomes. However, the findings of this study reveal that trained secondary school teachers need to improve their understanding with regard to this approach. By the way, its implementation in a developing country like Rwanda proves to be a necessity.

APPENDICES

Appendix I: Interview guide

Introduction: Being headmaster of a school, I am always looking for strategies and activities to carry out in order to develop my school and achieve high level of excellence. Within school setting, our business is to teach and help students learn effectively. So I want to learn from your experience with regards to teaching experience. This discussion will help me to expand my understanding about teaching and improve the practice in my school. In addition, this interview is done in the framework of my master's studies in educational quality where I have to do research as a requirement for the completion of studies. Please feel free to talk; there is no right and wrong in this discussion and none will know that you said this or that; the opinions from this discussion will be kept anonymous.

Topic	***Question***
Teaching	Would you tell me about you teaching experience, please? Would you describe an example of a good lesson? What do you find challenging in your teaching? What do you consider as strengths in your teaching?
Lesson preparation	Would you tell me about your lesson preparation? What key elements do you consider when preparing your lessons? Can you give me an example of your lesson objectives?

Topic	***Question***
Students engagement and activation	How do you proceed in order to engage more your students into active learning? Can you describe in as much details the assignments and home works you give to students? From your understanding, what is the aim of giving assignments to students? Would you tell me what you do in order to help your students develop their reflective skills?
Competencies	Is there any specific point you want to insist on in your teachings?
Challenges	What challenges do you face in your efforts to get students engaged in active learning? What is needed to be done in order to overcome those challenges? What areas do you feel you need more support and trainings in?
Quality teaching	If someone asks you the question like “Who is a good teacher”, How can you describe a good teacher from your understanding?
Final question	What additional information do you want me to know as far as the best practices of teaching are concerned?

Appendix II: Training didactical plan

Topic: Training secondary school teachers on cognitive activation by tasks

Place: IPK (Kirinda) Date: 25/01/2017 Time: 8:00 am-5:15 pm

What	How Pay attention to this!	Material	Who	How long	Total time
Prayer, wellcome, organization, schedule	Expectations& organization Prayer and introduction. Official opening of the training. Announcement of the objectives of the training and the expectations.	Sheets of papers	Charles	15 min	8:00 – 8:15 am
Educational quality: What and Why?	Brainstorming: Flash ideas about Educational quality. The best ideas produced are written down on the board. Aspects of Educational quality: PPP of aspects of Educational quality from UNESCO (overview)	Flip chart PPP	Participants Charles	7 min 8 min	8:15-8:30 am
Competency-based approach in education (CBA)	Competency: What does competency mean? Reflection from the participants and talk. Ideas of output/outcomes: Reflecting output and outcomes using coffee machine. Understanding the difference between outputs and outcomes in education field. Collecting examples from participants. Change of perspectives: reflecting what is needed so as to change from knowledge based to competency based approaches (change of belief, capacity building).	Coffee machine	Participants Charles &par-ticipants Charles &par-ticipants	5 min 10 min 5 min	8:30-8:50 am
Competency - based approach in education (CBA)	CBA: How? Competency-based teaching: What? And How? How to achieve a CBT in class-room setting? Competences as goals of a teaching. Levels of competencies according to Bloom's taxonomy (Knowledge, comprehension, application, analysis, synthesis and evaluation). Deep explanation and focus on some directive words. Competency-based assessment: Assessment serving competen-cy – based teaching. (Change of perspectives): Emphasis on how to make questions for assignments	Flip chart PPP Worksheet	Charles	CBT: 25 CBA: 10	8:50-9:25 am
Quality teaching	Brainstorming: Quality teaching: What? The participants produce ideas about quality teaching and write them on the sheets and discuss silently.(Silent discussion)	Posters Sticky tape (scotch) Markers	Charles & participants	20 min	9:25-9:45 am

What	How Pay attention to this!	Material	Who	How long	Total time
Quality teaching	Appreciating quality teaching: Teaming up in pairs and discussing how a quality teaching looks like (while standing up). Everyone is requested to look for a partner from a different table. Ideas generated make a mind map on flipchart. Criteria of quality teaching: What? The trainer will go through the 6 criteria of a quality teaching. Effecient classroom management Clarity in knowledge and structure High activation by tasks Good learning climate Forms of repetions Individual support	Flip chart PPP		10 min 15 min	9:45-10:10 am
Quality teaching	Focus on cognitive activation: What? How? Reflecting on how to work for cognitive activation purpose. I can achieve students cognitive activation by..... (one activity for every subject matter) High cognitive activation: Indicators The idea of complex tasks will be brought in.	Worksheet	Charles& Participants	12 min 3 min	10:10-10:25 am
BREAK				30 min	10:25-10:50 am
Complex tasks	What is a task? Brainstorming. Explaining a task. Reflection and talk. What is a complex task? Complicated task? They are asked to reflect on the difference between complicated and complex tasks.	Flipchart	Charles & Participants	5 min 10 min	10:50-11:05am
Complex tasks	What? Inputs from the trainer Discussing the features of a complex task Criteria of a complex task: Done by students in order to learn Linked to real life Different levels of competencies Students work on their own (responsible working) Need some materials May produce a product Repetition in peers according to their seats. The difference between complex and complicated task is highlighted.	PPP	Charles	30 min	11:05-11:35 am
Complex tasks	Some examples of a complex task Handouts bearing two complex tasks are distributed. Watching a video.	Hand-outs Video	Charles& Participants	30 min	11:35-12:05 am

What	How Pay attention to this!	Material	Who	How long	Total time
Complex task	Appreciating a complex task: Analysis of national examinations questionaires.	National examina-tion papers		25 min	12:05-12:30 am
LUNCH				90 min	12:30-2:00 pm
Cmplex tasks: Prac-tice	Setting complex tasks in groups Groups are made basing on subject matters taught. Focus on criteria	Work sheets Posters Markers		45 min	2:00-2:45 pm
Complex tasks: Practice	Setting complex tasks in groups: Appreciation by moving around all the posts. Basing on criteria	Posters		30 min	2:45-3:15 pm
Complex tasks: Practice	Setting complex tasks individually. Individual work.	Note-books		30 min	3:15-3:45 pm
Complex tasks: Practice	Setting complex tasks: Appreciation: analyzing the work done. Individual support. Basing on criteria			30 min	3:45- 4:15 pm
Recapitulation	We make a round table and the trainer asks questions to the participants. They give answers and where necessary the discussion occurs.	A serie of questions	Charles and participants	Game :25 min	4:15-4:40
Closing remarks	Thanksgiving by the trainer. Perspectives for the future Evaluation of the training.	Eval-uation sheets	Charles and participants	5 min 25 min	4:40-5:10 pm

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Abstract

The present research explores the implementation of quality teaching in Rwandan secondary education. The literature has shown that high cognitive activation by complex tasks is a teaching approach, which is associated with effective learning and the acquisition of much competencies needed to ensure survival in the 21st century. This qualitative research uses respectively semi-structured interviews with teachers, who participated in training on the use of high cognitive activation by complex tasks in teaching. The analysis has been supplemented with content analysis of relevant policy documents. The study revealed that teachers do not have a clear understanding of high cognitive activation by complex tasks. They cannot differentiate the idea of keeping students busy with works and engaging them cognitively. The research clearly shows that more efforts are needed on the side of school leaders and policy makers to achieve competency-based teaching. The research further identified a series of challenges (e.g., high teacher workload and lack of resources) that still need to be addressed to ensure the implementation of high cognitive activation by complex tasks as a teaching approach.

Abstrait

La présente recherche explore la mise en œuvre d'un enseignement de qualité dans l'enseignement secondaire rwandais. La littérature a montré qu'une activation cognitive élevée par des tâches complexes est une approche pédagogique, associée à un apprentissage efficace et à l'acquisition de nombreuses compétences nécessaires pour assurer la survie au 21ème siècle. Cette recherche qualitative utilise des entretiens semi-structurés

avec des enseignants ayant participé à une formation sur l'utilisation de l'activation cognitive élevée par des tâches complexes de l'enseignement. La recherche a été complétée par l'analyse du contenu des documents de politique pertinents. L'étude a révélé que les enseignants ne comprenaient pas clairement l'activation cognitive élevée associée à des tâches complexes. Ils ne peuvent pas différencier l'idée de garder les élèves occupés par des œuvres et de les engager sur le plan cognitif. La recherche montre clairement que les chefs d'établissement et les décideurs doivent redoubler d'efforts pour parvenir à un enseignement fondé sur les compétences. La recherche a également identifié une série de défis (pour exemple : charge de travail élevée des enseignants et manque de ressources, par exemple) qui doivent encore être résolus pour garantir la mise en œuvre d'une activation cognitive élevée par des tâches complexes en tant qu'approche pédagogique.

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