IOSR Journal of Research & Method in Education (IOSR-JRME)
e-ISSN: 2320–7388,p-ISSN: 2320–737X Volume 6, Issue 5 Ver. V (Sep. - Oct. 2016), PP 13-22
www.iosrjournals.org

The Effects of The Teaching Methods Used on The Cognitive Learning Achievements among The Students in Rwandan Universities

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Abstract: The level of cognitive abilities could be used to detect the extent of elimination of language barriers among the students. The learning environment that allows student choice and provides an opportunity for sharing is critical for enhancement of situational interest and understanding. Teachers should always strive to control the situational interest by manipulating the learning environment, modifying the teaching methods and improving the teaching strategies. The research was an experimental design done with MBA business statistics students and a sample size of 242 students. The teaching methods of group discussions and interactive lecture were the treatment while traditional lecture was the control. The data on students' cognitive achievements was collected and analyzed using descriptive statistics. Analysis of Variance (ANOVA) and X^2 (Chi Squared) was used to test significant differences and associations between teaching methods and cognitive achievements attained at 95% confidence limit. The teaching methods used had significant mean differences in the students' cognitive achievements. Post Hoc differences analysis indicated that group discussion was the most superior method followed by the interactive lectures and the least beneficial was the traditional lecture method. The alternative hypothesis that the teaching method used had a significant effect on the students' cognitive achievements was adopted.

Keywords: *Achievements, Association, Barriers, Cognitive, Elimination.*

I. Introduction

1.1 Background

To achieve the goal of teaching, the teacher must adopt effective teaching methods in education. The teacher has many options to choose from different teaching techniques designed specifically for teaching and learning. A variety of methods which elicit the learner's participation and motivation should be identified and used. The teaching method should be adopted on the basis of certain criteria like the knowledge of the students, the environment and the set of learning goals decided in the academic curriculum. The teaching methods should also consider that the students have individual differences in responding to different methods of teaching, knowledge acquisition and absorption of the information. Based on this observation, the teacher has to adopt a technique that assists the students in retaining the information and increasing their understanding while taking care of individual differences within the teaching and learning environment.

The language of instruction used is an important tool which facilitates the learning of content subjects. According to Kyeyune (2010), the importance of language for the teaching, learning, understanding and communication in any teaching and learning environment cannot be ignored. This is because teaching and learning can only be made meaningful through the use of a language that the students are able to communicate in for them to understand what is being taught. Furthermore, educational objectives require students to understand the concepts and to possess an ability to express their understanding of these concepts in written format and language is required for and engaged in bringing this knowledge into existence (Rogan, 2006). In the specific case of mathematics, students are required to possess competency both in everyday language and maths specific language.

Research has shown that effective teaching only takes place when a variety of methods and techniques are employed skillfully during teaching (Sammons, 1995; Teddlie & Reynolds,(2000) and Werf, 2005). The researchers have mainly placed emphasis on the effectiveness at the classroom level and educational effectiveness in relation to the structural processes related reproductive style of teaching and learning. The selection of what method to use should be guided by the instructional objectives, the content to be taught and the entry behavior of the student. In addition to the good use of teaching techniques, the teacher should vary his method of teaching at all times.

1.2 Statement of the Problem

According to the information in the Higher Education Policy for Rwanda, the Government's main objective is to improve and modernize the teaching and learning processes in higher learning institutions (MINEDOC 2008). The MINEDUC survey report of 2009 indicated that the challenge for the education system is that the English language proficiency amongst teachers is low. The survey details indicated that 85% of primary teachers and 66% of secondary teachers only had beginner, elementary or pre-intermediate levels of English 6. The specific concerns have also been raised in relation to disadvantages such as code- switching, translation of what is not comprehensible in one language, rote learning, memorization and cheating at exams.

These aspects are likely to slow the pace of learning a subject matter by the fact that both students and teachers have to struggle to produce comprehensible inputs and outputs. Researchers such as Samuelson and Freedman (2010) have also reported that up to today, it is still the Rwandan elites who have learned some English; hence, the language remains largely the domain of the elite and powerful Anglophones, mostly returnees from English speaking countries. Substantial research on the effectiveness of teaching methods indicates that the quality of teaching is often reflected by the cognitive achievements of the learners. According to Ayeni (2011), teaching is a process that involves bringing about desirable changes in learners so as to achieve specific outcomes in terms of their performance and attitude. This implies that teachers need to be conversant with numerous teaching strategies that take recognition of the complex concepts to be covered if quality teaching and learning is to be maintained. The Higher Education policy (MINEDUC 2008) indicated that there was very little research done to determine the aspects of teaching and learning that would bring out the best capacities and skills among students at the tertiary level under the current policy for language transition. This research therefore aimed to re-evaluate the English related challenges at the university level. The research outcome would be used to reveal the teaching methods and the related policy aspects that would be useful in ensuring quality assurance in terms of the students' cognitive learning achievements.

1.3 Purpose of the Study

The general purpose of the study was to determine whether particular teaching methods had measurable influence on the students' learning outcomes in terms of the students' cognitive language achievements.

1.4 Objectives of the Study

To determine the effect of the teaching method used on the cognitive learning achievements among the students in Rwandan Universities.

1.5 Research Hypothesis

H_o: The teaching method used had no significant effect on the cognitive learning achievements among the students in Rwandan Universities.

1.6 Significance of the Study

This study was set out to investigate if the use of particular teaching methods could improve the students' cognitive abilities in relation to subjects such as statistics and analytical methods that have been perceived to be technical in nature. The current transition from French to English as the language of instruction in schools has brought a challenge in grasping the concepts taught in English both to the teachers and the students as a result of the language barriers that are likely to arise. This means that more strategic approaches to teaching and learning that may unlock the performance related challenges may be required for reviewing and refining government education policies and regulations. The research results will also assist the government, the educators and the learners at all levels to make great strides in their efforts to reduce the variation in student achievement, close achievement gaps, and help all students to learn meaningfully for high quality professional development.

II. Literature Review

2.1 Teaching Methods and Students' Learning

In teaching, it is also important to recognize the uniqueness of individual learners that is important for avoiding the temptation to impose "mass production" standards that treat all learners as if they were exactly the same. Maryellen (2009) stresses that it is worth noting that the teacher knows the students and hence chooses a teaching method that permits control by the learner not only to learn better, but also to benefit more from teaching and learning. Felder et al (1998), among others, have used control and experimental groups to assess the effectiveness of novel teaching techniques. The researchers in the study made early decision in the research period to make a new learning tool available to all of the course's students and allow them to use it if they chose to do so in order to reduce variability. Research by Metzer and Manivann (2002) showed that active learning allows students to continuously probe their understanding and promote their meta-cognition and awareness of

the thinking process. Garcia and Pintrich (1995) associated this meta–cognition with increased cognitive achievement and further stated that student participation improves their motivation and by extension their achievement. Effective teaching is one which elicits acquisition of cognitive abilities. According to the principles of effective teaching by Talbert (2005), the following points must be considered while teaching students.

1. Effective teaching involves acquiring relevant knowledge about students and using that knowledge to inform course design and classroom teaching. This involves considering the student characteristics such as the students' cultural and generational backgrounds which influence how they see the world; disciplinary backgrounds which lead students to approach problems in different ways; and students' prior knowledge (both accurate and inaccurate aspects) which shape new learning. These aspects should be used to shape the objectives and lesson planning as well as help explain student difficulties and guide instructional adaptations;
2. Effective teaching involves aligning the three major components of instruction: learning objectives, assessments, and instructional activities. This should be done upfront to save time and lead to a better course achievement.

Instruction which is an integral part of effective teaching has been defined by Hiebert and Grouws (2007) as the interactions between teachers, students, and content directed toward helping students achieve learning goals. Instruction is instrumental in delivering the information and therefore should be focused on for continual improvement through the use of modern technologies available. Researchers have designed experiments to test various instructional approaches being used in combination with the curriculum, materials, and assessment tools. From the observations, they have suggested that technologies that make instruction process easier for teachers to use with increased efficacy should be employed in teaching and learning to improve performance. A review of research by Stanislav (2012) found that using specific instructional methods was linked with improved student learning, as well as more positive attitudes, more engagement in tasks, and higher motivation. These findings are consistent with the larger body of research reports on grouping.

Students' prior knowledge can help or hinder learning where by students come into the course with knowledge, beliefs, and attitudes gained in other courses and through daily life. As students bring this knowledge to bear in the classrooms, it influences how they filter and interpret what they are learning. If students' prior knowledge is robust and accurate and activated at the appropriate time, it provides a strong foundation for building new knowledge. However, when knowledge is inert, insufficient for the task, activated inappropriately, or inaccurate, it can interfere with or impede new learning. Students' motivation determines, directs, and sustains what they do to learn. Research has shown that as students enter college and gain greater autonomy over what, when, and how they study and learn, and motivation plays a critical role in guiding the direction, intensity, persistence, and quality of the learning.

Research has shown the students attitudes also affect their cognitive achievements such that when students find positive value in a learning goal or activity, expect to successfully achieve a desired learning outcome, and perceive support from their environment, they are likely to be strongly motivated to learn. Attitude is also affected by the fact that students are not only intellectual but also social and emotional beings, and they are still developing the full range of intellectual, social, and emotional skills. This can be shaped positively by creating positive learning environment. A negative climate affects the students' attitude and may impede learning and performance, but a positive teaching climate can energize students' attitude towards teaching and learning.

2.2 Teaching Method and Language Cognition Achievements

Quality education can only be achieved through commination of the following four components: appropriate medium of instruction (in mono- or multimedia systems); culturally-adequate curricular content; professionally-applied teaching methods; and adequate financial and material resources. This means that special emphasis must be laid on adequate curriculum reforms, teaching methods (both in training of teachers and for teachers in class) and secure funding. Quality education provides the support that the student requires to become independent and critical thinkers by being able to retain and apply what they have learnt.

An all rounder education system should always use a language of instruction that aim at developing a critical mind which considers the importance the cognitive categorization and conceptualization that goes hand in hand with teaching and learning. Ouane & Glanz (2010) confirms that languages are used in the classroom can hinder or facilitate communication and learning. The key requirement for learners to understand their learning material is good communication. Additionally it is essential to question whether the provided education is relevant to the students' lives outside of school

The teaching method used is important in the whole processes of developing language achievements because it affects motivation. According to Brown (2010), motivation factors affect not only the second

language learning process but learning in general because of its effect on the instrumental goals of learning that are integrative and intrinsic to the student. The teaching strategies chosen also determine the level of interaction whereby the term strategy refers to the fact that there are different methods to approach and solve a problem or a task (Brown, 2010).

In the second language classroom it is important to make space and time for the learners by varying strategies in order to optimize the learning process. In such situations, it is the teacher's responsibility to introduce different methods in order to touch all strategies and styles that will break any language achievements that exist among the students. Several studies provided evidence that when the medium of instruction was a foreign language for students and in which even the teachers were often not proficient, classroom interaction became teacher-centered and student performance was low (Williams and Mchazime, (1999); Mwinsheikhe, (2002); Rubagumya, (2003) and Brock-Utne (2005)).

Low performance and participation are demotivating for both the teachers and the students. In such a situation, teachers use coercive measures such as shaming, ridiculing and beating – either in frustration or because they believe that their students are lazy. The end result is fear which prevents learning and participation and leads to school disaffection (Smith, 2003). Mwinsheikhe, (2002), observed that whenever students were not familiar enough with the medium of instruction, teachers reverted to switching between the official medium of instruction and the language that most students are familiar with, to increase their understanding of the subject matter and encourage participation in classroom activities.

Evidence exist that making children to jump from first language literacy to second language medium of instruction widens the cognitive distance for the majority of learners, even if they have had a year or two of early literacy exposure to rudimentary second language narratives. Some research reports indicate that a very early introduction of a foreign language in the education system affects a students' entire learning cycle and the attitude towards learning. A comparative study by Ouane & Glanz (2010) even revealed that prolonged mother tongue education eventually leads students to have more proficiency in a foreign language later on and the longer the mother tongue education was maintained, the better the performance in the second language. This is because a good foundation in the familiar language simplifies the complex knowledge transfer from the familiar language.

Rwanda is one of the African countries which practice the early Transition model of language policy in the education system. However, a study by William (2011) proved that Rwandan students and their teachers have a low proficiency in the English as the language of instruction that has led to communication problems and a negative impact on learning behavior. Communication through a familiar language is much more efficient in that it facilitates student-centred teaching and learning practices that encourage learners to be active and become involved with the subject matter. According to Ouane & Glanz (2010), a familiar medium of communication is expected to results in an effective cognitive learning processes and teaching practices that support the development positive attitude.

2.3 Theoretical Framework

The determination of the extent of the reduction of language achievements using teaching methods in this study will apply the Vygotsky's (1978) social constructivism theory which states that the selection of the different teaching methods is based on key concept that knowledge construction is both a social and cognitive process. This implies that knowledge and meanings are actively and collaboratively constructed in a social context mediated by frequent social discourse and continuous interactions such that in a social constructivist learning environment, effective learning is affected by all the factors in the learning environment including the teaching method being used.

The theory stresses on the need to use the social environment to improve knowledge, learning, motivation and instruction styles. The output of the learning process using a particular teaching method will be determined based on Blooms Theory (1956) which states that the cognitive domain involves knowledge and the development of intellectual skills that can be determined by abilities of the student to recall, recognize, apply, analyze, synthesis, comprehend and evaluate specific facts, procedural patterns, and concepts.

The concept of the theory will be used to relate the indicators of cognition as classified in the Blooms Taxonomy (1956) with a particular teaching method. The relationship exists in the fact that cognitive domain involves knowledge and the development of intellectual skills through recall or recognition of specific facts, procedural patterns, and concepts after a relevant exposure or experience. In this case the domain being referred to is a particular teaching method. Questions that determine the levels of knowledge, comprehension, application, analysis, synthesis and evaluation will be administered after the use of each of the three teaching methods and comparisons made appropriately.

III. Research Methodology

3.1 Research Design

The study employed an experimental design that consisted of post-test for both control and treatment groups. The experiment was designed to test how teaching methods related to students' cognitive achievements in the course unit of business statistics at the universities. In this study, three teaching methods were compared: group discussions (a) and interactive lectures (b) were the treatments while traditional lecture (c) was used as the control. Intact classes were used to avoid disrupting programs for experimental purpose.

3.2 The Target Population

The study was conducted in Rwanda which is one of the east African community countries with eighteen (18) universities both public and private. The research was intended to investigate all the public and private universities in Rwanda. However, Mt. Kenya University and Jomo Kenyatta universities were purposively sampled for the experiment to represent all the 18 universities. This was because the two universities are centrally placed in Kigali city, have a wide variety of courses taught in English and a large student population. The masters' of business administration (MBA) students were the focus. The total population of MBA students at the two universities at any given semester is about 643 on average according to the most current registration information available.

3.3 Sample and Sampling Procedure

The sample size was determined based of the sampling recommendation given by Morgan and Robert (1970). The sampling of the classes taught for the research in each semester was done using purposive sampling technique by only selecting from the first year MBA business statistics classes taught by the researcher. Intact classes were used in the study to reduced unnecessary class interruptions. However, to ensure randomization and equalization of the number of students per class, the students from the three different classes picked for the experiment were reshuffled at the beginning of each semester by mixing the names of the students and randomly reassigning them to any of the three classes taught by the researcher. A total of 242 students were used for the research.

3.4 Research Instrument

In each of the three semesters used in the study, three classes made up of first year MBA students were purposively selected and labeled A, B and C. Groups A and B were always the experiment groups while group c was always the control group. The treatments were assigned as follows:

Group A: group discussion
Group B: interactive lecture
Group C: traditional lecture (control)

In each of the three semesters used in the study, three classes made up of first year MBA students were purposively selected. The cognitive achievement related data was collected using a questionnaire modified from attitude questionnaires of other authors such as Baldwin (1980) Solomon (1975) and Pintrich *etal* (1991). This was done by selecting and redesigning some questions to fit the situation under which the research was done.

3.5 Data Collection

The cognitive achievement questionnaires were administered once to all the students at the end of each semester taught. External and internal validity was enhanced by ensuring that the class environment remained controlled in terms of same instructor, same textbook, same course content, same lesson duration, same syllabi and assignments, same examinations and same grading scale based on the university rules and regulations. The novelty and Hawthorne effects brought about by new activities introduced abruptly in the classroom was also reduced by giving the students other questionnaires not related to the study to fill at regular intervals prior to giving the research questionnaire at the end of the semester.

3.6 test for Validity and Reliability

3.6.1 Validity

The validity of the questionnaire was tested by subjecting the items to pre-testing through pilot study before embarking on the main study. The research supervisors in the School of Business and Economics, Mt. Kenya University, Kigali Campuses were approached to validate the research instrument. The respondents from the pilot study were asked to express the ease with which they interpret and understand the items in relation to each of the objectives in order to establish the relevance of the items to the proposed study. The items were then adjusted where necessary to improve their accuracy. Construct validity was ascertained by assuming that there was a causal relationship between the variables in the study. To achieve this, the constructs were developed in such a way that they reflected well on the variables to be measured based on extensive literature review before

developing the data collection tools. The validity was also strengthened through the use of randomization of the students and reassigning them to new classes to ensure that there was no systematic bias in responses.

3.6.2 Reliability

Reliability was tested using the test-retest technique whereby a test was administered to the same group of students two times within an interval of two weeks. This involved subjecting the questionnaire items to pre-testing through pilot study using 12 students from other classes that were not going to be part of the study but were being taught the same course unit. The respondents from the pilot study were asked to express the ease with which they interpreted and understood the items in order to establish the relevance of the items to the proposed study. The items were then adjusted where necessary to improve their accuracy. To ascertain internal consistency of the items for each sub measurement, Cronbach's alpha scale was calculated for each objective's sub measurement based on the following formulae 1 by Cronbach (1990):

$$Cronbach\ Alpha = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum \sigma_i^2}{\sigma_x^2}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where: $k =$ *Number of items*

$\sigma_i^2 =$ *Variance of individual items*

$\sigma_x^2 =$ *Variance of total scores*

3.7 Data Analysis

The data was processed and analyzed with the help of a statistician using descriptive statistics of mean and percentages calculations to determine all the post test achievement scores. Further analysis was done using Analysis of Variance (ANOVA) and Chi squared at 95% level of significance to determine the significant differences and associations.

IV. Findings

4.1 Background

The objective sought to determine the extent to which the teaching method used affected the cognitive language achievements to teaching and learning. The data analysis was done to establish the extent of cognitive achievements among the students and how the teaching method used affected their cognitive abilities in the course unit taught. The extent of cognitive language achievements was treated as the dependent variable while the teaching method was the independent variable.

The conceptualization of the cognitive learning achievements was done by conducting an in-depth analysis of the extent to which the students' knowledge, comprehension, analysis, synthesis application and evaluation abilities were affected by the teaching method used. The effect of teaching method used on the extent of cognitive learning achievements was determined by analyzing the relevant cognitive constructs. The abilities were compared across the teaching methods. Analysis of variance (ANOVA) was used to determine any significant differences in the extent of learning achievements among the students between teaching methods used. The study used chi-square analysis to determine if there was a relationship between teaching the method used and the extent of cognitive language achievements among the students.

4.2 The Extent Cognitive Learning Achievements

The extent of language achievements was analyzed using six cognitive constructs which were related to the effect of the teaching method used. The respondents were requested to rank statements that related to the cognitive concepts of teaching and learning using a Likert scale of 1-5 (Strongly Disagree; Disagree; Uncertain; Agree; Strongly Agree). The analysis of the responses was done using frequencies, percentages, means and standard deviations.

The majority, (48.8% and 46.2%) agreed that they were comfortable with the knowledge and the comprehension outcomes of teaching and learning respectively after being taught using a particular method. However, the more complicated concepts of application, analysis, synthesis, and evaluation were grasped by fewer students as indicated by the higher percentages of those who disagreed that they understood the concepts at 36.7%, 41.7%, 40.0%, 37.7% respectively with the averages indicating uncertainty. This was an indication that the simpler cognitive concepts were much easier to grasp by the majority of the students and therefore, could be taught using more general methods than the more complicated concepts.

4.3 Comparisons of the Cognitive Learning Achievements between the Teaching Methods

Further mean comparisons were done to determine whether there were any significant differences in the students' cognitive concepts between the teaching methods at 95% confidence limit using the Analysis of

Variance (ANOVA) and Post Hoc comparisons. The results of the analysis showed that there were significant variations in the students cognitive abilities arising from the teaching methods used ($F(2,236) = 15.522$. $p = .000$).This indicated that the teaching method used had a significant effect on the cognitive abilities of the students. This observation could lead to the conclusion that the students' cognitive abilities were affected by how they were taught and hence, methodology should be emphasized on even at the university level as a matter of policy on quality education.

Further Analysis of Variance (ANOVA) comparison was done using the Post Hoc multiple comparisons. The results indicated that there was a significant difference in cognitive abilities of the students between discussion method and the interactive lectures with a mean difference of .44401 and between discussion method and traditional lectures with a mean difference of .45026 at 95% confidence limit. This indicated that both discussion method and the interactive lectures were superior to the traditional lecture approach to teaching and learning for the improvement of students' cognitive abilities. This gave the indication that in the university teaching and learning set up, the discussion method of teaching and learning was the most appropriate for the achievement of higher cognitive concepts such as analysis, synthesis, application and evaluation. The effect became more evident as the cognitive concepts analyzed became more complex. This study further gave the indication that the traditional lecture method was the least productive for developing students' cognitive abilities.

4.4 The Relationship between the Teaching Methods and Students' Cognitive Abilities

Chi square analysis was done to determine the relationship between the teaching method used and the achievement of students' cognitive abilities. The results showed that the model was significant $\chi^2(36, N = 240) = 58.190$, $p = 0.011$. This indicated that the difference in proportions of student abilities based on the teaching methods were significantly different at 95% confidence limit.

4.5 Summary of the Findings

The findings under the objective were as follows: The majority of the students were comfortable with the knowledge and the comprehension outcomes of teaching and learning after being taught using a particular method. However, the more complicated concepts of application, analysis, synthesis, and evaluation were grasped by fewer students as indicated by the higher percentages of those who disagreed that they understood the concepts. The results of the analysis further showed that there were significant variations in the students' cognitive abilities arising from the teaching methods as indicated by significant differences in cognitive abilities of the students between discussion method and the interactive lectures. The alternative hypothesis that the teaching method used had a significant effect on the cognitive achievements of the students in the cause unit taught was adopted. This observation could lead to the conclusion that the students' cognitive abilities were affected by how they were taught and hence, methodology should be emphasized on even at the university level as a matter of policy on quality education in a language transition environment case such as Rwandan universities.

V. Discussion of The Results

The result of study indicated that a significant difference was found to be present in the cognitive achievement of students in the cause unit taught using group discussions, interactive lectures and traditional lectures ($F(2,236) = 15.522$. $p = .000$). A significant association between the teaching method used and their cognitive achievements was also shown by the analysis of variance $\chi^2(36, N = 240) = 58.190$, $p = 0.011$. The Scheffe's post hoc analysis indicated that group discussion was the most effective in facilitating students' cognitive achievement in business statistics. This was followed by interactive lecture method and traditional lecture was seen to be the least effective.

The findings tally with the results of Onwioduokit & Akinbobola (2005) that the practical oriented teaching methods such as a pictorial organizer is one of the most effective in facilitating students' achievement and retention of materials taught in among different types of advance organizers. This research study supports earlier studies by Omwirhiren (2002), and Akinbobola (2006) that the more practical teaching methods such as guided discovery approach, group discussions and demonstrations were effective in enhancing the achievement and retention of students in science subjects.

Nwagbo (2006) conducted an experiment using a biology class in Nigeria and the results showed that the guided inquiry method was significantly better than the expository method in enhancing cognitive achievement in biology for students of all levels of scientific literacy, especially the high ones. Furthermore, students of different levels of scientific literacy showed positive attitude to biology, when the two methods were used although the interactive effects of teaching methods and scientific literacy levels, on both achievement in and attitude to biology, were not significant ($p > 0.05$).

The study is in agreement with position of Onyejiaku (1987) who opined that in the learning process

involving reacting, doing and experiencing such as demonstration, information is better registered because the hearer sees the instructor demonstration strategy over expository strategy. The findings can also be explained using the constructivist view of learning which points towards a numbers of different teaching practices that place emphasis on practical learning techniques. The approach encourages the students to use active techniques such as group discussions and demonstration to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing.

The superiority of group discussions and interactive lectures in cognitive achievement can be explained using the elements of constructivist approach to teaching and learning. The constructivist approach to teaching and learning is based on the fact that learning occurs as learners are actively involved in a process of meaningful and knowledge construction rather than passively receiving information. This is important in the process because learners are the makers of their own understanding hence , the need for making efforts to foster independent learning, creative thinking and motivation towards learning. These findings can also be explained using the fact that guided discovery has the benefit of increasing intellectual potency by enhancing the learner's ability to organize and classify information. Information absorbed through guided discovery becomes firmly embedded in the cognitive structure of the learner thereby facilitating retrieval.

The results of the research by Afolabi and Akinbobola, (2009) indicated that 5.6% of the teachers use lecture method, 3.4% use project, 64.2% use discussions in secondary school setups but may not be the case in university situations. Studies at the university level have shown that retention (remembrance) level in practical lessons beginning with experiment and slide demonstration was higher than that of beginning with lecture. Because, people remembrance 10% of what they read, 20% of what they heard, 30% of what they saw and 90% of what they had a hands-on experience Beydogan, (2010). Teaching methods such as laboratory work, group discussions and interactive lectures are considered practical and have some element of a hands-on experience because the students take active part.

Research by Probyn, (2004) indicated that lecture method is commonly preferred by university lectures. On the other hand, researchers such as Costello, (1991) have reported that lecture method is ineffective in that it turns the learners into passive participants in the learning process but is considered useful in covering large content. Teaching methods such as discussions, project and discovery methods create an enabling environment for the learners and ensure that individual differences are taken care of hence help in improving the students' cognitive abilities.

Based on the research findings for the objective and the supporting observations, the null hypothesis that the teaching method used has no significant effect on the cognitive achievements of the students in the cause unit taught was rejected and restated that there teaching method used in the cause unit had a significant effect on the students cognitive achievement . The university lecturers should therefore take some time to understand the students' preexisting conceptions and guide the teaching and learning activities to address the practical aspects that allow the students to build on their own experiences and cognitive aspects especially the higher levels such as analysis, synthesis and evaluation in the process of learning. This will make learning more meaningful and more supportive in building their abilities to apply what they learn in a more general environment.

VI. Conclusion And Recommendations

6.1 Conclusion

The teaching methods used had a significant effect on the cognitive achievement s of the students. This gave the indication that in the university teaching and learning set up, the discussion method of teaching and learning was the most appropriate for the achievement of higher cognitive concepts such as analysis, synthesis, application and evaluation. This study further gave the indication that the traditional lecture method was the least productive in terms of students' performance. This could be related to the fact that more practical methods such as group discussions and interactive lectures tend to make learning more meaningful and more supportive in building the students' abilities to apply what they learn in a more general environment.

6.2 Recommendations

6.2.1 General Recommendations

1. The university lecturers need to change their instruction approaches to be more student centred to make a positive change in the students' attitude and its effect on the students' cognitive abilities. Generally, the students develop a better attitude towards a subject if they view the teacher, the classroom and subject positively.
2. The university lecturers should take some time to understand the students' preexisting conceptions and guide the teaching and learning activities to address the practical aspects. This will allow the students to build on their own experiences and cognitive aspects such as analysis, synthesis and evaluation in the process of learning.

3. To restrain the traditional approaches of teaching; lecturers must use innovative strategies to enhance the cognitive level of students. Students must be given the exposure to compete among themselves and with the outer world.

6.2.2 Recommendations for Further Studies

1. Conduct research to investigate the effectiveness of additional active and collaborative teaching methods especially in a large class environment.
2. Conduct studies that also incorporate measures of other learning outcomes in addition to cognitive abilities. This may include measuring improvement in higher level comprehension, critical thinking, and problem solving skills that could provide more insight into the value of the teaching methods in large class sizes.
3. Undertake the same study in a survey mode to cover all institutions of higher learning in Rwanda in order to get the real picture on the ground.

Acknowledgements

My special thanks go to my supervisor, Dr. Michael Ng'umbi for the constructive criticisms, helpful suggestions and the encouragement he offered during the work.

I am also grateful to Dr Mary Kitula, the former Co-coordinator School of Post Graduate Studies, Open University of Tanzania; Rwanda branch for her valuable inputs, academic advice and encouragement.

I will not forget to thank Prof. Issa Mcholo Omari the Course unit lecturer and my classmates who encouraged me and gave material and spiritual support which enabled me to finish this work.

I wish to also recognize the contribution of all the lecturers of Jomo Kenyatta University of Agriculture and technology and Mt. Kenya University, Rwanda who gave in valuable criticisms and provided the necessary guidance.

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