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Research article

The Teaching Methods Used in Universities in Rwanda and their Effect on the Students' Academic Performance

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Abstract

Over a long period, the education in Rwanda had been French. This has been changing systematically but with quality related challenges. The study was an experiment designed to test how teaching methods related to the academic performance at the universities in the country. The study employed an experimental design consisting of post-test control and treatment groups. The research was done over three semesters with MBA business statistics students and a sample size of 242 students. The teaching methods used included group discussions, interactive lecture as treatment and traditional lecture as the control. Data on students' academic performance was collected and analyzed using descriptive statistics. Analysis of Variance (ANOVA) was used to test significant differences in the performance means between teaching methods and X^2 (Chi Squared) was used to test the associations between teaching methods and grades attained at 95% confidence limit. The teaching methods used had significant mean differences in the students' performance. 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' academic performance was adopted.

Keywords: Academic, discussion, interactive, performance, traditional

1. Introduction

2. Background

Innovativeness in teaching is essential because it allows the instructor to change the delivery method of the information provided to students as dictated by the prevailing circumstances. Teaching methods have been dynamic and currently include technologies which enable the instructor to include a number of teaching aids and use a variety of approaches. This research explores how the different teaching methods affect the student performance in the course units being taught at the Universities in Rwanda. The main objective of this research project was to determine whether particular teaching methods could result in measurable effects on students' performance and attitude towards the course unit.

Effective teaching methods are important because they create independence, control and active engagement by providing a sense of student control over learning and interest in the subject matter. According to Maryellen (2009), good teachers create learning tasks appropriate to the student's level of understanding. They also recognize the uniqueness of individual learners and avoid the temptation to impose "mass production" standards that treat all learners as if they were exactly the same. Her observation can therefore be used to conclude that it is worth stressing that the teacher should know the characteristics of the students and hence be able to choose a teaching method that permits control by the learner not only to learn better, but that they enjoy learning more. In most adult learning set ups the instructors tend to depend on textbooks and the need to complete the syllabus within a given time as the determinants of their teaching or institutional requirements. Under such circumstances, the teaching method chosen may have a relationship with imitation instead of comprehension. According to Yuezhong and Yachun (2008), such methods favor abstract symbol operation or reasoning but seldom take student's intuitive sensation into consideration. Creativity and independent thinking is also curtailed through such approaches.

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. However, research by Lemke (2006) indicated that competency in the natural language does not necessarily contribute to competency in the maths-specific language because of the technical concepts involved in teaching and learning mathematics.

On the educational uses of languages, researchers have identified the importance of relating the methodology of teaching to the language ability of the students. According to Barnes (2008); Mercer and Dawes (2008) exploratory talk is the most appropriate method in the development of learners' understanding of new concepts where a language barrier exists. This is because exploratory talk promotes interaction and flourishes in mutually supportive groups. Mercer (2005) confirmed that by allowing the students to expose lack of knowledge and float new and incomplete ideas they are able to take the opportunities to develop a careful knowledge base that can culminate in knowledge

sharing and development. Other studies by Li et al. (2010) also examined the contribution of peer network, group discussions and collaboration as positive practices that are likely to mediate cognitively demanding academic concepts.

Teaching method is a systematic and orderly procedure a teacher employs in any teaching or learning activity and should be adequate to achieve the desired terminal behavioral objectives. Quality of education has been emphasized in Rwanda's educational policy documents and teachers are faced with more standards than ever to achieve this. This requires the need to take a closer look at the curricula and methods mapped out to meet them against the main challenges which include the language achievements to teaching and learning. This may call for the relooking at the traditional teaching formats and finding ways of making the teaching and learning more integrated to cover the multitude of standards and to prepare students to make real life connections among various academic disciplines.

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

The Higher Education Policy (MINEDOC 2008) for Rwanda points out the questionable quality of teaching and learning as one of Country's major education sector challenges. It further identifies severe shortage of adequate and appropriate teaching aids and equipment and shortage of well trained and qualified teachers, particularly in Mathematics and Sciences as the causal agents to education quality drawbacks. It concludes that the challenges must be addressed urgently if the Government's main objective to improve and modernize the teaching and learning processes in higher learning institutions. This is important to the Country for the purpose of meeting its international education based commitments such as the Millennium Development and the Education for All Goals.

Students' academic performance is fundamentally linked to application of ineffective teaching methods by teachers use to impact knowledge to learners (Adunola, 2011). Substantial research on the effectiveness of teaching methods indicates that the quality of teaching is often reflected by the achievements of learners. 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. 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. Effective teaching is therefore a reflection of the teaching method used.

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 outcome would be used to reveal some of the aspects of teaching and learning especially the teaching methods and the related policy aspects that would be useful for the development of special approaches and mechanisms that would guarantee quality assurance in teaching and learning in the country.

1.3the 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 academic performance.

1.4 Objectives of the Study

The objective of the study was to determine the effect of the teaching method used on the academic performance of the students in Rwandan universities

1.5 Research Hypothesis

H_0: The teaching method used had no significant effect on the academic performance of the students in Rwandan Universities at 95% confidence limit.

1.6 Significance of the Study

Government of Rwanda has identified education as a major sector contributing to growth in its development agenda. As such, the Ministry of Education (MINEDUC) has committed to prioritize reforms that would enhance quality teaching and learning. This study was set out to investigate if the use of particular teaching methods could yield a better performance and changes in the attitude of the students towards subjects. The challenges related to the language of instruction especially in subjects such as statistics and analytical methods that have been perceived to be technical were also emphasized in the study.

2. Literature Review

2.1 Teaching Methods and Students' Performance

Teaching method is a systematic and orderly procedure a teacher employs in any teaching or learning activity. Jensen and Sandlin, (1992a) reported that to be able to educate our youth, adequate care must be taken to ensure that the methods used are adequate to achieve the desired terminal behavioral objectives. Maryellen (2009) further emphasizes that effective teaching methods create **i**ndependence, control and active engagement by providing a sense of student control over learning and interest in the subject matter. Good teachers therefore, create learning tasks appropriate to the student's level of understanding.

In mathematics and statistics teaching, the students are expected to develop the cognitive ability to apply formal symbol operation quickly and precisely and therefore, the teachers must always ensure that teaching methods chosen are the ones that help the students remember knowledge and deal with the intuitive aspects developed in the teaching learning process. Freiberg and Driscoll, (1992) emphasized that key to teaching math is to make students internalize and transfer their knowledge so as to make learning math personal. Bruner (1996) indicates in his 'Constructivist Theory' that there is no one best strategy to teach mathematics and puts emphasis on the fact that teaching mathematics entails much more than merely transmitting knowledge to the students hence, several approaches and techniques, ranging from direct, teacher-centered approaches to the less direct and more student-centre ones, should be used to ensure effectiveness in teaching and learning.

However, teaching and learning is not a very straight forward process making it difficult to prescribe a particular teaching method. According to Wehrli and Nyquist (2003), each of the methods or a group of methods chosen has disadvantages and disadvantages. They indicate further that in addition to the good use of teaching techniques the teacher should vary his method of teaching at all times. Jarnin (2005) conducted an extensive survey of teaching method used in secondary schools in Enugu State. She gave a number of methods used either simple or in combination to include group discussions, interactive lectures and traditional lectures among others with no conclusive statement on which one works best under what circumstances.

Traditional lecture is one of the commonly used teaching methods and is considered to be very useful in providing fast hand information and can be used with a large group of students. Wehrli and Nyquist (2003) reported that lecture method is appropriate primarily in situations where there is need for didactic presentation of information, usually to a large group and often with or without with the use of audiovisual aids to transmit information. Its main

advantage is that it helps in providing new information and clarifying existing information to a large heterogeneous group in a short period.

Hake (2002) describes traditional lectures to consist of students sitting in front of a teacher and passively listening as the teacher works through the notes, demonstrations and gives lectures. He argues that traditional lectures tend to encourage passivity and make students dependent on the teacher. According to Cahyadi (2004), lecture method is not appropriate because students need to form a knowledge base and not be told or lectured if they are to retain the information. Tao (2001) also reported that when students that have learned using lectures are tested in class, they tend to be proficient in using the knowledge in immediate problem solving activities. He based this observation on lack of conceptual understanding of the concepts and referred to the practice as 'rote' learning which may produce the correct answer without the ability to reason as to why a particular concept has been used.

Many researchers support the use of lecture method but emphasis that the problem arise from the way lectures are used, not from their inherent inability to promote significant learning. In practice, most lectures do not engage students or motivate them to take responsibility for what and how they learn. Lectures can be more useful to promote learning fully if used interactively with other learning methods such as the use of power point presentation to avoid exceeding attention spans and boredom. Group discussions actively involve participants and stimulate peer group learning. Small groups of 5-10 address case-based tasks, exchanging points of view while working through a problem-solving process. According to Wehrli, and Nyquist, (2003), the main advantages include: helping participants explore pre-existing knowledge and build on what they know; facilitates exchange of ideas and awareness of mutual concerns; promotes development of critical thinking skills; develops leadership, teamwork, communication, and collaboration skills; promotes higher levels of thinking (application, synthesis, and evaluation) versus simple memorization and creation of safe environment for learners to participate, ask questions.
Dykstra et al (1992) states that discussions bring about student ownership of the ideas by allowing them to think through the questions and form their own connections. Smith et al (2009) supports this by confirming that students engaged in group discussions benefit by increasing their conceptual understanding through peer discussions and coming to a consensus after looking at all possible answers and ensure that all students are engaged in the process. Discussions allow for immediate feedback and give every member a chance to have a say on what is being discussed. They also provide the students with an opportunity to develop their communicative and meta- cognitive skills that are crucial for components of disciplinary expertise. However, Wehrli and Nyquist, (2003) identified disadvantages of group discussions to include: the potential degeneration into off-task or social conversations difficulty in ensuring participation by all, especially in larger groups which may result in frustration for participants when they are at significantly different levels of knowledge and skill; unpredictability in terms of outcomes; increased potential for interpersonal conflicts and time factor. This was confirmed by Brandes and Ginnis, (1986); Anon, (1992); Petty, (1998) indicating that other than the known advantages, group discussions also has a number of implementation achievements such as language and understanding achievements that may come from both the students and the teachers.

Improved lectures through the use of interactive techniques may make lectures more interesting and interactive. Interactive teaching involves a variety of strategies that influence students directly or indirectly. Teachers can use the interactive approach by telling, showing, asking and providing students with the opportunities to self explore topics and lessons. The actual techniques that have been identified to work include; the use of flush cards, brain storming, think in pairs and sharing, demonstrations, cooperative learning and independent study among others. Students may benefit from interactive teaching by learning to construct their own understanding and meaning while learning to reason, problem solve and think critically. Researchers such as Cortright et al (2005), Cahyadi (2004), and Falconer et al (2001) reported increased conceptual understanding which leads to better quantitative problem solving and higher knowledge retention abilities when interactive lectures are used. Pigdon and Woolley, (1992) reported that students are active learners should be allowed to research, interpret, communicate, and process learning to both others and themselves.

Inquiry approaches allow for students to construct meaning using their prior knowledge on a subject, and new knowledge gained during the learning process. Further Analysis of their work revealed that interactive approach

allows learners to explore, gather, process, refine and present information about topics they want to investigate without the constraints imposed by traditional subject achievements. Armstrong (2009) observed that the subject at hand proved to make a difference. The data from SPSS indicated that the difference in scale scores was almost negligible in social studies, although those receiving interactive instruction scored slightly higher. Conversely, the data indicated that the difference in scale scores was significant in reading whereby, those receiving interactive instruction scored significantly higher than those receiving traditional instruction. This indicated that teaching method played a bigger role in reading than in social studies. They concluded that interactive method proved successful in both subjects. Their recommendation was that future studies could investigate other independent such as ethnicity, socioeconomic status, and student attitudes. However, Metzer and Manivann (2002) warn that although the conceptual understanding is higher in cases where interactive lectures are used, it may not be easy to use the approach to cover the same amount of material as traditional lectures. They also indicated that students may initially resist the implementation of such methods because they are used to the traditional methods.

From the observations it can be concluded that the teaching approach used should allow students to engage in purposeful, relevant learning. These views are supported further by both the Social Cognitivism Theory by Piaget (1981) and Vygotsky's Social Constructivism Theory (1978) which at their point of similarities emphasizes the fact that cognition as the result of mental construction and learning is affected by the context in which an idea in put across as well as the student's beliefs, attitudes and social influences. The two theories emphasis on the need to embody the concepts of individual learning styles that impact the way in which individual students process and store information in the teaching and learning process through more practical oriented approaches and techniques.

2.2 Teaching Methods and Effective Teaching

Teaching is a complex, multifaceted activity, often requiring the teacher to juggle multiple tasks and goals simultaneously and flexibly. George and Madeleine (2005) describe effective teaching as an intellectually demanding process that requires the teacher to know the subject well and hence select the key strategies, instructional materials and methods. This requires serious thinking and clearly defined problem solving strategies. They further emphasize that effective teaching requires the teacher to consider the student entry behavior to communicate to them and stimulate them to learn, think and communicate. Effective teaching aims at creating the conditions that support student learning and minimize the need for revising materials, content, and policies and should aim at embracing approaches to meet the needs of all learners.

The quality of students' performance remains at top priority for educators as it is affected by a very high number of factors. The aim of all teaching activity is to facilitate and support student learning and the teaching skills are applied to ensure that this is done in the best way possible. Teaching (including supervision and examination), the preparation of study guides and learning material, the development of courses and new methods, efficient administration and good pedagogical leadership are examples of the different elements of teaching. Of importance as well is what the teacher has done to develop and maintain his or her pedagogical competence. According to Kuh et al (2005), teaching is more effective and student learning is enhanced when: (a) the instructors articulates a clear set of learning objectives (i.e., the knowledge and skills that students are expected to demonstrate by the end of a course); (b) the instructional activities (e.g., case studies, labs, discussions, readings) support these learning objectives by providing goal-oriented practice; and (c) the assessments (e.g., tests, papers, problem sets, performances) provide opportunities for students to demonstrate and practice the knowledge and skills articulated in the objectives, and be able to offer targeted feedback that can guide further learning.

Research by Ramsden, (1992) suggested that for effective teaching to take place; a skilful teacher needs to use a variety of methods and techniques. He was of the opinion that teaching aids and materials are needed by teachers for effective motivation of the student. The selection of what method to use should be guided by the instructional objectives and the entire behavior of the student. Rex Mauler (2005) identifies the student's age as an important factor and states that teaching a pre-school child is very different from teaching an adult in terms of attention span, interest and the challenges involved in the tasks given. The material also needs to be matched with the interests of the students being taught. The summary given by Glickman, (2009) is that effective teaching should not be looked at

as a set of generic practices, but instead is a set of context-driven decisions about teaching. Effective teachers do not use the same set of practices for every lesson but constantly reflect about their work, observe whether students are learning or not, and, then adjust their practice accordingly. Effective teaching should also set high standards for students by articulating clear goals up front on what they will learn and what they will be expected to do during the lesson.

2.3 Theoretical Framework

The study applied the Paiget's (1981) individual or cognitive constructivism and the Vygotsky's (1978) social cognitive constructivism theories as summarized by Powell and Kalina (2009). The selection of the different teaching methods was based on key concept of Vygotsky's (1978) social constructivism theory which states 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 happens only through interactive processes of discussion, negotiation, and genuine knowledge sharing.

3. Materials and Method

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' academic performance 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)

Three topics from the course outline were chosen for the research. The students in the experiment group A were taught by group discussion as the main method of teaching, group B was taught mainly by use of interactive lectures presentations while group C was the control group taught by the traditional lecture method.

The students in all the groups (A, B and C) were tested in the chosen topic areas at the completion of the teaching period as a way of conducting summative evaluation with two formative evaluations in between to get students' average scores. For each experimental topic chosen, the total performance was recorded on the class mark sheets. The questions set from the three topics for the tests were set in structured format using the recommended testing procedures which take the different cognitive levels of knowledge, comprehension, analysis, synthesis, application and evaluation into consideration.

3.5 Data Collection

The total achievement score was recorded for each experimental topic chosen on the class mark sheets each time an assessment was administered to the experimental and the control classes. 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.

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):

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

Where: $k =$ *Number of items*

σ_i^2 =*Variance of individual items*
σ_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.

4. Results

4.1 Introduction

The purpose of the study was to determine whether particular teaching methods had measurable influence on the students' learning outcomes in terms of academic performance. The academic performance was also tied to some specific environmental factors that were also likely to affect the students' performance.

4.2 General Comparison of the Performance between the Teaching Methods

Preliminary investigation was done by comparing the scores from the three different teaching methods of discussions, interactive lectures and traditional lectures. The grades were compared from the A grade of excellent through the ranks to the F grade of fail for the different teaching methods. The results showed that all the three methods recorded relatively low percentages of failures in grades F. However, the traditional lecture method had the highest number of failures with F grades (27.4%); followed by discussion and interactive lecture methods both of which were not significantly different from each other at 11.3 and 11.2% respectively. The traditional lectures gave the highest number of average C grades at 27.5% while interactive lectures had the highest number of B grades at 27.5%. The higher grades showed significant differences where discussions method lead with 47.5% A grades and 25.0% B grades the followed by interactive lecture at 37.5% A grades and 27.5% B grades. The last was traditional lectures which had 25% A grades and 20.0% B grades. The results showed that the discussion method gave more superior results in terms of performance than the other two teaching methods when compared using percentages.

4.3 Comparisons of the Performance between the Teaching Methods

Further, mean comparisons were done to determine whether there were any significant differences in the students' performance between the teaching methods at 95% confidence limit. The results of the ANOVA of the means of students' performance between the teaching methods showed that there were significant variations in the students' performance arising from the teaching method used ($F(2,237) = 7.944$, $p = .000$). This indicated that the teaching method used had a significant effect on the performance of the students. Further comparison of the means using the Post Hoc multiple comparisons to determine the least significant differences in the students' performance between the teaching methods at 95% confidence limit was also done. The results showed that there was a significant difference in performance between discussion method and the traditional lectures with a mean difference of .73750 and between interactive lectures and the traditional lectures at a mean difference of .53750 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. However comparing the mean differences, the discussion method still remained higher than the interactive lecture method when the two were compared to the traditional lecture method. The positive mean difference of .2000 between the discussion method and the interactive lecture method was not significant at 95% confidence limit. This was a further indication that the discussion method remained slightly more superior to the interactive lecture method. The results pointed to the fact that in the university teaching and learning set up, both the discussion and the interactive lecture methods of teaching and learning were applicable for the

achievement of good grades but the discussion method still remained the most superior of the three methods. This study further gave the indication that the traditional lecture method was the least productive in terms of students' performance.

4.4 The Extent of Association between Teaching Method Used and the Students' Performance.

Chi-squared analysis was used to test the extent of association between the teaching method used and the students' academic performance. The results of chi-squared analysis for students' performance as affected by teaching methods showed that the model was significant $\chi^2(8, N = 240) = 17.965$, $p = 0.021$. This indicated that the difference in proportions of student performance based on the teaching methods were significant at 95% confidence limit.

4.5 Summary of the Findings

The research findings were summarized based on the specific objective as follows: The teaching methods used had significant mean differences on the students' performance. Further analysis of the differences 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' performance the course unit taught at the university was accepted. This indicated that both discussion method and the interactive lectures were superior to the traditional lecture approach to teaching and learning. This observation could lead to the conclusion that the students' learning outcomes 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. This gave the indication that in the university teaching and learning set up, both the discussion and the interactive lecture methods of teaching and learning were applicable for the achievement of good grades but the discussion method still remained the most superior of the three methods. This study further gave the indication that the traditional lecture method was the least productive in terms of students' performance.

5. Discussion of the Findings

5.1introduction

This chapter presents the discussions of the study findings. The discussions were based on the objective of the study, the information available in literature review and the findings for the objectives. The research objective sought to determine the relationship between the teaching method used and the academic performance of the students in the course unit taught in Rwandan universities. The data analysis was done to establish the extent to which the teaching method used affected the performance of the students. The teaching methods formed the independent variable while the student's performance formed the dependent variable. The general comparison of the performance from the three different methods was done using descriptive statistics of frequencies and percentages. Further analysis was done using ANOVA to determine whether the mean differences in the performance were significant between the teaching methods. Chi square analysis was employed to test the association between the teaching method used and the performance.

5.2 Discussions

The results of the analysis of variance showed that there were significant variations in the students' performance arising from the teaching method used, $F(2,237) = 7.944$, $p = .000$). On comparison of the students performance between teaching methods, the report indicated that group discussion was the most superior teaching method followed by interactive lectures and the last in mean rankings was the traditional lectures as a teaching method; all

compared at 95% confidence limit. The results of the Chi squared analysis indicated that the teaching method used had an effect on the student performance in the business statistics course at the university level $\chi^2(8, N = 240) = 17.965$, $p = 0.021$. This indicated that the difference in proportions of student performance based on the teaching methods were significantly different. The observation could be generalized to teaching and learning at all levels but with special reference to teaching at the university. The observations corroborated what was reported by other researchers such as Hunt, et al (2003) who examined student performance in team learning methods and reported positive learning outcomes in team work methods as compared to traditional lecture-based methods. Other research studies which conducted a comparison of lecture combined with discussion versus active, cooperative learning methods by Morgan et al (2000) who demonstrated that the use of the lecture combined with discussion resulted in superior retention of material among students than in cases where specific methods are used. They further explained their observed results using the fact that an integrated approach allows learners to explore, gather, process, refine and present information about topics they want to investigate without the constraints imposed by traditional subject achievements.

The fact that the use of discussion and interactive lecture method proved to be superior to traditional lecture method has been reported mainly in lower levels of teaching and learning but also seems to be applicable to higher level teaching and learning. Both the discussion method and the interactive lectures were described by Pigdon and Woolley, (1992) and were categorized as integrated approach to teaching and learning. The superiority of the two methods emanate from the fact that an integrated approach allows students to engage in purposeful, relevant learning. Lecturers can use a variety of interactive activities to engage their students. Such activities include having students to share knowledge and experiences between themselves. Hake (2002) defines interactive engagement (IE) methods as those designed at least in part to promote conceptual understanding through interactive engagement of students in terms of heads-on and hands-on activities which yield immediate feedback through discussion with peers and/or instructors. This notion put forward by Hake (2002) was a conclusion from research in which he compared student performance in Interactive engagement versus the traditional approach to teaching of various courses and observed significant larger learning outcomes for both discussion and interactive lecture teaching methods by type courses relative to traditional courses.

Overall, the results of recent studies concerning the effectiveness of teaching methods favor constructivist, active learning methods. Further, research on group-oriented discussion methods has shown that team learning and student-led discussions not only produce favorable student performance outcomes, but also foster greater participation, self confidence and leadership ability (Perkins & Saris, 2001; Yoder & Hochevar, 2005). Research done by Carpenter (2006) in determining the best teaching method that can be used for effective teaching in large classes indicated that the lecture and discussion teaching methods were the most preferred among students. Student comments as to their reason for selecting this as the most valuable method seemed to suggest that the students usually have a desire to be somewhat active learners, engaging in discussion rather than passively listening to a lecture. The discussion interactive lecture combined method was the most preferred by 56% of the students (19%). This suggests that some students wish to be very active in their learning process, taking sole responsibility for a portion of the material and learning the other portions through interaction with their classmates.

Integrated learning encourages students to see the interconnectedness and interrelationships between the curriculum areas. Rather than focusing on learning in isolated curriculum areas, an integrated program is based on skill development around a particular theme that is relevant to the children in the class hence, giving them opportunities for students to learn more about the content" (Pigdon and Woolley, 1992). Smith and Ellery (1997) agree with this, saying that children can develop a deeper understanding of content through a range of purposeful activities. In this approach, the Students are active learners who research, interpret, communicate, and process learning to both others

and themselves. Inquiry approaches allow for students to construct meaning using their prior knowledge on a subject and new knowledge gained during the learning.

Based on the report by Armstrong (2009) the general conclusion is that the inquiry approaches such as discussion in groups and interactive lecture allow for students to construct meaning using their prior knowledge on a subject, and new knowledge gained during the learning process. Further Analysis of the work reveals that interactive approach allows learners to explore, gather, process, refine and present information about topics they want to investigate without the constraints imposed by traditional subjects. The data from SPSS indicated that the difference in scale scores was almost negligible in social studies, although those receiving interactive instruction scored slightly higher. Conversely, the data indicated that the difference in scale scores was significant in reading whereby, those receiving interactive instruction scored significantly higher than those receiving traditional instruction. This indicated that teaching method played a bigger role in reading than in social studies. It can therefore be deduced that interactive method proved successful in both subjects. The recommendation from the report was that future studies could investigate other independent variables such as ethnicity, socioeconomic status, and student attitudes. Hake (2002) on the other hand defined traditional lectures as those which rely on reporting by the instructors without making any reference to the interactive approaches and relies primarily on passive-student lectures. Traditional lectures have been in use mainly at higher level learning especially in tertiary institutions. The whole process involves students sitting in front of a teacher passively listening as the teacher works through notes, does demonstrations, and gives lectures. The traditional passive view of learning involves situations where material is delivered to students using a lecture-based format.

The lecture method is the most widely used form of presentation especially for introduction of new subjects, summarizing ideas, showing relationships between theory and practice, and reemphasizing main points. Several research studies have downgraded the traditional lecture method despite its wide usage especially in institutions of higher learning. Instances where preference is shown for the lecture method have been related to the fact that the method is adaptable to many different settings, including either small or large groups. Lectures also may be used to introduce a unit of instruction or a complete training program and can easily be combined with other teaching methods to give added meaning and direction. This also goes with a condition that every instructor using the lecture method should know how to develop and present a lecture. They also should understand the advantages and limitations of this method. However, many researchers such Barnes & Blevins (2003) contrast to these findings, by suggesting that active, discussion-based methods are inferior to the traditional lecture-based method. Tao (2001) support the use of lecture method but emphasis that the problem arise from the way lectures are used, not from their inherent inability to promote significant learning. In practice, most lectures do not engage students or motivate them to take responsibility for what and how they learn. Lectures can therefore be more useful to promote learning fully if used interactively with other learning methods such as the use of power point presentation to avoid exceeding attention spans and boredom.

The use of discussion groups and interactive lectures are in line with constructivism which is the modern view of learning where students are expected to be active in the learning process by participating in discussion and/or collaborative activities (Fosnot, 1989). Overall, the results of recent studies concerning the effectiveness of teaching methods favor constructivist and active learning methods. Research has shown that students benefit from interactive teaching by learning to construct their own understanding and meaning while learning to reason, problem solve and think critically. Researchers such as Cortright et al (2005), Cahyadi (2004), and Falconer et al (2001) reported increased conceptual understanding which leads to better quantitative problem solving and higher knowledge retention abilities when interactive lectures are used. Researchers such as Pigdon and Woolley, (1992) Damodharan & Rengarajan, (1999) confirmed this by indicating that students are active learners and should allowed to research,

interpret, communicate, and process learning to both others and themselves. As such, research evidence on teaching approaches maintains that interactive teaching methods teaching methods that involve some level of discovery are more effective in improving students' academic performance and interest in learning.

It is also important to note that teaching and learning is not a very straight forward process making it difficult to prescribe a particular teaching method. According to Wehrli and Nyquist (2003), each of the methods or a group of methods chosen has disadvantages and disadvantages. They indicate further that in addition to the good use of teaching techniques the teacher should vary his method of teaching at all times. Jarnin (1976) conducted an extensive survey of teaching method used in secondary schools in Enugu State. She gave a number of methods used either simple or in combination to include group discussions, interactive lectures and traditional lectures among others with no conclusive statement on which one works best under what circumstances. The findings of a study by de Caprariis etal (2001) suggest that all the practical teaching methods have some advantages and should not just be dismissed. They went ahead to state that lecture is important because it may lead to the ability to recall facts, but discussion produces higher level comprehension.

In conclusion, the discussions lead to the view that all the practical teaching methods have some advantages even at higher levels such as the university and should not be dismissed. Based on this conclusion, the null hypothesis that there was no significant effect of the teaching method on the students' performance in the course unit taught in Rwandan universities was rejected at 95% confidence interval and restated that the teaching method used had a significant effect on the students' performance in the course unit taught at the university. This did not mean that traditional lectures should not be used in teaching and learning in universities but should be used with conditions and in combination with more practical approaches such as group discussions and interactive lectures.

6. Conclusion

The null hypothesis that the teaching method used had no significant effect on the students' performance outcomes was rejected. This meant that even in the university teaching and learning just like in all the other levels, both the discussion and the interactive lecture methods of teaching could be used to improve students' performance in the course unit. The two methods could be interchanged for each other but the discussion method still remained the most superior of the three methods. This did not mean that traditional lectures should not be used in teaching and learning in universities but should be used with conditions and in combination with more practical approaches such as group discussions and interactive lectures

7. Recommendation

Based on the results of the study, the following recommendations were made:

7.1 General Recommendations

1. A combination of teaching methods is the best approach to teaching and learning. This is because even the lecture method that is considered to be the most downgraded method of teaching mean still works well if used with conditions and in combination with more practical approaches such as group discussions and interactive lectures.

2. The university lecturers need to change their instruction approaches to be more student centered to make a positive change in the students' attitude towards teaching and learning. Generally, the students develop a better attitude towards a subject if they view the teacher, the classroom and subject positively.

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.

7.2. Recommendations for Further Research

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 examination scores. 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.

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