

Challenges Faced by Lecturers in Teaching Quantitative Courses at a Distance: A Case of Harare Region of the Zimbabwe Open University

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ABSTRACT The thrust of the Zimbabwe Open University (ZOU) is to produce graduates who, in addition to being specialists in their respective fields. In trying to develop these research capacities, the statistics and basic mathematics courses become indispensable. The teaching of these quantitative courses poses both opportunities and threats to the successful delivery of these courses. The purpose of this study was therefore to investigate the challenges of teaching quantitative courses through distance learning. The study also sought to identify the perceptions of Statistics lecturers within the four faculties of the university and the challenges they faced. The study examined the challenges and strategies that can be implemented by the institution to overcome these challenges. Convenient sampling of lecturers currently teaching the courses was employed. Findings indicate that there are several challenges in teaching the courses due to a generalized fear of quantitative subjects by students, lack of motivation and attitudinal problems as well as inadequate preparation of students for examinations.

INTRODUCTION

ZOU is an Open and Distance Learning (ODL) institution that was established in 1999 through an Act of parliament (Chapter 25:20) (Ndeya-Ndereya et al. 2003). The university also caters for Zimbabweans who had been marginalised from accessing tertiary education during colonial period and inability to attend full time studies due to work commitments and other pressures of life. The concept of distance education and open learning from most authorities indicate that it is whereby learners learning separated from the instructional base or teacher, either in space or time, for a significant portion of their learning (Chabaya et al. 2000). According to the Association for Education in Africa (2002), most definitions of distance education pay attention to the

following characteristics: institutional accreditation, the use of a variety of media, the provision of a two way communication and the possibility of face to face meetings for tutorials. It means that distance education is an educational process that ensures that a significant proportion of the teaching is done by someone who is removed in space and time from the learner (Kangai and Bukaliya 2011). In the context of teaching quantitative courses through this mode, it is important to understand distance education not as a mode of delivery with one identity but rather a collection of methods that facilitates learning.

The understanding of the main tenets of distance education is important in explaining the challenges and possibilities that are posed by teaching quantitative courses through distance education. The term ODL represents approaches that focus on opening access to education freeing learners from the constraints of time and place, and offering flexible learning opportunities to individuals and group learners. Worldwide, many factors have contributed to the growth and development of ODL, including in-

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creased pressures for access to educational opportunities, technological innovations and vast economic changes on the global scale (Brindley 1995). The main characteristics of open and distance learning as illustrated by Ndeya- Ndereya et al. (2003) embraces a wide range of forms of study in which students are not in a position to be tutored immediately and at whatever time. In ODL teaching is not continuously carried out. There are many gaps between one teaching session and the next one. Face to face tutoring, electronic tutoring and other forms of academic support to learners form an important component of distance education. While all the courses are taught through the open learning mode, there are several challenges that tutors face in their delivery.

The focus and thrust of the ZOU is to produce graduates who, in addition to being specialists in their respective fields, are also fully fledged researchers. In trying to develop these research capacities, the statistics and basic mathematics courses become indispensable. The possession of research skills is a prerequisite among graduates the world over, as this equips students with the necessary data analysis skills. The ZOU in developing these required skills has in its curricula courses that aim to impart theoretical and practical aspects of research and these include statistics courses and basic mathematical courses that reflect on the particular aspirations of the degrees. In teaching these courses through the distant learning mode of delivery, Zimbabwe Open University is facing many challenges which include low pass rates, skipping of quantitative exam courses, lots of exam deferments, significant attrition as a result of continuous failure of quantitative courses and others in its four faculties (Borresen 1990).

Lecturers the world over are faced by the challenges of many students failing introductory statistics courses and other related mathematical courses (Pan and Tang 2004). This is particularly evident within degree programmes that don't have statistics and mathematics courses as majors (Kangai and Bukaliya 2011). Several studies have been done so as to come up with explanations for this phenomenon with Onwuegbuzie and Wilson (2003) reporting that American students taking statistics courses report high levels of anxiety in these courses as compared to other courses. The low performance in statistical and related courses is regarded as 'statistics anxiety' a concept that is defined as any 'performance characterized by extensive worry, intrusive thoughts, mental disorganization when exposed to statistics content, problems instructional situations and is commonly claimed to debilitate performance in academic situations by interfering with the manipulation of statistics data and solution of statistics problems' (Zeidner 1990: 319). In their study, Onwuegbuzie and Wilson (2003) categorized statistics anxiety into three, namely, situational, environmental and dispositional factors. The situational factors encompass factors related to performance parameter of statistics and mathematics prior knowledge, instructor's evaluation course grades and whether the course is an elective or core course. Environmental dispositions denote to issues like gender (female reporting higher anxiety), age (older students reporting higher anxiety), race, and learning styles. The dispositional factors included variables related to self esteem, perceived scholastic competence, perceived intellectual ability, perfectionism, procrastination, hope and coping strategies. Onwuegbuzie et al. (2000) found that 75 % to 80 % of graduate students in the social sciences appeared to experience uncomfortable levels of statistics anxiety which negatively affected learning and performance. This is more common in students whose academic background includes little previous statistical or no mathematical training. Lalonde and Gardner (1993) argue that any teacher of statistics can attest that a significant number of students experience apprehension with regard to their ability to perform well in the course. This anxiety most likely stems from the individual's history of performance and affective reactions in learning mathematics, and is present when the individual enters a university program. In fact, Betz cited by Onwuegbuzie and Wilson (2003) found that "math anxiety" is experienced by a significant number of college students undertaking mathematically related courses.

Several studies have noted that it is very difficult to rate the levels of statistics anxiety that students experience when they are taking these courses (Pan and Tang 2004; Yunis 2006). In their studies Onwuegbuzie and Wilson (2003) observed that there were several instruments that were currently in use that rate the levels of students' anxiety. They report that there are five scales that directly measure statistics anxiety, namely, the Statistics Anxiety Scale developed

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by Pretorius and Norman in 1992, the Multifactorial Scale of Attitudes Toward Statistics by Auzmendi in 1991, Zender's 1991 Statistics Anxiety Inventory, an unnamed instrument of statistics anxiety developed by Zanakis and Valenza in 1997, and the Statistics Anxiety rating designed by Cruise in 1985 (Yunis 2006). It is noted that in most cases lecturers that teach statistics courses and other quantitative courses can detect or perceive the presence of anxiety among students even without the use of psychometric instruments (Mpezeni et al. 2010; Onwuegbuzie and Wilson 2003; Yunis 2006). After teaching the course for several years a tutor can accurately predict whether students positively view themselves as passing or failing the courses.

Several reasons have been put forward so as to explain why students perceive statistics courses as being difficult. Literature on the subject reveal that instructors fail to effectively articulate the statistical language of instruction to students contribute to failure and dissatisfaction in the course (Connors et al. 1998; Pan and Tang 2004). In another related study, Mji and Onwuegbuzie (2004) outlined that many students enter statistics courses with negative attitudes and uncomfortable levels of anxiety which contribute to subsequent failure and low performance. Using the Egyptian sample of students, Yunis (2006) found that one of the possible reasons why students failed quantitative courses was that while in secondary school most students shunned courses that had anything to do with science and mathematics since they perceived them as difficult and only did humanities subjects. This ensured that why all undergraduate courses have at least one Statistics module the majority of students fail these courses as they do not have firm foundations of quantitative related courses. Hence to these students dealing with numbers and formulae only bring upon them negative experiences, thus statistics anxiety. Murtonen and Lehtinen (2003) noted that one of the reasons why students fail in any discipline is due to problems in vocabulary and language of instructions that are used in the various courses. The language of instruction that is used by statistics lecturers is often not related to the everyday language that students use, in most instances the vocabulary might not be suitable to the language and understanding of the students. Another reason that usually contrib-

utes to the rise in the failure rate of students taking quantitative courses is due to the fact that most students do not regard statistics to be a relevant or important component of their degree programs but merely a pervasive obstacle that they must overcome in order to graduate (Gal 2000). In summing up the challenges that statistics instructors face in teaching the course, Connors et al. (1998) states that they usually face four main challenges: to motivate students the value of a subject that they think is irrelevant too their life, to deal with the anxiety that is often associated with learning statistics, to effectively teach both high and low achiever, and to make the learning of the course memorable.

However, few studies have examined methods and strategies that reduce the anxiety in quantitative courses (D'Andrea and Waters 2002). Our study sought to examine challenges faced by students in learning of statistics. Onwuegbuzie (2000) asserts that at times the levels of anxiety that is associated with the teaching of quantitative courses can be reduced by ensuring that students are assessed in a manner that they understand and appreciate. He argues that in most cases students view the examination period as a time of punishment and pain. He states that students must be assessed periodically during the course of the semester and not take assessment as a one off initiative that is done after the completion of the course. Also in terms of assisting students that find these courses difficult, Yunis (2006) stated that there is a great need of assisting these low performers in order to increase their self esteem and performance. Garfield (1995) states that students should be assisted with model examination papers that are related to the taught material. Such models are important in the teaching of quantitative courses as they allow students to know the performance expected by the course lecturers. Such initiatives are also important in increasing the chances of students passing these courses as students usually prepare for examinations in ways that reflect how they believe they will be tested (Onwuegbuzie 2000). Other studies by Berk and Nanda (1998) noted that the use of humour had a tremendous effect of reducing students' statistical anxiety. It is noted that while the levels of anxiety were reduced the researcher also found that there was no change in the attitudes towards statistics by the respondents. In other studies, Borresen (1990) illustrated the im-

portance of cooperative learning in the study of Statistics as students often understand each other better when issues are discussed by their peers rather than by their instructors. D'Andrea and Waters (2002) also advocate for the use of short stories in the teaching of Statistics and other related courses in order to reduce anxiety and fear of the courses.

The literature on the subject area illustrates that universally the statistics courses are rated as being difficult among undergraduate students (Schacht and Stewart 1990). It has to be noted that all the studies were done with students taking the course at conventional universities. The fact that the students within the ZOU's four faculty's students were taking the course through distance education poses the need of finding new ways of helping students in meeting their challenges. The above mentioned fact incited the researcher to carry out the study as there was an urgent need to understand the perceptions of lecturers on their perceptions as well as the challenges that they faced in teaching quantitative courses through distance education. This was deemed as of importance as the study can eventually influence policy and delivery of quantitative modules using this mode of delivery.

The teaching of quantitative modules is an important aspect of the academic lives of many Lecturers and Teaching Assistants in many Faculties in various universities. The teaching of these courses through distance learning is somewhat different from how the same courses are taught in conventional universities. Distance learning is tutorial-based while in the conventional universities the lecturers and the students meet regularly for teaching and discussions of concepts. Within the ZOU's four faculties, quantitative courses are prioritized and are seen as core courses that are required of all students taking any degree within the university. In sharpening students' analytical and research skills, the quantitative modules play an integral part in the academic lives of students. In teaching these modules, there are several challenges that lecturers and teaching assistants face as they endeavour to impart relevant concepts to students. The pass rates of these courses are generally low as compared to other courses on the same level.

A synopsis of the pass rates for the statistics courses across the four faculties in the June/July 2012 exams shows that pass rates were generally low compared to other courses between and within faculties (see Fig. 1).

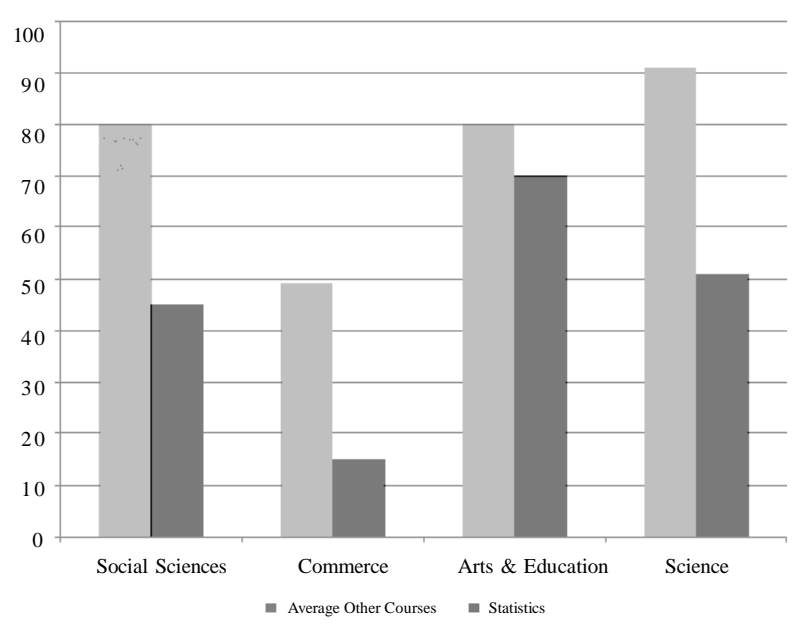


Fig. 1. Quantitative courses pass rates from Zimbabwe Open University June/July 2012

This study was guided by the following research questions: (a) What are the lecturers' perceptions regarding failure and success in quantitative courses? (b) What are the lecturers' challenges of teaching quantitative courses through distance learning?; and (c) What strategies can be implemented by the institution to overcome challenges in quantitative learning in Open Distance learning?

METHOD

Design

This study used qualitative research methods to determine challenges faced by lecturers and assistant lecturers who teach quantitative courses through Open and Distance Education. In selecting the methodology for this study, the researchers aimed to capture individual experiences in the teaching of these courses that would provide a platform from which solutions and strategies would be formed.

Population

The population of this study was made up of 49 lecturers and 4 assistant lecturers from ZOU's National center and Harare regional campus. Lecturers and assistant lecturers from Harare were used in this study because one of the researchers was based in Harare before moving to ZOU's Mashonaland region. The findings cannot be generalized to ZOU as a whole because the sample used is small.

Sampling

Purposive sampling was used to select lecturers and assistant lecturers who were teaching statistics and Basic Mathematics courses within the four faculties. A sample of lecturers and assistant lecturers who are based at the Harare Region and at the National Centre were used in the study because of easy access since one of the researchers was based in Harare. The number of lecturers interviewed is shown in Table 1.

Instrument

This study used an interview guide to find the perceptions of lecturers and assistant lecturers who teach quantitative courses through distance Education. The interviews enabled the study to probe perceptions of lecturers and as-

sistant lecturers who teach quantitative courses through distance education. The interview guide used in this study was tested for content validity.

A pilot study was used to obtain criterion validity. The use of a province was done to avoid sharing of information among would be respondents.

Table 1: Distribution of respondents by faculty (n=53)

Faculty	Lecturers	Assistant lecturers
Commerce and Law	10	0
Social Sciences	11	3
Science	8	1
Education	20	0
Total	49	4

Data Collection

Data from lecturers and teaching assistants were collected using interview. In this approach, a set of topics instead of structured questions were discussed in depth. The selected topics covered the following issues: (a) The reasons students failed in quantitative courses as compared to other courses at the same level; (b) Whether the current mode of delivery was adequate in teaching quantitative courses; (c) The number of tutorials needed to effectively teach quantitative courses through distance education; (d) The challenges of teaching quantitative courses through distance learning; and (e) The strategies and solutions of overcoming these challenges.

Data Analysis

The data that resulted from the interview were analysed manually. All the audio-taped interview sessions were transcribed. Similar ideas were identified and grouped into thematic a category, that is themes were put into categories based on the meaning they conveyed.

Ethical Considerations

The study addressed the following ethical considerations: (a) *Informed consent and voluntary participation*: Respondents who were lecturers and assistant lecturers of ZOU were

given all relevant information about the risks or harm that could arise if they participate in the research. Participation in this study was voluntary and the participants were free to withdraw at any point. (b) *Protection from harm*: The study thrived to ensure that respondents were not exposed to any undue physical harm or psychological harm. According to Happner et al. (1992:93), harm can be embarrassment, anger imitation, physical and emotional stress, low self esteem, exacerbation of stress, delay of treatment, sleep deprivation, loss of respect from others, negative labeling, invasion of privacy, damage of personal dignity, loss of employment and civil or criminal liability. The researchers tried as much as possible to be honest, respectful and sympathetic towards all participants. (c) *Confidentiality and privacy*: Respondents' information and responses shared during the study was kept private and only used for purposes of this study. All research transcripts being audio or written were destroyed at the completion of the study.

RESULTS

Interviews were held with the lectures of the respective faculties and they presented the following perspectives on teaching of quantitative courses to distance learners. The findings are presented following four themes driven from respondents' responses and research questions.

Theme 1: Reasons why students fail in quantitative courses as compared to other courses at the same level?

Responses from the participants:

- Open and Distance Learners have too many responsibilities that affect their studies, most of them are civil servants, mothers, fathers, entrepreneurs as well as students.
- Students exhibit high levels of anxiety when confronted with statistical ideas, problems or issues that have anything to do with numbers.
- Most students usually do the statistics course during their last semester and enter the course with expectations that it is one of the toughest they have to tackle during the course of their studies.
- Students often cannot balance their time to include study and other related concerns.
- Courses like statistics cannot be taught in one's mother language and its difficulty for students to generalize what they learn into real life experiences.

- Students fail as they feel that the concepts and issues that they learn in statistics are not relevant to their everyday lives.
- Most students tackle these courses several years after completing their O' levels and it becomes difficult for them to cope.
- Students always perceive that the time allocated for the course is inadequate even before embarking on the course which affects overall performance.
- Students have generalized fear of statistics that make it difficult for Lecturers in teaching them. One lecturer had this to say

Theme 2: Mode of delivery and materials adequate in teaching of quantitative courses to distance education learners?

Responses from the participants

- The modules are adequate in the teaching of statistics and other courses.
- Students need extra materials to supplement the modules.
- Apart from the module students must be given workbooks that help them in understanding basic concepts in the courses.
- The materials are clear but students must attend tutorials for further explanations of concepts in the modules.
- Quantitative courses require a lecture-like approach so that students can effectively understand these concepts.
- Modules alone are not adequate in the teaching of statistics and other related courses.
- Statistics modules are not as interactive as other modules for other courses and the examples that are often given do not relate to the students' way of life and general understanding.

Theme 3: Challenges in of teaching quantitative courses through distance learning

Responses from the participants:

- Students who attend tutorials in statistics and basic mathematics often lack the motivation in the subject area that emanate from low self esteem in tackling anything that has to do with numbers or symbols.
- Most of the students who enroll for degrees through ODL will have left school for 10 or more years, thus making it difficult for understanding Statistics and Mathematics courses.
- Most of the students do not have sound mathematical backgrounds or other related qualifications.

- The majority of students do not attend the tutorials as they feel they are unnecessary, it is difficult to force them to attend as the ZOU does not have a policy that forces students to attend.
- Students usually do not have the necessary sufficient information that is pivotal in understanding basic statistics. It could also be that the entry qualifications into degree programmes do not take Maths and Statistics as prerequisites.

Theme 4: Strategies and solutions of overcoming these challenges in teaching quantitative courses to Open and distance learners.

Responses from the participants:

- There is need to introduce basic statistics courses that assists students in grasping basic statistics concepts.
- The university must introduce extra statistics tutorials for those who are not good in statistics (Statistics remedial courses).
- There must be a reorientation exercise for students who are to embark on the statistics course so that they are taught effective study habits.
- Students must be encouraged to form study groups that are aimed at assisting each other on quantitative subjects.
- Lecturers must work very hard in demystifying the course during the first sessions that they interact with students.
- There is need of reviewing statistics course modules so that examples must be relevant to the students' contexts and experience.

DISCUSSION

The findings of the study indicated that lecturers teaching quantitative courses at ZOU believed that most students at their institutions do not do well in quantitative courses because they have quantitative phobias. Statistical related phobia is believed to have contributed to the perception that quantitative courses are difficult by students in most tertiary institutions (Schacht and Stewart 1990). They were also found displaying significant level of anxiety which emanate from negative attitudes towards statistics courses in general as compared to other courses within the same level of study. Anxiety was also cited as a causes of poor performance in quantitative studies in most tertiary institutions world over (Onwuegbuzie and Wilson 2003; Pan and

Tang 2004). Besides anxiety as a major contributing factor to poor students performance in quantitative courses emanate from their attitudes of the statistics courses in general as compared to other courses within the same level of study Yunis (2006) also believed that another cause for poor performance in quantitative courses from adult distance learners is that most students from most tertiary institutions again do not see relevancy of the course to their real life experiences (Yunis 2006). This perception may not motivate them to take up quantitative courses seriously believing that it is not a serious requirement of their future employment hence passing it after a repeat may not be an issue of concern to them.

The tutorial method used in ZOU's Open and distance learning was not accommodative of different statistical backgrounds of its students. In the institutions it is common to find students from different levels of statistical aptitude in the same class doing the same course. For example, it is normal to have a class with students with ordinary level statistical aptitude as well as those that might have done the subject with at advanced level, certificate level or diploma level. The lecturers confirmed tutoring as a delivery mode in ZOU presented them with problems associated with how to effectively teach such heterogeneous classes in the limited allocated times. Individualised teaching was indicated as the appropriate methods for demanding courses such as quantitative courses. The need to have an inclusive teaching approach in quantitative courses in ZOU was also noted by Mpezeni et al. (2010). In their study, Mpezeni et al. (2010) found that students cited that quantitative course modules were not user friendly to new comers in the area and they needed additional materials, more time and lecturing than tutoring to complement the modules.

The study also found out that besides methodological related problems they were also finding it difficult to motivate low self esteemed students who believe that they would fail the course at the end of the semester. Causes of low self esteem among ZOU may be emanating from poor appreciation of quantitative material and phobias associated with them. Connors et al. (1998) concurred that it is not easy to motivate students who do not appreciate the value of the course in their everyday lives. Lack of appreciation of mathematics could be due to truancy

among ZOU students in quantitative courses tutorial.

Lectures were also found having possible suggestions address issues around poor performance among ZOU students in quantitative courses. The suggested strategies included developing innovative approaches that address specific problems associated with teaching specific concepts on quantitative courses. Innovation was supposed to focus on how best the students can develop positive attitudes in statistics. These include breaking down content to small and manageable units like having one semester quantitative course done over two semesters. The use of innovative approaches in Open and distance learning for concept mastery was also supported by Berk and Nanda (1998) who even went on to advocate the use of humour in the teaching of statistics courses as a way of reducing statistics anxiety among students taking the course. Innovative teaching would also include the use of model answers in the teaching of statistics because they motivate the student to learn alone and enhance their chances of passing the final examination (Garfield 1995).

CONCLUSION

This study was set up to investigate the challenges that are faced by ZOU lectures in teaching and learning of quantitative courses. The study found that there was a generalised fear of quantitative courses across all the four faculties of the university. The study also concluded that ZOU's mode of delivery was not user friendly poor quantitative to its clients as it was perceived of not meeting demands of quantitative courses. Lectures were perceived as best option for quantitative courses than tutorials.

RECOMMENDATIONS

This study recommends the introduction of bridging courses that assists students without a good grounding in quantitative subjects to have an appreciation of basic statistics concepts and this would assist in demystifying of the myths that quantitative courses are tough.

The study also found that most of the ZOU students have many other responsibilities that range from family issues to work commitments. These other responsibilities were found to be

interfering with their study times. Quantitative courses are time demanding. The study recommends the university students management department to embark on extensive programmes that are aimed at teaching students effective time management and study habits that that accommodates both their social and work responsibilities this would help them improve their performance in statistical courses.

The use of tutorials in quantitative courses were also found to be contributing to poor pass rate among ZOU students. Lectures were perceived as better teaching method for quantitative courses. This perception contradicts with policy driven mode of delivery for distance education in the university and other universities in the world. This then calls for staff development programmes for open and distance lectures to find out how best can they use tutorials for effective teaching of quantitative courses. The study also recommends that quantitative course lecturers who teach open and distance learners be sensitised on the characteristics and profiles of Open and Distance Education students. This would make them understand their heterogeneous composition and try to adapt their tutorial deliveries to accommodate different backgrounds of their students.

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