PERCEPTIONS OF ACTUARIAL SCIENCE STUDENTS ON FACTORS INFLUENCING ACADEMIC PERFORMANCE IN QUANTITATIVE COURSES IN UNIVERSITY OF JOS

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Abstract
The study investigated the perceptions of all actuarial science students (407) of the University of Jos, on factors influencing performance in quantitative courses. The study used a descriptive survey research design. The sample used for the study was 204 students who were drawn from the population of actuarial science students of the University. The researchers used stratified and simple random sampling technique to draw the sample. The primary data used in the study was collected through a 5-point Likert scale questionnaire which was adopted by the researchers. Two research questions guided the study, and one null hypothesis was stated and tested at 0.05 level of significance. The data collected were analyzed by descriptive statistics of mean and standard deviation and inferential statistics. The mean criterion of 3.0 was set for decision taking. The results of the finding revealed that, actuarial science students perceived lack of awareness of the application of actuarial science, lack of strong computational skills, negative study habits by the students, poor elementary mathematics background, methods of teaching used by lecturers, study materials are too difficult and involves symbols that are difficult to comprehend, and deficiency in basic computer skills that would ease analysis as important factors that influence performance in quantitative courses. Furthermore, the female students perceived that admission policy is an important factor to be considered. It was concluded that lecturers should rise to the challenge of demystifying the course to enhance better performance, students should develop positive attitude towards learning to have a better understanding of quantitative courses. It was recommended that the university management should admit students who applied for the course and those who are mathematically strong, among others.

Keywords: Perception, Academic Performance, Actuarial science, and Quantitative courses.

Introduction
Actuarial science assesses risk and plan for its financial impact. It is a tool that is used to evaluate and predict future payouts for insurance and other financial industries such as pension. Actuaries are those professionals that assess financial risk and manage it; they use mathematics and statistical models to evaluate risk in the insurance and finance industries (Cabell, 2017). They also use probability, economics, and computer programming to create actuarial models (Kagan, 2019). The ability of any nation to compete successfully in the global market today, to a large extent, depends on the mathematical literacy of its citizens which is the tool actuaries used for analysis (Abotoruwa, 2015). In addition to examining the risk of investments in the financial world, the discipline study financial organizations to analyze their liabilities and improve financial decision making (Zapart, 2013). Actuaries employ their specialty in science to evaluate the financial, Economic, and other business applications of future events. In life insurance,

actuarial science focuses on the analysis of mortality, the production of life tables, and the application of compound interest to produce life insurance, annuities, and endowment policies. In health and social insurance, actuarial science focuses on analyzing rates of disability, morbidity, mortality, fertility, life and other contingencies. In the pension industry, actuarial science compares the costs of alternative strategies regarding the design, funding, accounting, administration and maintenance of pension plans. Actuarial science is also applied to property, casualty, liability, and general insurance in which coverage is generally provided on a renewable period (Adeyele, 2015). Given the foregoing, quantitative courses play a key role in someone becoming an actuary. Quantitative courses in the context of this study refer to courses that are mathematically inclined. These include: Business mathematics, Basic mathematics, advanced mathematics, theory of interest, risk theory, probability and mathematical statistics, Actuarial computing, life and other contingencies, actuarial statistics and mortality analysis, numerical analysis, quantitative analysis for business decision, operations research and Business statistics among others.

Despite the importance of actuarial science in human development, research investigation have shown that students are not very much interested in quantitative courses which are the backbone of actuarial analysis (Abotoruwa, 2015) and this has led to poor performance. Reasons advanced for the poor performance are due to students study habit, poor methods of teaching(Annual program assessment report(APAR), 2016-2017), lack of awareness of actuarial science as a course (Adeyele, 2015 & Ikeobi, Jugu, Kamsen, Ajita, Oladoja & Williams,2016), lack of materials for learning, abstract nature of the course, lack of computational skills, poor elementary mathematical background, family socio-economic status, lack of interest, lack of motivation, admission policies, method of assessment, and lack of understanding of general business concepts and transactions among others. It is also buttressed that majority of the actuarial science students consider the course as having many technical terms and symbols difficult to remember. These influence their performance in the course negatively. For example, statistics of performance from actuarial science department, university of Jos from inception on quantitative courses has been poor as highlighted in table 1.

Table 1: Trends of performance of actuarial science students in quantitative courses

Year(session)	Pass(A-C)		Pass(D-E)		Total
	Number	%	Number	%	
2014/2015	12	49.3	13	50.7	25
2015/2016	29	48.5	31	51.5	60
2016/2017	91	50.3	89	49.7	180
2017/2018	72	50.5	70	49.5	142

Source: Actuarial Science Department, University of Jos

A glance at table 1 indicates that the average pass rate over the 4 years period was 49.65%. This means that 50.35% of actuarial science students had either weak pass or fail quantitative courses. The implication of this is that the performance of students in actuarial science is bedeviled by several factors. Some of the factors are real and others are perceived by the students. Unearthing these factors that affects performance in quantitative courses is the concern of this research paper. The above scenario is disturbing and, therefore, calls for an in-depth exploration into the reasons for this poor performance in quantitative skills among actuarial science students in the university. However, the assessment of the performance in the

table above revealed that majority of the students did not perform to the expected level, hence, the drive to investigate the perception of actuarial science students on factors influencing performance in quantitative courses. Perception therefore in the context of this study refers to the way actuarial science students think about the course, their understanding about the nature of the course and their belief about it. Meriam-webster (1828) dictionary defined perception as the way in which something is understood, regarded or interpreted.

The influence of gender variations on students Perception in academic subjects is still a major controversy among researchers. This is as a result of conflicting results from gender related studies. Some researchers found significant differences in favour of females (Mohammad & Binji, 2017) and Areelu (2014) found significant differences in favour of males. On the other hand, Nasiru and Binji (2016) found that males and females are the same in Mathematics Performance. This inconsistency in the perception of between males and females in quantitative courses calls for the need for further investigation in the use of different teaching approaches to enhance Performance in quantitative courses.

Statement of the Problem
The importance of actuarial science in the life of an individual and in national development cannot be overemphasized. However, the performance of actuarial science students in quantitative courses, which is supposed to reflect good understanding of mathematics skills, based on meaningful teaching and learning has been poor over the years. Many factors are said to be responsible for this poor performance in quantitative skills. The major factor is the use of inappropriate teaching methods (Nalen, 2008 & APAR, 2016-2017). The teaching methods used by lecturers tend to impact positively or negatively on meaningful teaching and learning of quantitative courses. The other factors that lead to poor performance of actuarial science students in quantitative skills are: Students interest, study habit, lack of awareness of the course, abstract nature of the course, lack of understanding study materials, lack of computational skills, poor elementary mathematics background, family socio-economic status, admission policy, lack of motivation, method of assessment among others (Nalen, 2008).

The persistence of the problem of poor performance in quantitative skills tends to create problems for students, lecturers, parents and industries that require such skills for their businesses. This menace denies actuarial science students from graduating as at when due. Additional school fees for spill over students is required to be paid by parents, similarly, more workload is expected on the part of the lecturers to teach a larger class against the normal lecturer student ratio. Industries and companies who need actuaries to structure their programs will have problems since not too many students are graduating from actuarial science. For example, the first set of students of actuarial science of the university of Jos for the 2017/2018 session that graduated are only 24(48.9%) out of the 49 students. This indicates that 51.1% of the students could not graduate. The number of graduates is too small based on the demand for actuaries in our industries. The result indicated that the remaining 25 (51.1%) students that could not graduate had problems with most quantitative courses. It is on the basis of this that the study was conducted to find out the causes of the poor performance in quantitative courses by actuarial science students of the University.

Objectives of the Study
The aim of the study is to find out the perceptions of actuarial science students on factors influencing performance in quantitative skills in the University of Jos. The specific objectives of

the study are to find out the factors that influence student's performance in quantitative skills and find out if actuarial science students' perceptions of factors influencing performance in quantitative courses are based on gender

Research Questions
The following questions were answered in the study:
(i)   What factors do actuarial science students perceive as influence their performance in quantitative courses?
(ii)   What is the influence of gender on the perceptions of actuarial science students on factors influencing performance in quantitative courses?

Hypothesis
There is no significant difference between the perceptions mean scores of male and female students on factors influencing performance in quantitative courses.

Review of Empirical Studies
The literatures reviewed for the study was based on awareness of students and academics and on factors influencing successful completion of actuarial science programme. Adeyele (2015) conducted a study on the knowledge and perceptions of actuarial science among students and academics: evidence from Joseph Ayo Babalola University (JABU). The study was set to find out reasons why few students study actuarial science, and to assess the knowledge and perceptions of people about actuarial science in JABU. 220 Participants were used in the study which was selected randomly from the population. The data collected in the study was analyzed using Yates correction for continuity phi and Lambda. The result of the finding showed that more than 96% of the participants mistake actuarial science for insurance (lack awareness). And it was concluded in the study that students and academics are not aware of what actuarial science is all about, and therefore the study recommended that an awareness programme for actuarial profession be made to train actuaries for the growth of insurance industries in Nigeria.

Nalen (2008) examined factors likely to affect the successful completion of an actuarial qualification in South Africa. The study was aimed at identifying the factors likely to be critical to student's success in undergraduate actuarial studies, post-graduate actuarial studies and eventual qualification as an actuary. The study identified the following factors that likely affect completion of actuarial programme: Family socio-economic status, lack of interest, lack of motivation, the role of the teacher (methods of teaching), admission policy, inability to understand study materials, study habit, method of assessment, lack of computer skills, lack of understanding of general business concepts and transactions among others. It was recommended in the study among others that, method of lecturing should be sensitive to students of different Educational backgrounds and should be consistently assessed to ensure that the students' individual differences are properly handled.

Ikeobi, Jugu, Kamsen, Ajita, Oladoja and Williams (2016) assessed the awareness level of actuarial science among staff and students of Nigerian universities. The study was designed to assess the awareness level of actuarial science in the university of Jos community. The finding of the study indicated that some respondents are aware of the discipline but some had never heard about the course. The finding also indicated that actuarial science and insurance are the same. It was concluded and recommended in the study that there is need for more awareness to be created about the course and its relevance to the society.

Finally, Jugu, Kamsen, Ikeobi, Ajita, Oladoja and Williams (2016) evaluated the perceptions of key stakeholders on the prospects of actuarial science in Nigeria. The stakeholders in the context of the study were staff of insurance firms, banks, pension administrators and academic institutions. A questionnaire was used to collect data from 80 respondents and it was analyzed using descriptive statistical tools. From the finding of the study, it was established that, stakeholders are aware of actuarial science, but were divided in their responses with respect to prospects of actuarial science in the relevant industries. It was recommended in the study that more awareness need to be created on the prospects of the profession.

From the few empirical studies, it is evident that there is little or no literature specifically that studied the perceptions of actuarial science students on factors influencing performance in quantitative courses except Nalen (2008) who studied factors likely to affect the successful completion of an actuarial qualification in South Africa. Some of the researches conducted in this area of actuarial science are about awareness of the course, knowledge and prospects of the profession of actuarial science in University of Jos and JABU. The studies reviewed are related to the present study because it involves students' awareness, prospects, and knowledge about actuarial science. However, the reviewed work on students' perceptions was conducted in Jabu, and similarly, the reviewed work on factors affecting successful completion of actuarial science profession was conducted in South Africa. The foregoing shows that the reviewed works are not the same with the present study. Hence the need to conduct the present studies so as to fill the gap that was not covered by the reviewed work.

Methodology
Primary data was obtained through survey using structured questionnaire. The selected respondents were students of actuarial science department of the University of Jos. The Secondary data were collected from the department of actuarial Science University of Jos on the performance of actuarial science students in quantitative courses from inception of the department. A total population of 407 Students was structured in a stratum and a total sample size of 204(50.12%) students was selected using stratified sampling technique. Questionnaires were designed using 5- point Likert scale of rating. The questionnaire was divided into two parts, part A which sought information about Bio-data of respondents, while part B sought information about respondents extend to which they strongly agree, agree, undecided, disagree, and strongly disagree with factors influencing performance in quantitative courses. The questionnaires were administered by the researchers. The method of sampling was stratified and random sampling technique. The strata consist of actuarial science students based on their levels. From each level, respondents were randomly selected comprising of 52 from 100 level, 73 from 200 level, 46 from 300 level and 33 from 400 level.

Table 2: Strata of students in actuarial science department, University of Jos

Level	Population	Sample
100 level	104	52
200 level	146	73
300 level	91	46
400 level	66	33
Total	**407**	**204**

Source: Actuarial science department

A criterion for acceptance of a factor of 3.0 was set as a decision rule for accepting a factor influencing performance in quantitative courses. The criterion was obtained as thus: 5+ 4+3+2+1= 15/5=3.0. Any mean that falls below the criterion was not considered as a factor that influences performance in quantitative courses. For the null hypothesis, if the calculated t-value is greater than 0.05, the null hypothesis will be rejected in favour of the alternative hypothesis. Descriptive statistics of mean and standard deviation was used to answer the research questions and inferential statistics (t-test) was used to test the null hypothesis formulated for the study.

Results
The data analyzed and interpreted are based on the research questions that guided the study, and are mainly from responses from the primary data obtained through the questionnaires administered.

Research Question One: What factors do actuarial science students perceive as affecting their performance in quantitative courses?

Table 3: Perception of actuarial science students on factors influencing performance in quantitative courses

S/No	Factors	Mean	SD
1	I don't like actuarial science because it involves a lot of mathematics	2.86	8.49
2	I am not aware of the application of actuarial Science	3.08	8.21
3	I am not motivated to study actuarial because it is abstract	2.66	8.56
4	My computational skills are not strong for quantitative courses	3.22	8.64
5	Actuarial science students fail quantitative courses because of their negative study habit	3.25	7.48
6	My elementary mathematics background is poor, hence it affects my performance in quantitative courses	3.25	7.48
7	I am not motivated to study quantitative courses, because of the methods of teaching used by lecturers	3.30	8.19
8	I am not motivated to study actuarial science because I did not apply for it	2.82	8.33
9	My family socio-economic status de-motivate me from studying actuarial science	2.59	8.56
10	Actuarial science study materials are too difficult for me to because of its symbolic form	3.24	8.14
11	I am deficient in basic computer skills that would aid my quantitative analysis	3.25	8.26
12	I am not interested in any course that is quantitative in nature	2.56	8.72
13	I lack the understanding of business concepts and transactions in actuarial science	2.66	8.46

Source: Researcher's computation, 2020.

From Table 3 above, actuarial science students perceived the following as important factors that influence performance in quantitative courses: lack of awareness of the application of actuarial science, lack of strong computational skills, negative study habits by the students, poor elementary mathematics background, methods of teaching used by lecturers, study materials are too difficult and involves symbols that are difficult to comprehend, and deficiency in basic

computer skills that would ease analysis. All these factors had a mean of 3.0 and above. The mean responses of 3.0 and above implied that, the factors influence performance in quantitative courses.

Research Question Two: What is the influence of gender on the perceptions of actuarial science students on factors influencing performance in quantitative courses?

Table 4: Perception of male and female actuarial science students on factors influencing performance in quantitative courses

S/No	Factors	Male		Female	
		M	SD	M	SD
1	I don't like actuarial science because it involves a lot of mathematics	2.86	4.15	2.86	3.99
2	I am not aware of the application of actuarial Science	3.13	4.04	3.03	4.17
3	I am not motivated to study actuarial because it is abstract	2.71	4.08	2.61	4.48
4	My computational skills are not strong for quantitative courses	3.52	4.66	2.92	3.98
5	Actuarial science students fail quantitative courses because of their negative study habit	3.32	3.55	3.17	3.93
6	My elementary mathematics background is poor, hence it affects my performance in quantitative courses	3.36	4.03	3.25	3.91
7	I am not motivated to study quantitative courses, because of the methods of teaching used by lecturers	3.51	4.33	3.08	3.86
8	I am not motivated to study quantitative courses, because of the methods of teaching used by lecturers	2.65	4.31	3.00	4.02
9	I am not motivated to study actuarial science because I did not apply for it	2.67	4.18	3.34	4.38
10	Actuarial science study materials are too difficult for me to because of its symbolic form	3.34	4.18	3.14	3.95
11	I am deficient in basic computer skills that would aid my quantitative analysis	3.54	4.24	2.96	4.02
12	I am not interested in any course that is quantitative in nature	2.50	4.33	2.61	4.39
13	I lack the understanding of business concepts and transactions in actuarial science	2.62	4.21	2.69	4.25

Source: Researcher's computation, 2020.

From Table four above, male students perceived the following factors as important factors influencing performance in quantitative courses: lack of awareness of the application of actuarial science, lack of strong computational skills, negative study habits by students, poor background in elementary mathematics, methods of teaching used by lecturers, study materials involves too much mathematics symbols, and lack of basic computer skills. On the other hand, female students perceived the following factors as important in influencing performance in

quantitative courses: lack of awareness of the application of actuarial science, negative study habits by students, poor mathematics background, and method of teaching used by lecturers, admission policy, and symbolic form of actuarial notation.

Hypothesis: There is no significant difference between the perceptions mean scores of male and female students on factors influencing performance in quantitative courses.

Table 5: Summary of t-test analysis between the perception mean scores of male \ and female students on factors influencing performance in quantitative courses

Gender	N	Mean	SD	d_f	t_{cal}	Alpha	Decision
Male	111	3.06	4.18				
				202	0.155	1.98	NS
Female	93	2.97	4.10				

Table 5 revealed that the calculated t-value (0.155) is less than the alpha level of 1.98. The decision therefore is to fail to reject the null hypothesis and reject the alternative hypothesis which states that there is no significant differences between the perceptions mean scores of male and female students on factors influencing performance in quantitative courses. The implication of this finding is that gender is not a significant factor that influences performance in quantitative courses.

Discussion
The discussion of finding for the study was centered on the research questions that guided the study. From the analyses of the responses gathered, actuarial science students perceived the following factors as important factors influencing performance in quantitative courses: lack of awareness of the application of actuarial science, lack of strong computational skills, negative study habits by the students, poor elementary mathematics background, methods of teaching used by lecturers, study materials are too difficult and involves symbols that are difficult to comprehend, and deficiency in basic computer skills that would easy analysis (APAR,2016-2017). All these factors perceived had a mean of 3.0 or greater based on the criterion that was set for the study. From the finding of the study, it appears the students are not aware of the application of the course in real life. This factor shows students lack of awareness of the practice areas in actuarial science. The finding of the study corroborated with Adeyele (2015) and Ikeobi, *et al* (2016) findings. Male and female students had similar perceptions for the factors except that female students strongly perceived that admission policy affects their performance in quantitative courses. This can be observed in table four with a mean of 3.0. The female students observed that they did not apply for actuarial science, since they don't have strong mathematics background. This finding is in line with Nalen (2008). The admission policy is important because it defines the population that will succeed through to qualification, but it can only be a useful predictor of success if it measures the appropriate skill. The finding of the hypothesis revealed that there is no significant difference between male and female in the perception mean scores of students on factors influencing performance in quantitative courses. The finding contradicts with the findings of Areelu (2014)., Mohammed and Binji (2017) who found that gender is significant in students performance in academic subjects. While the study is in line with the finding of Nasiru and Binji (2016) who found that male and female students are the same in their performance level in quantitative courses. This finding indicates that there is inconsistency of gender variations on factors influencing performance.

Conclusion
The findings of the study revealed that actuarial science students perceived lack of awareness of the application of actuarial science, lack of strong computational skills, negative study habits by the students, poor elementary mathematics background, methods of teaching used by lecturers, study materials are too difficult and involves symbols that are difficult to comprehend, admission policy, and deficiency in basic computer skills that would ease analysis as important factors that influence performance in quantitative courses. Therefore, there is the need to reduce the students, lecturers, and university management related factors that affect performance in quantitative courses. This could lead to a better understanding of the courses, which should motivate meaningful and rewarding learning among actuarial science students beyond the need for certification.

Recommendations
Based on the results of the finding, there is the need for the university management to change their admission policy by admitting students that applied for actuarial science and those who have pass through remedial programme of the university to study actuarial science. These categories of students have acquired some knowledge of further mathematics that would encourage outstanding performance in actuarial science. The following recommendations are made on how to encourage performance in quantitative courses:
(i)   More awareness should be created for students to understand the application of actuarial science in real life.
(ii)   Actuarial science students are to be encouraged to develop positive study habit thereby engaging them in problem-solving activities that would encourage and improve their performance and to enhance positive perception of the students.
(iii)   Lecturers should vary their method of teaching in order to carry the students along in their classroom interaction. They should also explain the technical symbols involve in the course in order to motivate the students to understand the course better and enhance their performance.
(iv)   Basic mathematics should be made a pre-requisite course in the department of actuarial science in order to boost students' elementary background in mathematics.
(v)   Actuarial computing course should be taught practically in order to engage the students in computer programmes that would aid their actuarial analysis.
(vi)   Lectures should consider the gender of students in their instruction in order to take care of sex differences as identified by the respondents. This will carry both sexes along through meaningful and rewarding learning.

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