Involvement of Private Universities in Statistical Education in Nigeria: Prospects and Challenges

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Abstract
The importance of information in the development of any organization or nation necessitates a strong statistical education because of its role in information dissemination. The issue of developmental challenges in Nigeria can be associated with low level of statistical education. In this paper, various challenges facing statistical education in Nigeria were identified from the authors' experiences. Nigeria still grapples with low statistical literacy and the most disturbing finding is that the little progress is at a slow pace. Insufficient teaching aids such as computers with standard statistical software, power supply, electronic boards and internet facilities were some of the challenges identified. A very serious challenge that has also been identified as facing statistical education in Nigeria is expensive tuition. This is more pronounced in private universities. Courses like medicine, engineering, law, economics, and others usually referred to as lucrative, attracts more enrolments in private universities than courses like statistics that are regarded as less lucrative in this part of the world. A survey carried out in a Nigerian private university identified some issues that could be linked with the low level of statistical literacy in Nigeria. These include: students seeing the course as difficult, boring, not lucrative and not well taught. These responses were suggested as reasons for the lackadaisical attitudes of some students in statistics classes, and consequently part of the causes of difficulties in teaching statistics in tertiary institutions. The survey also showed that the level of understanding on what the course is all about is very low. Firstly, 62.8% of the respondents didn't answer the question on their view about statistics, which might suggest either that they don't like the course or not well acquainted with it. Also, out of the 37.2% who answered the question, 20.4% indicated that they don't know about the course. Suggestions were made on ways of improving statistical education in Nigeria. Teaching with more practical illustrations in specific interest areas of students was one of the suggestions made. The paper is an addition to information on making statistics more appreciated as a course in order to improve the level of statistical literacy in Nigeria.

Keywords: survey; teaching aids; negative attitudes; practical illustrations.

[1.0] Introduction

Statistics as a course receives varying attention across different fields, careers and professions in Africa. The need to have statistical knowledge is well recognised in developed countries where statistics or related topics forms part of curricula for various grade levels (North et al, 2014). The study of statistics, either as a chosen career or part of curriculum for a career however comes with its own peculiar challenges. It is a well known fact that statistics is included in the curricula of most course of study across different colleges; natural or life sciences, medicine, agriculture, engineering and social sciences. Interactions with students and professionals from these various fields have shown different levels of challenges with the course.

A lot of attention has been given to understanding the challenges in learning and teaching Statistics as well as identifying the changes that are needed in training more statisticians (Tishcovskaya and Lancaster, 2012). The problem areas were classified in Tishcovskaya and Lancaster (2012) into three main domains which are teaching and learning of statistics as a discipline; statistical literacy and communicating statistics; and statistics as a profession in the UK and other countries. One of the identified problems in these areas was: focus on the mathematical and

mechanical aspects of knowledge resulting in students not being empowered to apply statistical content knowledge to solve problems arising from a specific context. This and other indentified challenges of statistical education are even more pronounced in Africa, due to the development level of the continent. Peculiarities of these challenges in African context have been discussed in a few literatures. Inadequate and weak foundation in mathematics at the elementary educational levels was raised in North et al (2014) as one of the major issues giving statistical literacy hard time in South Africa. This was said to be the situation before an intervention program by the government- the establishment of two national mathematical curricula: "mathematics" and "mathematical literacy", expecting that all students would do either of the two as part of their last three years of high school. Specifically, Gal (2009) reported that the South African national mathematical curricula enabled the introduction of many statistical topics and a greater emphasis on the practical or applied aspect of mathematics in general and statistics and probability in particular. Under the previous system, these learners would not have had any training in mathematical subjects in their last three years of high school.

Oyesola (2000) identified lack of statistical education in secondary schools and technical colleges in Nigeria as hindrance to students from pursuing careers requiring statistical computations. Other issues found in literature on statistical literacy in Africa were centred on the qualification and expected versus actual teaching done by teachers (Carnoy & Chisholm, 2008; UNESCO 2012). Analysis of video-taped lessons showed that teachers over-emphasised procedural skills and allocate a large proportion of class time to class management practices due partly to large class size and partly to teachers' knowledge (Tishcovskaya and Lancaster, 2012).

Involvement of individuals and private organizations/religious bodies in university education has gained ground in Africa within the last decade. This comes with both advantages as well as challenges. There are usually little or no interruptions of the academic activities as members of staff are not allowed to carry out industrial actions. Students too are in most cases not free to demonstrate or disrupt academic activities. This goes a long way in ensuring a stable calendar for the university, thereby allowing for adequate coverage of the syllabus. Most private universities are also able to source for funds to have required infrastructure in order to obtain and maintain the approval of the regulatory bodies. This same funding is however also serving as a big challenge in the sense of high fees. The fact that private universities do not get government funding makes it necessary for them to charge high fees. This also has some negative effects on courses like statistics that are regarded as not highly lucrative in this part of the world and has therefore contributed to the low level of statistical education in these countries. This paper draws attention to the prospects and challenges of the involvement of private universities in statistical education in Nigeria. Some suggestions are also made. It is expected that discussions that could ultimately bring about improvements will be initiated.

[2.0] Statistical literacy level in Africa

Personal experience as well as literature indicates increase in statistical literacy level across the world, Africa having her own share too. Technological advancement plays a very significant role in this development. For instance, we want to compare statistics classes from two decades ago in stages until the present time. First, up till two decades ago, statistics classes used to be what students refer to as "abstract", boring and tiring because the theories and methods were taught without practical applications with the use of statistical software. Some years later, most statistics departments in universities, got equipped with computer laboratories where students are engaged in practical classes. This increased the interest of the students, mostly those who major in statistics. This also made lecturers to update their skills in this profession for better delivery. The applicability, relevance and usefulness of statistics became more real to the students. This however did not extend to students from other departments taking statistics as a course in their curriculum. This may be because the contact hour per week was not enough to include practical classes; hence many students still could not see statistics as interesting and important.

More recently (about two years ago), the use of new technological development has also positively affected students' perception and interest in the course. An example is the e-board in classes. Personal experience shows a lot of improvement in the classes taken with the use of electronic boards over previous classes without it. Statistical software are installed on the electronic board and these are used during lecture for all students to see, rather than the lecturer moving round the students in a computer lab to teach them. This implies that the teaching is done centrally while the students follow on their computers. Experience shows that students understand statistical theories and methods more when the application is done in such interesting and user-friendly way as this. This suggests that statistics classes should not be taken as only theories and methods. It should include applications with the use of statistical software, through modern facilities that carry the whole class along at the same time.

It is however unfortunate that despite this development level, statistics education is still grossly under-patronized in Nigeria, especially in private universities whose contribution to standard and qualitative education cannot be ignored. Also, statistics literacy level can still be seen as below average from experience while teaching statistics to masters students in natural sciences. It is quite shocking to see these students showing lack of basic knowledge of elementary statistics as if they have never come in contact with the course.

[3.0] Positive Features of Private Universities for Quality Education

As earlier mentioned, private universities have the advantage of uninterrupted academic calendar. This allows for steady and adequate flow of the knowledge impartation program. It is a strong point for all the courses offered in the institutions provided other requirements are met. Personal experience as a statistics teacher in a private university proves this. The struggle to meet the requirements for approval by government regulatory bodies, as well as build a standard that can beat the highly competitive market; also make private universities acquire infrastructure and equipments, some of which are not even available in government universities. The purpose of highlighting these positive features of private universities that favours quality education is to bring to notice, the fact that despite their availability, statistics still have very low patronage. It is also to emphasise that private universities have positive roles to play in statistics education because of availability of quality infrastructure and human resources.

[4.0] Challenges

The difficulties faced in trying to increase and strengthen statistical literacy in Nigeria are discussed here under three points; general, users and statisticians.

[4.1] General

Relationships with people from different professions, high school students and tertiary institution undergraduates in Nigeria have shown some faulty and wrong understanding of statistics as a course. Part of the reason might be because statistics is not taught in developing countries in a way that people can easily relate with. Adelodun and Awe (2013) also shared this view, stating: "the most important challenge in statistics education is to connect statistical thinking with real-world applications at every level". Faulty or weak mathematical foundation contributes as well to this problem. Some sees anything mathematical as abstract or outside reality. Ben-Zvi and Gartfield (2004) made a list of reasons why statistics is seen as a hard or difficult subject to learn and teach.

A recent study by the department of mathematical sciences of a private University in Nigeria provides some information on student's view about statistics. The study was a survey of students' perception of the two programs in the department: Industrial mathematics and statistics. Data on the statistics part of the survey is used here with permission from the department. 250 questionnaires were administered to students from any department in the University. This is because views about statistics as a course is not only required from those who have offered or is offering the course but also from those who do not have anything to do with the course. For example, everybody has some knowledge of what Medicine, Engineering and Law are about, whether they have any contact with the courses or not. Out of the 250 questionnaires, only 93 gave candid opinion about statistics. The result is presented

in Table 1. The fact that more than half of the respondents did not answer this question (but answered other questions) was the first thing to note in this survey. It is a pointer to the low level of knowledge about statistics and what statistics is about. 39.8% of the respondents see statistics as a good course. This implies that more than half of those who even bothered to answer the question at all have one complaint or the other about the course. 20.4% stated that they do not know much about the course, suggesting that there is need for more impactful publicity and general orientation on statistics. Another serious challenge to statistical education in Nigeria is reflected in the view about statistics presented in this survey: hard/difficult. It is also very important to note that some also see the course as boring and not well taught.

Table 1: Views of students about STATISTICS

S/No	Views about Statistics	Frequency	Percentage
1	Hard/difficult	23	24.70%
2	Don't know much about it	19	20.40%
3	Good/Interesting	37	39.80%
4	Not lucrative/has no use	5	5.40%
5	Indifferent	2	2.15%
6	Boring	2	2.15%
7	Not well taught	1	1.10%
8	Don't like it	4	4.30%

The statistics provided in Table 1 can be regrouped into two groups as favourably disposed to statistics and not favourably disposed as presented in Table 2. It is clear that we have more people who are not favourably disposed to the course out of those who cared to answer the question on their view about statistics.

Table 2: Views about Statistics in two groups

S/NO	Views About Statistics	Frequency	Percentage
1	Not favourably disposed	56	60.2%
2	Favourably disposed	37	39.8%

[4.2] Teaching Method

Another source of the challenges facing statistical education in Africa is the way the course is being taught. Personal experience during my undergraduate program showed that some lecturers teach statistics courses as if they were completely theoretical with no application to real life problems. There were marked differences in our (students) interest and performances in those courses that time. We only got proper understanding of some of the theories that were made completely abstract to us that time later on during masters program. Now as teachers, we've seen this teaching method as very key to the interest and performance of students in Statistics courses. An example of an event to illustrate this from one of the authors' personal experience is as follows:

I was taking a statistics class one day and explained the residual term in a simple linear regression model as the term that represents all the variation in the observed data on the response variable that cannot be explained by the model under study. I then illustrated with some variables. Later on, I asked the students to explain this concept; meanwhile, they are computer science students. The student that responded explained the residual term thus:

"Usually we expect our input to be completely responsible for the output, but when it doesn't happen that way, the part of the output that cannot be explained by the input is represented by the residual term"

The whole class loved it and I was satisfied. The lectures taken for that course were always very interesting and appreciated by the students. If statistics lecturers were allowed to share personal experiences, most likely, there will be many of such experiences from which others could learn.

[4.3] Relative Cost

By relative cost we mean the cost of tuition for studying statistics relative to how important people rate the course. Generally, fees are high in private universities because of the high cost of running a university. This challenge is the major one faced by private universities. Enrolment for statistics is usually much in government universities where tuition is more affordable by a greater percentage than those patronizing private universities. A few statistics to illustrate this is presented in Table 3 for a government university and a private university in Nigeria. The fees for the private university was between N400,000 and N650, 000 over those years presented in the table while that of the Government university was less than N50,000 over those same years.

Table 3: Enrolment for Statistics Program in a Government university and a Private university

	Enrolment	
Year	Government	Private
2015/16	57	1
2014/15	*NA	1
2013/14	36	0
2012/13	*NA	0
2011/12	27	2
2010/11	15	9

*NA- The information was not available at the time of gathering this data.

Most people sending their wards to private universities prefer to send them for courses they believe are more lucrative and professional than statistics. This is due partly to the general lack of knowledge about the usefulness of statistics and partly to low economic level of African countries which does not encourage employment of statisticians in required number.

[4.4] Infrastructural and teaching aid deficit

Statistics education requires the use of software which necessitates the availability of computer laboratories. This is however lacking or below standard in many Nigerian universities. Standard libraries with up-to-date hard copy and electronic textbooks are also important, which is also a big challenge in some universities. Some private universities however try to be up to date as far as the issues raised here are concerned because of the high competition as mentioned earlier.

[5.0] Some Suggestions on Solutions to the Challenges

[5.1] Regular training of Statistics teachers.

This includes frequent attendance at statistics conferences and workshops by teachers of Statistics at various levels of education where statistics is being taught. Personal experiences have also shown this to be very useful. Such conferences and workshops need to contain discussions on how to teach statistical theory, methodology and applications in a way that more people can relate with easily. This is very important as can be seen from the result of the small survey presented in Table 1, where some students indicated that the course is boring and not well taught.

[5.2] More Practical Classes.

Recent rate of advancement in technology has turned interests to computerised and automated programs, events and activities. While it is very important to teach the theories and methods of statistics, it is also very important to increase activities on the practical side too. This includes making the theories more applicable in different fields and ensuring clarity to the point of making the students to provide examples. If they get such examples right, they are more likely to be very happy and more interested in the course. Statistics laboratory containing computers and different statistical software needs to be made available in every institution where statistics is being taught. Creating statistics laboratories will increase the general view on the importance attached to statistics as a course. Students can then be allowed to work with relevant statistical software across different fields of research. For computer science students offering a course in statistics as an example, they can be taught with software like R, SAS, BayesX, WinBUGS and so on, where they can write codes, programs and sub-programs. This is likely going to increase the interest of such students in learning the statistical theories and methods on which such analysis are based.

[5.3] Increase in Research Grant and Funding for Statistics Workshops.

Research grants are like incentives and high motivation for people to be actively involved in research. If this is made more available for research in statistics, it will encourage more participation. It should also come with rules and guidelines that ensure quality and outstanding work so that it will not attract sub-standard works. Funding for statistics workshops in Nigeria will attract more interest in the profession, both as statisticians and users. With these two important funding in place, private universities in Nigeria can have more participation in statistics education. This is because research grants for example, can allow scholarships for statistics students.

[6.0] Conclusions and Recommendations

Some efforts have been made in this paper to present the importance of private universities in statistical education in Africa, the challenges as well as some suggestions for solutions to the challenges. Therefore, considering the application and importance of statistics which is very wide and the role of private universities which cannot be undermined, attention is being sought for positive intervention. Consequently, better and higher quality statistical services will be made available in Africa for the use of the whole world.

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