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INNOVATIVE APPROACHES IN MAKING THE TEACHING OF STATISTICS TO BUSINESS STUDENTS IN POLYTECHNICS MORE EFFECTIVE

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ABSTRACT: *The statistics syllabus meant for the business students in Tertiary institutions cannot be presented in the same manner as it is presented to purely statistics students; neither can it be taught as an isolated course. It should be structured in such a way that it will fit into the broad objectives of the entire business curriculum. If the syllabus does not fit into the main objective of the business curriculum, it is likely to become unattractive to them. The processing of statistical information by students is done in various ways; the pedagogy of transmitting statistical information to students also varies considerably. There is therefore the need for a balance between these two ends. This study adopted the content and document analysis approach to present summary of innovative methods that have been tried in some Tertiary schools and had yielded results to facilitate the trade-off that should exist between learning behaviors of students and teaching methods of lecturers. As of first importance, each lecturer should conduct a need assessment of the learning styles of the business students and implement the results of the findings. There need to be collaboration between industries and the institution to the effect that real-life data on business situations would be collected and used as examples in classrooms. The method of presentation of the lessons should also be varied to suit the various learning needs of the students: peer tutoring, group work, field trips and study, oral presentation of reports, role plays, simulations and use of spreadsheet. Various assessment procedures should be adopted to include; project assignments, oral presentations, interpretation of business situations and some computations. Most importantly, the lecturer should present himself as a real person to the student with the view of creating a conducive atmosphere suitable for learning. These techniques have been validated through carefully documented and repeatable researches and therefore there is no doubt about their usefulness and workability. When there exist gaps between learning behaviors of students and the teaching styles of the lecturer, the students become bored and not attentive in class, they perform poorly in examinations, get discouraged, and in some cases drop out of school. If the trade-off is achieved, all students will be taught partly in their preferred learning styles, which lead to an increased comfort level and willingness to learn.*

KEYWORDS: business statistics, innovative methods, learning behaviors, teaching methods

INTRODUCTION

The relevance of statistics to business education cannot be over-emphasized; this is seen from the cohesive and inter-connected nature of the courses of all business education programs right from the Advanced Business Certificate Examinations (RSA Stages I, II & III) level through to the Doctoral level and beyond. A key issue in course design is aligning the

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characteristics of the course with those of the program within which the course is offered. No business education course exists in isolation; they are part of a larger programme. Designers of the business curriculum saw statistics as the spine that runs through almost the entire elective subjects of the business program including but not limited to the following;- Financial Management, Cost Accounting, Economics, Finance, Marketing, Purchasing and Supply, Production, Insurance, Management Accounting, Banking and Investment and Portfolio Management, they envisaged the need for students to understand the statistics underlying the elective courses and thus its inclusion in the syllabuses, nevertheless, when viewed with the eyes of the students, the story is different. To some students the introductory statistics courses are irrelevant to their discipline; others think that the subject matter is difficult and unattractive; some also indicated that, they did not know the importance of statistics as a research tool when they took the introductory statistics and did not foresee its relevance in the nearest future. The issue of the importance of the subject matter of statistics to the business education is given a further twist when viewed from the lecturers' standpoint. For many lecturers teaching statistics to business students is considered a notoriously difficult task and a dreaded experience and that they would have preferred to avoid it if given the chance. The researchers have had personal experiences of this untoward behavior towards lecturers, the sight of us scared some people to death, they considered statistics as difficult and therefore any lecturer connected with it was seen as dreadful, this scare had the negative tendency of mental block and anxiety towards the already seemingly unattractive nature of the course.

Many authors have expressed various views towards "Making Statistics Effective in Schools and Business" (MSESB); [6] they expressed substantial dissatisfaction with much of the current teaching methods of business statistics, especially as reflected in the poor selection of topics from popular textbooks and the limited opportunity for students to work with real data or to make serious use of statistical computing. They lamented that many managers see statistics as simply a collection of complicated techniques that are not relevant to the process of management and decision-making, they further encouraged interaction between teachers and students as they learn. John and Johnson [10, 11] advocated three learning concepts that were particularly beneficial in helping business students to appreciate the importance and value of statistics: - these were interaction, discovery and experimentation. Gandhi, [8] during a presentation at the ICOTS-7 outlined his findings on the general performance of business students in statistics as follows. He indicated that students:-

- Have problems in writing statistical results and words
- Have difficulty formulating testable hypothesis
- Do not give justifiable reasons for sample sizes they choose
- Are able to input data into the spreadsheet and Minitab, they are able to get graphics and descriptive statistics but are not always able to interpret the output properly.
- Are not able to use correlation and regression analysis satisfactorily with the exception of few students.
- Find it very difficult to identify the proper statistical procedures to test their propositions

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- Have problems with the identification of the type of variables and scales of measurement.
- Find it difficult to differentiate between sample statistics and population parameters.
- Often repeat percentages and numerical descriptive statistics from the computer outputs and do not synthesize.

The practical ways used to address the above problems within the sixteen years that we have been teaching business statistics, coupled with the suggested solutions from other authors are captured by this article under the sub- section methods

It has also been observed that, one of the greatest challenges in teaching business statistics in Polytechnics was the low level of preparedness of students before they enroll on their program of study, at the high school(Senior Secondary Schools[SSS]) levels, mathematics were sometimes taught by unqualified and demoralized teachers especially when you go to the rural areas, it is further noted that within the mathematics syllabus at the SSS level topics in statistics and probability constituted only about 5 percent of the course content, worse of all, due to the limited number of years students spend at the SSS level, even the 5 percent topics in statistics and probability are not taught because of the position it appears in the syllabus, this has a replicate effect on the students statistical thinking. Statistical literacy is essential in our personal lives as consumers, citizens and professionals; it plays a role in our health and happiness. Sound statistical reasoning skills take a long time to develop. They cannot be acquired to the level needed in the modern world through one high school course. The surest way to reach the necessary skill level is to begin the educational process in the elementary grades and keep strengthening and expanding these skills throughout the middle and high school years. A statistically literate high school graduate will know how to interpret the data He or she will be comfortable handling quantitative decisions that come up on the job, and will be able to make informed decision about quality of life issues. [7]

Other schools of thoughts on the teaching of introductory statistics to business students contend that

- Effective teaching does not only involve being passionate about the subject, but it also involves been able to convey the subject matter to the students such that they would understand it.
- Teaching goes beyond working with students in the classroom, it is important to be available to the students outside the classroom.
- The best way to learn statistics is to solve a lot of problems relevant to the real world using various methods of assessments.
- Teachers must create a conducive and relaxing atmosphere in the classroom during lessons.
- Teaching is a dynamic profession and therefore lecturers must remain active by participating in seminars and conferences. [9]

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The Role of the Polytechnics in Ghana

The Polytechnics were established under **the Polytechnic Act** 745 of 2007.The goal of the Polytechnic is to create high quality and diverse middle level management personnel who easily slide into the Ghanaian industrial environment and form the backbone for Ghana's development. The Polytechnics have been positioned to provide the students with Competency Based Training (CBT) which is needed for the accelerated development of the nation. With this kind of training, emphasis is placed on what a person can do in the workplace as a result of completing a program of study. Under this system of training, each learner is assessed to find the gap between the skills they need and the skills they already have, a training program is then developed to help the learner acquire the missing skill gap [2, 13]. In furtherance to this innovative ideas, it has been made mandatory for Polytechnic students to undertake at least six months of industrial training during the inter- semester breaks

Delivering a presentation on the theme "Tertiary Institution must stick to their Original Mandate" The rector of Accra Polytechnic said that "As a result of a lack of integration between theory and practice, students find it difficult to construct their own conceptual knowledge". He added that students' lack of interest in the various subjects can be attributed to the teaching methodology and advocated a radical transformation in the assessment of students to achieve a better understanding of what is learnt.[1]

What does Business wants from Higher Education?

Arthur Rothkopf(as cited in Mattoon, 2007), U.S. Chamber of Commerce, stated that business wants graduates who can read, write, and speak intelligently; solve problems; work collaboratively; understand mathematics and science; and possess a good work ethic and professional attitude. The problem is a failure of the education community at all levels to produce these kinds of future employees. He suggested that dealing with this requires some urgency. American competitiveness and productivity require that students be able to master key skills, and yet studies by the ACT (American College Testing Program) have found that roughly fifty percent of students applying to college have sub-standard reading, writing, and mathematics skills. He further suggested that the cost of this failure to society and business is high and that over forty percent of all college graduates end up taking at least one remedial course at an estimated additional cost to taxpayers of $1 billion. A conference board study found that forty percent of high school graduates hired by firms were not ready for work because of inadequate reading, writing, and mathematics skills. This forces businesses to spend billions of dollars on remedial education for employees beyond the normal expense of training employees for their jobs. [12]

METHODS

The study adopted content and document analysis approach to unearth tried and tested innovative approaches to making statistics more effective. In the analysis, the following summary data was gathered:

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- Students must be taught to reason, think and communicate statistically:-this could be achieved by directing students on how to translate relevant information from questionnaires, use of various real-life business data in computations, laying emphasis on interpretation of results, and encouraging market research report writings.
- Lecturers are encouraged to use statistical packages or spreadsheet to solve practical problems with large data sets while explaining to the students the theoretical concepts underlying the statistical tool they are using. Due to some complexities in the use of statistical packages like SPSS, SAS and Minitab, it is beneficial to concentrate our attention in using Excel which has some admirable advantages like ease of usage by all students, ease of access, students familiarity with it before enrolling on the program, it's user-friendliness and the additional advantage that in most companies managers are aware of the use of spreadsheets. With this approach of solving practical problems, students will be provided with hands-on experience with problem- solving.
- During the first day of meeting the students the lecturer is encouraged to administer a questionnaire on Index of Learning Styles (ILS) [4] to ascertain the learning styles of students, once this is done, the lecturer should blend his/her methodology to satisfy the four main kinds of learners: sensing, visual, active and sequential learners who are always present in every class.
- The lecturer is also encouraged to modify the modus operandi of assessing students, they could encourage peer tutoring and team work project assignments, students could be encouraged to present written and oral reports:- where propositions will be formulated, hypothesis will tested and models build up to explain real business situations. Though it is very useful for students to do computations, such demands should be minimized, while attention is concentrated on explanation and interpretation of results provided by the lecturer either from a computer output or manual calculations.
- The lecturer is encouraged to represent himself or herself as a real person to his students: He must be approachable and friendly, students should be able to relate with you comfortably, you must also be tolerant and patience, not easily angered, you can informally share your experience with the class, academic jokes could be used to laze the discussion period with the view of releasing tension.

RESULTS

These techniques have been validated through carefully documented and repeatable researches and therefore there is no doubt about their workability. The potential results that would be derived from the innovative methods of teaching of statistics to business students at the Polytechnic are presented in Table1 below.

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Table 1. Comparison of the outcome of the tradition method of teaching with the innovative teaching method

Items	Traditional mode of teaching	Innovative mode of teaching
1.Drafting of statistics curriculum.	1. Few stakeholders consulted.	1.All stakeholders consulted
2.Syllabus	2.Syllabus is followed strictly	2. Teacher uses creative and innovative methods.
3.Learners	3. Emphasis is on completing the syllabus. Learners are Passive Learners do rote learning.	3. Emphasis is on achieving positive learning outcomes. Learners are Active Learners learn by critical thinking.
4.Teachers	4.Textbook and teacher centered.	4.Teaching is learner- centered
5.Assessment	5. Computational and questions picked from textbooks.	5. Formative and based on applications to real life situations.

DISCUSSIONS

With reference to the mission of the polytechnic to create high quality and diverse management personnel who easily slides into industries with competency based training and the challenge posed by Rothkopf regarding what businesses need from graduates, failure of which would cost the society and businesses close to $1 billion, it is urgent for statisticians to put their hands to the plough and implement the five interventional methods proposed above. These interventional methods are tried and tested schemes which have yielded marvelous results. Following is the summary of the expected outcomes.

- Identification of the learning styles of the business class and implementation of the suggested strategies for teaching the various styles of learning in the class as outlined by Felder [3, 4 and 5]: - This approach will be liked by all students and will help the students to learn the subject matter with ease.
- Use of MS-Excel in analysis of data exposes the students to what the businesses out there are looking for. It is common knowledge that business prefers hiring business graduates with

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relatively good knowledge and background in MS-Excel and its uses in business environment to analyze business data.

- Use of real- life business data has the potential of arousing the interest of students and brings to bear the relevance of statistics to the business education program.
- An important objective of the statistics course is to help the business students to be able to apply the gained knowledge to the solution of practical problems in business through evaluation and selection of appropriate statistical techniques, this could be achieved if students are guided through data collection, analysis, interpretation and writing of reports.
- Encouragement of peer tutoring and team work has a multiplicative effect:- in the classroom collaboration and team spirit will be built among students, in the world of work the built-up spirit of collaboration will be easily exhibited, this team spirit are usually built in the classroom when lecturer-assisted group project works on data collection, analysis and presentations are practiced
- Employers of business graduates are generally more interested in attitudes and personal skills than in acquisition of statistical theories. A good practical grounding in basic statistics is rated higher than knowledge of only the theory and mastery of computations. This can only be achieved if attention is shifted from the traditional way of examining students to one where students will be asked to think statistically by interpreting data, rather than focusing on mathematical computations. [6]

CONCLUSION

Since the introductory statistics course cannot be taught as an isolated course, but must fit into its program before the students could appreciate it, certain strategies must be adopted for the course to achieve its intended purpose. The course needs to have practical relevance and provide students with the opportunity to understand how the concepts they are learning can be applied in the world of work. The objective of the subject matter is to add value to the career of the student by way of providing statistical skills and knowledge. Since the presentation approach is as important as the content, lecturers are expected to include visual aids, role plays, pauses, change of voice tones enthusiasm, animations, spreadsheets, emphasis, story-telling and other innovative means to transmit the knowledge to the students. [10, 11]

Research has shown that there are many ways to teach business statistics than most of the courses in the business education. A mismatch between the teaching methods of the lecturer and the learning behaviors of students can lead to poor performance and negative attitudes towards the course. The interventions proposed above are well-defined instructional techniques that make teaching more effective. Implementation of these techniques can be done enthusiastically, slowly and methodically, without sacrificing coverage of the syllabus, the techniques do not require much resources and efforts. Finally, these techniques have been validated through carefully documented and repeatable researches. Their effectiveness is not simply a matter of opinion. They work. [3, 4, 5]

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