# Abstract

Undoubtedly, statistics has become one of the most important subjects in the modern world, where its applications are ubiquitous. The importance of statistics is not limited to statisticians, but also impacts upon non-statisticians who have to use statistics within their own disciplines. Several studies have indicated that most of the academic departments around the world have realized the importance of statistics to non-specialist students. Therefore, the number of students enrolled in statistics courses has vastly increased, coming from a variety of disciplines. Consequently, research within the scope of statistics education has been able to develop throughout the last few years.

One important issue is how statistics is best taught to, and learned by, non-specialist students. This issue is controlled by several factors that affect the learning and teaching of statistics to non-specialist students, such as the use of technology, the role of the English language (especially for those whose first language is not English), the effectiveness of statistics teachers and their approach towards teaching statistics courses, students' motivation to learn statistics and the relevance of statistics courses to the main subjects of non-specialist students. Several studies, focused on aspects of learning and teaching statistics, have been conducted in different countries around the world, particularly in Western countries. Conversely, the situation in Arab countries, especially in Saudi Arabia, is different; here, there is very little research in this scope, and what there is does not meet the needs of those countries towards the development of learning and teaching statistics to non-specialist students. This research was instituted in order to develop the field of statistics education.

The purpose of this mixed methods study was to generate new insights into this subject by investigating how statistics courses are currently taught to non-specialist students in Saudi universities. Hence, this study will contribute towards filling the knowledge gap that exists in Saudi Arabia. This study used multiple data collection approaches, including questionnaire surveys from 1053 non-specialist students who had completed at least one statistics course in different colleges of the universities in Saudi Arabia. These surveys were followed up with qualitative data collected via semi-structured interviews with 16 teachers of statistics from colleges within all six universities where statistics is taught to non-specialist students in Saudi Arabia's Eastern Region.

The data from questionnaires included several types, so different techniques were used in analysis. Descriptive statistics were used to identify the demographic characteristics

of the participants. The chi-square test was used to determine associations between variables. Based on the main issues that are raised from literature review, the questions (items scales) were grouped and five key groups of questions were obtained which are: 1) Effectiveness of Teachers; 2) English Language; 3) Relevance of Course; 4) Student Engagement; 5) Using Technology. Exploratory data analysis was used to explore these issues in more detail. Furthermore, with the existence of clustering in the data (students within departments within colleges, within universities), multilevel generalized linear models for dichotomous analysis have been used to clarify the effects of clustering at those levels. Factor analysis was conducted confirming the dimension reduction of variables (items scales).

The data from teachers' interviews were analysed on an individual basis. The responses were assigned to one of the eight themes that emerged from within the data: 1) the lack of students' motivation to learn statistics; 2) students' participation; 3) students' assessment; 4) the effective use of technology; 5) the level of previous mathematical and statistical skills of non-specialist students; 6) the English language ability of non-specialist students; 7) the need for extra time for teaching and learning statistics; and 8) the role of administrators.

All the data from students and teachers indicated that the situation of learning and teaching statistics to non-specialist students in Saudi universities needs to be improved in order to meet the needs of those students. The findings of this study suggested a weakness in the use of statistical software applications in these courses. This study showed that there is lack of application of technology such as statistical software programs in these courses, which would allow non-specialist students to consolidate their knowledge. The results also indicated that English language is considered one of the main challenges in learning and teaching statistics, particularly in institutions where English is not used as the main language. Moreover, the weakness of mathematical skills of students is considered another major challenge. Additionally, the results indicated that there was a need to tailor statistics courses to the needs of non-specialist students based on their main subjects. The findings indicate that statistics teachers need to choose appropriate methods when teaching statistics courses.