

Attitudes towards statistics of third year students of the School for Allied Health Professions, UFS and the influence of an introductory statistics course.

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1 Introduction

The introductory statistics course is given by the Department Biostatistics to Nutrition and Physiotherapy students in their third year of study and forms part of an introductory course to research methodology. Since the beginning we noticed that students were very apprehensive about the course and using a computer to do analysis.

The aim of this project was to determine and describe the attitude of third year students of the School for Allied Health Professions, UFS, towards an introductory course in statistics. The Statistics Attitude Rating Scale (SATS) consists of 28 items, grouped into 4 subscales namely affect, cognitive competence, value and difficulty (Schau(1999)).

This was a cross sectional study. All students doing the course in 2006 were asked to complete a questionnaire. Participation was voluntary and anonymous. There were 53 (Physiotherapy: 31, Nutrition: 22) students during 2006.

2 Method

All students were asked to participate by the researcher after a class by the end of the first semester. All students received information concerning the research from the researcher and all students who were interested were asked to give informed consent. All completed questionnaires were then left in front of the class as students left the classroom. During the second semester after the first test the same students were again asked to participate by the researcher. After having given informed consent students were given a questionnaire to complete. Students after completing the questionnaire left it at the front of the classroom when leaving the class.

3 Data Analysis

Descriptive statistics, namely frequencies and percentages for categorical data and medians and percentiles for continuous data, were calculated. Using the last digits of students' student numbers the pre and post questionnaire were matched to calculate the change from pre to post and the change was described by means of 95% confidence intervals. Comparisons per department were calculated and compared by means of 95% confidence intervals.

4 Ethics

The objectives of the study were given to participants after the class in order for the students to make an informed decision whether to participate or not. Written informed consent was obtained from all participants at each data collection occasions. Participants were anonymous. The last part of a participant's student number was only used to match a participant's pre and post questionnaire. This was not used to identify a participant. Questionnaires were available in Afrikaans and English as these are the two languages of instruction at University of the Free State. Consent was obtained from the Head of the School of Allied Health Professions,

from the Vice rector: Academic Planning of the University of the Free State and from the Dean of Student services. Ethics approval was obtained from the Ethics committee, Faculty Health Sciences.

5 Results

During the first semester 41 students participated and during the second semester 40 students participated. Response rates per department were Physiotherapy 77.4% (24 of 31) and Nutrition 77.3% (17 of 22) for the pre questionnaire and physiotherapy 58.1% (18 of 31) and nutrition 59.1% (13 of 22) for the post questionnaire. For only 31 students pre and post questionnaires could be matched, a response rate of 58.5%. The students median age was 21 years (range 20 to 32 years) and most (87.8%) were female. All (n=41) the students took high school mathematics for 5 years and most (80.5%) took mathematics at Higher Grade. Some (n=39, 59%) students noted that they did well in their high school mathematics courses. About half (52.6%) of the students viewed themselves as doing well at mathematics. Most (n=38, 76.6%) students had little or no computer experience. There were 4 students who did some mathematical or statistical courses at university, three did 1 course and 1 student took 2 courses.

Few students (n=38, 28.9%) thought that they will use statistics in their field in which they hoped to be employed when they finish school. Only 40% of students were confident that they could master introductory statistics. Most students (70%) viewed the gender's skills in statistics as similar, though a third (30%) viewed males as much better in their statistical skills.

The SATS uses a 7-point likert scale (1 = strongly disagree, 4 = neither disagree nor agree, 7= strongly agree) that contains 4 subscales namely affect, cognitive competence, value and difficulty. Higher scores indicate more positive attitudes toward statistics.

Students (n=31) had mixed views regarding the practical implementation of statistics and these items changed with a median of 1 value on the likert scale. A positive view was that "I can learn statistics" (58.1%). Negative views were, "statistics formulas are not easy to understand" (53.3%), "I am under stress during statistics class" (51.6%), "I find it difficult to understand statistics concepts" (51.6%). A general view were, "learning statistics requires great deal of discipline" (58.1%), "statistics involves massive computations" (63.3%), and "most people have to learn a new way of thinking to do statistics" (64.5%).

There was no statistical significant change for the subscale affect (students feelings concerning statistics), cognitive competence (students attitudes about their intellectual knowledge and skills when applied to statistics) and value (students attitude about the usefulness, relevance and worth of statistics in personal and professional life) from pre to post, though there were tendencies for cognitive competence and value to have lower values for the post. There was a statistical significant difference in terms of difficulty (students attitude about the difficulty of statistics as a subject) from pre to post, they viewed the course as less difficult after the first test.

There was a statistical significant difference between departments regarding the change from pre to post for cognitive competence (95% CI [-9 ; -1]) and value (95% CI [-18 ; -2]). Physiotherapy students scored statistical significantly less for cognitive competence and value than Nutrition students. There was a tendency for Physiotherapy to have lower values for affect and difficulty than Nutrition though not statistically significant.

The students expected to receive a median mark of 60 percent (range 50 to 90 percent) for the pre questionnaire. After the first test (post questionnaire) the students expected to receive a median mark of 60 percent (range 45 to 80 percent). This is not statistical significantly different (95% confidence interval for paired data [-5 ; 0]), although there is a tendency for lower expected marks.

6 Discussion

Students had mixed views of the course as the subscales affect, cognitive competence and value tended to have lower values after the first semester test (post or second evaluation), although the students viewed the course statistically significant less difficult after the first test. Wise (1985) noted that anxiety about the course in terms of achievement at the beginning of the course seem to have no relation to the end result.

Statements that imply less than positive attitudes: Students agreed that they get frustrated over statistics tests in class, that statistics is a complicated subject, that it requires a great deal of discipline, that it is highly technical, and that it is not a subject quickly learned by most people, was also found by Mills (2004).

Students had mixed views regarding the practical implementation of statistics, these views changed very little during the course with a median value of 1 on the likert scale of seven.

The timing of the second questionnaire could be a limitation in this study. Changing the date of the second questionnaire (post) to after students had done their own research project might show a more positive attitude.

7 Recommendation

We recommend lecturers to be more aware of students feelings concerning statistics, students attitude about their intellectual knowledge and skills when applied to statistics and attitude about the usefulness, relevance and worth of statistics in personal and professional life as these attitudes tend to lower during the course. As Pan and Tang (2004) noted it is important that we continue to explore innovative teaching methods to better serve the students.

Mvududu (2003) noted that regardless of the attitude toward the field of statistics a supportive atmosphere can help achievement in a course. Lecturers may improve students attitudes by making students more aware of the practical application of statistics in research.

We recommend the post questionnaire be given to students again after completion of their research projects during their fourth year of study. Students will then have personal experience with research and the application of statistics in their profession.

REFERENCES

Mills JD. 2004. Students attitudes toward statistics: implications for the future. *College Student Journal*. 38(3): 349-361.

Mvududu N. 2003. A cross-cultural study of the connection between students attitudes toward statistics and the use of constructivist strategies in the course. *Journal of Statistics Education*. 11(3), www.amstat.org/publications/jse/v11n3/mvududu.html Accessed on 11/01/2007.

Pan W, Tang M. 2004. Examining the effectiveness of innovative instructional methods on reducing statistics anxiety for graduate students in the social sciences. *Journal of Instructional Psychology*. 31(2): 149-159.

Schau C. 1999. Survey of Attitudes toward Statistics. <http://www.unm.edu/~cschau/viewsats.htm> Accessed on 29/11/2004.

Wise, SL 1985. The development and validation of a scale measuring attitudes toward statistics. *Educational and Psychological Measurement*. 45: 401-405.

ABSTRACT

Attitudes towards statistics of third year students of the School for Allied Health Professions, UFS and the influence of an introductory statistics course.

The introductory statistics course is given by the Department Biostatistics to Nutrition and Physiotherapy students in their third year of study and forms part of an introductory course to research methodology. Since the beginning we noticed that students were very apprehensive about the course and using a computer to do analysis.

The aim of this project was to determine and describe the attitude of third year students of the School for Allied Health Professions, UFS, towards an introductory course in statistics by means of the Statistics Attitude Rating Scale developed by Schau. All students doing the course in 2006 were asked to complete a questionnaire before and during the course. Participation was voluntary and anonymous.

There were 53 (Physiotherapy: 31, Nutrition: 22) students during 2006 of which only 31 students pre and post questionnaires could be matched, a response rate of 58.5%. The students median age was 21 years (range 20 to 32 years) and most (87.8%) were female. Most (76.6%) students had little or no computer experience.

There was a statistical significant difference in terms of difficulty (students attitude about the difficulty of statistics as a subject) from pre to post, they viewed the introductory statistics course as less difficult after the first test. Students had mixed views regarding the practical implementation of statistics, these views changed very little during the course.

Lecturers should be more aware of students attitude about their intellectual knowledge and skills when applied to statistics and attitude about the usefulness, relevance and worth of statistics in personal and professional life. Lecturers may improve students attitudes by making students more aware of the practical application of statistics in research.