A Cross-Cultural Comparison of Path Models Relating Attitudes About and Achievement in Introductory Statistics Courses

Joseph M. Wisenbaker
University of Georgia, Educational Psychology
Athens, Georgia 30602 USA
joe@coe.uga.edu

Janice S. Scott
East Georgia College, Mathematics and Science
Swainsboro, Georgia 30401 USA
jan@coe.uga.edu

Fadia Nasser
Tel Aviv University, School of Education
Ramat Aviv, P.O. Box 26
Tel Aviv Israel
fadia@post.tau.ac.il

The difficulties that many students encounter in introductory statistics courses have been widely reported. While many difficulties may be traced to conceptual and skill deficits in mathematics, some are attributed to non-cognitive factors such as students' attitudes about the subject. In addition to the potential for such attitudes to affect students' learning of content, attitudes at the end of a course may constitute course objectives in their own right.

Earlier work (Wisenbaker, Nasser & Scott; 1998) explored the psychometric properties of Arabic and Hebrew translations of an instrument for assessing pre-course and post-course attitudes about statistics (Schau, Dauphinee, Del Vecchio, & Stevens, 1992). The purpose of the present study was to explicitly compare path models relating pre-course mathematics and statistics attitudes, and prior math achievement to course achievement and end of course statistics attitudes. The focus was on undergraduate English and Arabic speaking students.

1. Method

The data from Arabic speaking students (n=111) and English speaking students (n=136) were collected between 1996 and 1998 at a teacher training college in Israel and at a small public college in the United States. The Arabic speaking students were enrolled in a teacher training program for elementary and middle schools, were mostly female (91%), and were of traditional college age (mean=20.0). The English speaking students were primarily enrolled in education and nursing programs, were mostly female (80%), and were slightly older.

Information about prior achievement in math was drawn from student records or obtained by self-report. Attitudes toward math and anxiety related to learning math were assessed with separate instruments. The Survey of Attitudes Toward Statistics (SATS) was used as a measure of students' attitudes about statistics. SATS subscales included Affect (positive and negative feelings concerning statistics), Cognitive Competence (attitudes about students' intellectual knowledge and skills when applied to statistics), Value (attitudes about the usefulness, relevance, and worth of statistics in personal and professional life), and Difficulty (views on the degree of difficulty of statistics as a subject). Finally, students' overall performance in their course was obtained from instructors and expressed on a percentage scale.

2. Results

The general model examined was based on an organization of the variables into four subsets. The first includes exogenous variables of prior math performance, attitudes toward math as a subject, and anxiety related to learning math. The second included the pre-course measures of Affect, Cognitive Competency, Value and Difficulty. The third consisted of achievement in the introductory statistics course while the fourth involved the post-course version of the SATS scales. Of special interest were possible links between pre-course SATS variables and course achievement and the role of course achievement in shaping the post-course SATS variables, especially Cognitive Competency.

Interestingly, there were no direct paths noted linking pre-course SATS variables and course performance. Prior performance in math was positively related to course performance for both groups; and anxiety about learning mathematics was negatively related, but only for the Arabic-speaking group.

There were some similarities between the groups related to those parts of the model leading to post-course Cognitive Competency. Regardless of group, students with greater pre-course Cognitive Competency and who anticipated the course would be easier had higher post-course Cognitive Competency. In other aspects, the two groups were clearly different. For English speaking students pre-course Affect had a positive impact on post-course Cognitive Competency while it had almost no relationship for the Arabic speaking students. Also, initial attitude toward math was positively related for Arabic speaking students and negligibly so for English speaking students. Finally, for English speaking students course achievement was more important here than it was for Arabic speaking students. Some aspect of this may have been caused by the English speaking students getting far more explicit feedback about their performance during their course than did the Arabic speaking students.

It may be very important to consider the specific demands of individual courses in trying to formulate any overall model relating attitudinal variables with student background and achievement. Much more work needs to be done exploring these issues in the context of different instructors and different cultural circumstances.

REFERENCES

Schau, C., Dauphinee, T., Del Vecchio, A., and Stevens, J. (1992). Survey of attitudes toward statistics (SATS). Center for Educational Research and Evaluation. Albuquerque, NM: University of New Mexico.

Wisenbaker, J., Nasser, F., and Scott, J. (1998). A multicultural exploration of the interrelationships among attitudes about and achievement in introductory statistics. Presented at ICOTS 5, Singapore.

FRENCH RÉSUMÉ

Contraire aux espérances, nous n'avons pas trouvé des effets directs entre les attitudes de statistiques de pré-cours et l'accomplissement de cours. Les étudiants anglais et arabes étaient différents dans leurs modèles pour la compétence cognitive de poteau-cours. Ceci pourrait avoir été provoqué par des différences dans des méthodes d'essai.