Undergraduate Social Sciences Students’ Attitudes Toward Statistics

Asal Aslemand
University of Toronto
Most students, particularly social sciences students, feel this way ("afraid") when they learn that they need to take an introductory statistics course!
Attitudes Toward Statistics

• Includes affective, cognitive, and behavioral dimensions (Olson & Zanna, 1993).

• Positive or negative responses to everything related to statistical learning (Gal, Ginsburg & Schau, 1997).

• If positive, it will motivate the use of statistics in the future (Davis & Mirick, 2015; Lalayants, 2012).

• Relates to past mathematics achievement and statistics outcomes (Emmioglu, 2011; Sorge & Schau, 2002).

• Conceptualized as six components in the Survey of Attitudes Towards Statistics (SATS-36©).

  • These components are: Affect, Cognitive Competence, Value, Difficulty, Interest, and Effort.
Research Questions

1. How do undergraduate social sciences students’ attitudes toward statistics change from the beginning to the end of an introductory statistics course for the social sciences?

2. How do undergraduate social sciences students’ past mathematics achievements, their statistics course grade, their sex, and their year of study contribute to their attitudes toward statistics?

3. What are the structural interrelationships among undergraduate social sciences students’ past mathematics achievements, their statistics attitudes at the end of the course, and their statistics outcomes?
Participants

• There were 71 students enrolled in the course under this study.

• 51 students (72%) agreed to participate and completed both the pre- and post-course surveys (SATS-36©).

• Of all participating students (n = 51):
  • 32 students (63%) identified themselves as female; 19 (37%) students identified themselves as male.
  • 5 students (10%) were in their first year; 11 students (22%) were in their second year; 14 students (27%) were in their third year; and, 21 students (41%) were in their fourth year.
  • 44 students (86%) completed their high school in the province of Ontario.
  • 42 students (82%) took a grade 11 mathematics course, whereas 9 students did not.
Changes in Students’ Attitudes Toward Statistics

Linear modelling procedure was used and the results showed that students’ attitudes:

• improved for those who reported poor pre-scores in terms of:
  Affect, Cognitive Competence, Value, Difficulty, and Effort components.

• remained the same for those who reported high pre-scores in terms of:
  Affect, Difficulty, and Effort components.

• dropped for those who reported high pre-scores in terms of:
  Cognitive Competence, Value, and Interest components.
Pearson correlations were conducted and the results showed:

- Pre-scores in Affect, Cognitive Competence, and Value were related to past math achievement.
- Post-scores in Affect, Cognitive Competence, and Interest were related to past math achievement.
- No evidence that past math achievement was related to either pre- or post-scores in Difficulty, and Effort.
- No evidence that statistics achievement was related to any of the six pre-attitudes components.
- Post-scores in Affect, Cognitive Competence, and Effort were related to statistics achievement.
Mixed-design Analysis of Variance were used and the results showed:

• No significant differences between male and female students’ attitudes toward statistics.

• No significant differences between the participants’ years of study in any of the six attitudes components.

• However, compared to third-year and fourth-year students, first-year and second-year students indicated higher scores in terms of:

  Affect, Cognitive Competence, Value, Interest, and Effort Components.
Main Dependent Variable: Statistics Outcomes
Endogenous Variables: Affect, Cognitive Competence, Value, Interest, and Effort
Exogenous Variables: Difficulty, and (Past) Math Achievement
Interrelationships Among Past Mathematics achievements, Statistics Attitudes, and Statistics Outcomes

![Diagram showing the interrelationships among past mathematics achievements, statistics attitudes, and statistics outcomes. The diagram includes nodes for difficulty, cognitive competence, effort, math achievement, affect, value, interest, statistics outcomes, and a self-loop on cognitive competence with a weight of -0.35.](image-url)
Implications for the Practice of Statistics Education

Departments that offer introductory statistics service course should consider:

- Offering a three-hour weekly lecture-sessions to demonstrate more relevant examples;
- Revising program requirements for third-year students;
- Designing a preparatory course that reviews working with numbers, operations, and algebraic expressions;
- Creating collaborations among faculties to integrate quantitative literacy across the curriculum in social sciences.
Implications for the Practice of Statistics Education

Instructors of introductory statistics course for the social sciences should consider:

- Permitting peer discussions during lectures and tutorials;
- Providing students with worksheets during tutorials;
- Incorporating weekly relevant online quizzes in multiple-choice format;
- Including weekly videos of statistical contents covered in lectures.