Challenges to Using and Interpreting the SATS-36 Instrument: 

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About the SATS Instrument

- Widely-used to measure attitudes toward statistics
- 28-item (Schau, 1992) Affect, Cognitive Competence, Value, and Difficulty
- 36-item (Schau, 2003) the above, with Interest and Effort
- Primarily used with undergraduate, introductory statistics students
- Translated into many languages

Data & Analysis

- Graphs and analysis are based on student data in the SATS data warehouse, collected from 2007-2010
- Students in introductory statistics courses
- Approximately 2300 students across 120 courses
- Missing values excluded from these analyses
- Stem results graph is from internal data collection using adapted instruments for which validity evidence is largely unavailable

Other Challenges

- Neutral option included, coupled with non-standard instructions:
  - “If you have no opinion, choose Neither disagree nor agree.”
- Difficulty may depend on type of student/course
- Example: Engineering students at BYU tend to have higher difficulty scores than for general populations at UNM.
- Negatively worded items use “not” – may be overlooked by students
- Claimed congruence with Expectancy Value Theory (EVT; e.g. Eccles, 1983, 2014)
- Potential mismatch between SATS constructs and EVT constructs (e.g. Cost)
- Rigid pre/post structure makes longitudinal research (e.g. Kerby & Wroughton, 2017; Millar & White, 2014) difficult at best
- Not appropriate for use with other populations of interest (e.g. Teachers)

Ways to Address these Challenges

- Understand limitations of SATS when using it or reading reports that use it
- Document validity evidence for your intended uses and question uses that are not supported
- Revisions to SATS? Lots of challenges to address.
- Development of a new instrument? Ongoing project: Surveys of Motivational Attitudes toward Statistics: SOMAS (e.g. Batacic, Bolon, & Bond, 2018; Unfried, Kerby, & Coffin, 2018; Whitaker, Unfried, & Batacic, 2018; Whitaker, Unfried, & Bond, 2019)

Changes from Pre to Post

- Changes often absent from Pre to Post (especially Affect, Cognitive Competence, and Value)
- Does this reflect a true lack of change in the underlying constructs?
- Or does this reflect an inability for the instrument to detect such changes?
- Initial development article (Schau et al., 1995) includes only Pre survey
- More variability in Post scores than Pre scores
- Adapted version of SATS to STEM demonstrates similar patterns among scores (see Figures 3 and 4)
- See Table 1 and Figure 1

Interest and Effort Scales

- Only four items per construct while the original SATS-28 attitude constructs had no less than 6 items: Affect (6 items), Cognitive Competence (6 items), Value (9 items), and Difficulty (7 items). 
- “More discrete” than the other constructs: possible values for the construct end in .00, .25, .50, .75
- No negatively-worded items while SATS-28 constructs did include negatively-worded items
- All the Interest items have the word “interest” in them.
- Example item: I am interested in learning statistics. (Schau, 2003, p. 3)
- All the Effort items have the word “plan” in them.
- Example item: I plan to complete all my statistics assignments. (Schau, 2003, p. 3)
- Students who reviewed the Effort items in focus groups (Sofia, STEM Attitudes, 2014 and 2015) indicated that one would tend to strongly agree to all of the items.
- Effort scale tends to exhibit a ceiling effect (especially on Pre), that is the distribution is not symmetric, bounded by 7 (Strongly Agree), and skewed towards 1 (Strongly Disagree) (see Figure 2)
- Students tend to overestimate their effort at the beginning of the semester.

References


