# A Qualitative Approach to Understanding Students' Attitudes Towards Statistics

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**Abstract:**

Statistics is a dreaded required course for countless undergraduate majors[7]. Students start their semesters off with anxiety, convinced they will do poorly[1,6]. These attitudes and anxieties have the potential to affect student outcomes[8,9]. Additionally, students' beliefs about their academic abilities play a large role in how they interact with course material[3,5]. Academic self-efficacy and pre-existing attitudes towards statistics are positively correlated with each other and with academic performance[2,4,10]. Research on attitudes toward statistics is primarily quantitative[6] and may not capture the full picture of how students' attitudes towards statistics originate and take shape. This project uses qualitative methods to obtain a nuanced understanding of the relationship between these attitudes and student interactions.

Forty-five undergraduate students were recruited from an introductory statistics course for non-majors at a large Midwestern University. Data collection consisted of three classroom observations, a voluntary survey (23 respondents), and one interview with an intentionally sampled student. Data were coded in the constant comparative method to triangulate components of attitudes towards statistics which are associated with deeper conceptual understanding, overall course performance, and in-class participation. The analysis of classroom observations established patterns in participation and group dynamics while the analysis of the interview highlighted the effect of cognitive competence. The survey questions, largely based on the Survey of Attitudes Towards Statistics (SATS-36)[11] , were rephrased to be open-ended to identify aspects of attitudes that the forced-choice SATS-36 survey might fail to capture. Additional survey items included students' thoughts on the classroom environment and a self-rating of participation in the course.

Observations identified students who regularly participated in class discussions and assisted their peers as well as those who struggled with the material but did not utilize their instructors or peers. Survey responses and observations suggest that students who engaged more with the instructors were more likely to have a positive view of the material and participate in class. While this did not necessarily improve their grades, it did noticeably improve their conceptual understanding. The interview suggested otherwise: the interviewed student was specifically chosen because of their positive interactions with course instructors and concurrent minimal effort in assignments and group discussions; this discrepancy may be due to the student's self-proclaimed fixed mindset. Of note, the majority of survey respondents reported feeling confident in their ability to learn statistics and many enjoyed statistics or were neutral in affect. The interviewed student explicitly stated their dislike of statistics and alluded to not being confident in their ability to learn statistics so it is possible that affect and self-efficacy beliefs play a role in the relationship between positive instructor interaction and in-class participation.

The combination of the constructed response survey and classroom observations illuminated novel aspects of students' attitudes, specifically the connection between participation in classroom discussions and components of attitudes towards statistics. These results can also be

used to design new items to measure aspects of students' attitudes, which would allow for large-scale analyses of how attitudes relate to students' interaction with course material.

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