

Understanding Students' Experiences in Statistics

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Objectives

This study designed a brief, classroom-embedded set of reflective activities to support students' attitudes and affect toward statistics. We compared attitudes and beliefs of students across multiple FASS courses. We examined feasibility and report preliminary outcomes.

Introduction

Prior research suggests that social science students' difficulties in learning statistics often include worries about making mistakes and perceptions that statistical concepts are complex or unfamiliar. These challenges can reduce confidence and contribute to statistics anxiety and avoidance behaviors and reduce student performance [1].

In Singapore's educational context, research suggests that non-cognitive barriers (e.g., negative attitudes and anxiety) may be particularly salient yet often overlooked [2].

Methods

We used a quasi-experimental design across six statistics/research-methods course sections per semester (AY2025/2026) for social science students.

Each semester, two courses implemented a brief set of classroom-embedded reflective activities (intervention, see Figure 1), while the remaining four courses served as comparison courses.

Students completed pre- (n=19) and post-semester (n=29) surveys assessing attitudes and affect toward statistics*. Participation was voluntary.

Scan for poster PDF, reading list, activity materials, and questionnaires



Survey components included established measures on:

- Demographics, educational background, and study beliefs
- Attitudes toward statistics (ASMAS; plus the difficulty subscale from SATS-36)
- Ratings of the reflection activities
- Open-ended feedback and suggestions

*Note. Total responses received: Pre N = 42, Post N = 41; Pre- and post-survey responses were not matched at the individual level. Accordingly, pre/post differences should not be interpreted as within-person change.

Intervention Example

"Stats Matter!" activities (Weeks 1–13)

Timing	Activity	Purpose (what students do)
Week 1 (Pre)	Why are you here?	Reflect on why stats courses matter beyond degree requirements
Week 3/4	Stats across my major	Connect statistics to students' discipline
Week 5/6	Breaking news!	Interpret a statistics-related news story
Week 7/8	Dear statistics diary	Record daily observations linking statistics to everyday life
Week 10/11	Reporting for duty	Apply statistics to future work scenarios
Week 12/13 (Post)	What have I gained?	Synthesize learning and reflect on changes in thinking

Example prompts (Reporting for Duty)

Goal: Generate ideas about how students' desired professions use data and statistical reasoning.

Prompted questions (e.g., asked to an AI chatbot):

You are a [job title or job role]. I am going to interview you about your job to learn how it relates to what I am studying.

AI response

What kinds of data do you regularly work with in this job?

AI response

What statistical methods or analyses are most useful in your day-to-day work?

AI response



Deliverable: write a short paragraph about why learning research and statistical methods are relevant to the job

Conclusions

- **Exploratory Comparison:** At post-survey, intervention sections reported lower ASMAS total than comparison sections (Welch t-test, $p = .036$; Hedges' $g = 1.09$, 95% CI [0.07, 2.07]). Given baseline non-equivalence (year of study and pre-survey attitude differences) and few matched pre-post responses, we do not interpret this as an intervention effect.
- **Overall feasibility:** Activities were rated as moderately useful, suggesting the reflection format is feasible in-class or as assignments.
- **Most useful activities:** "Stats across my major", "Breaking news!", and "Reporting for duty" received the highest usefulness ratings.
- **What students want more of:** Open-ended feedback suggested adding more concrete, personally relevant examples and clearer scaffolding/support materials
- The sample size was insufficient for most direct pre/post comparisons, and pre/post comparisons were based on non-matched samples.

Results from Sem 1, AY 2025/2026

- **Engagement:** The reported engagement rate of each activity ranges from 42 to 71% within intervention classes.

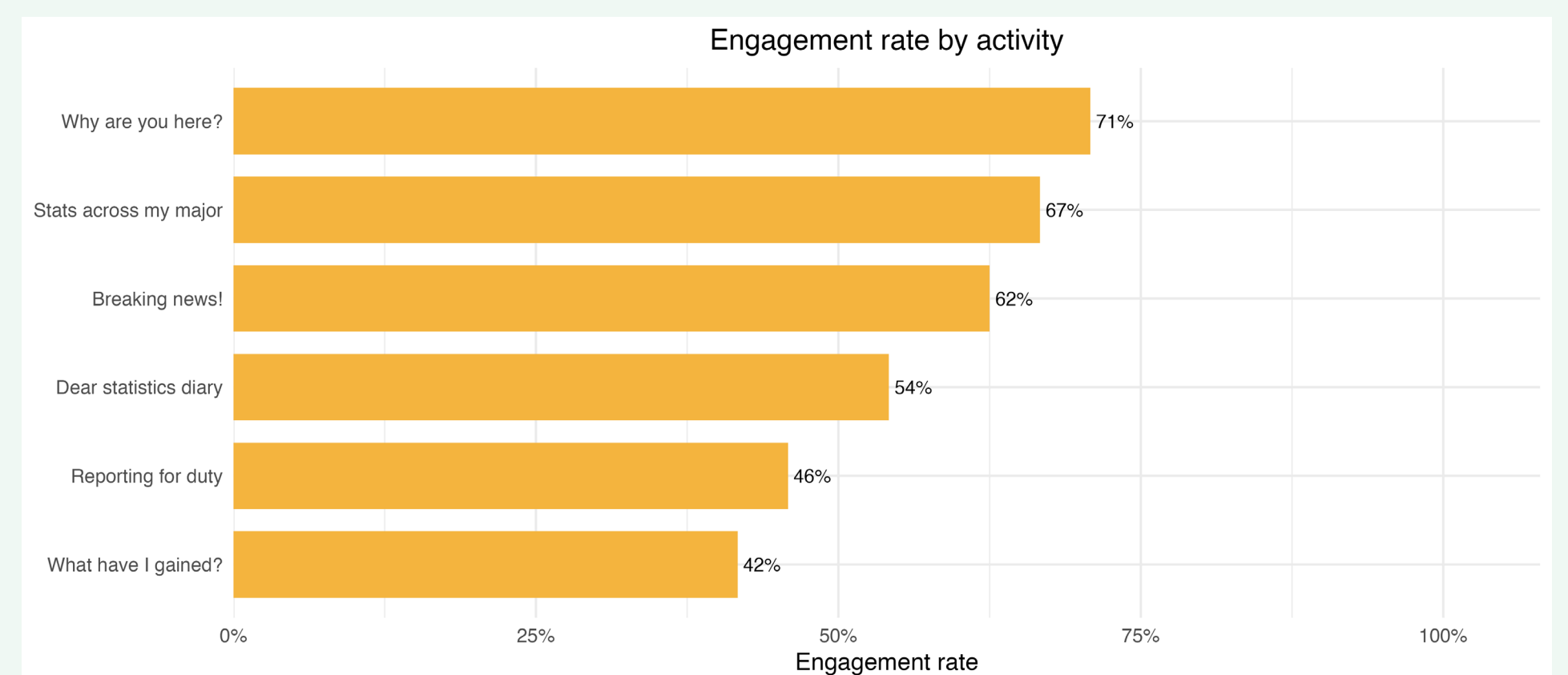


Figure 1. Engagement rate (%): Proportion of intervention-course post-survey respondents (n = 24) who reported completing each activity.

- **Perceived usefulness:** Perceived usefulness was moderate and similar across activities (means 2.6–3.1 out of 5; SD ~1.1–1.3). The following chart shows usefulness mean \pm SD for each activity.

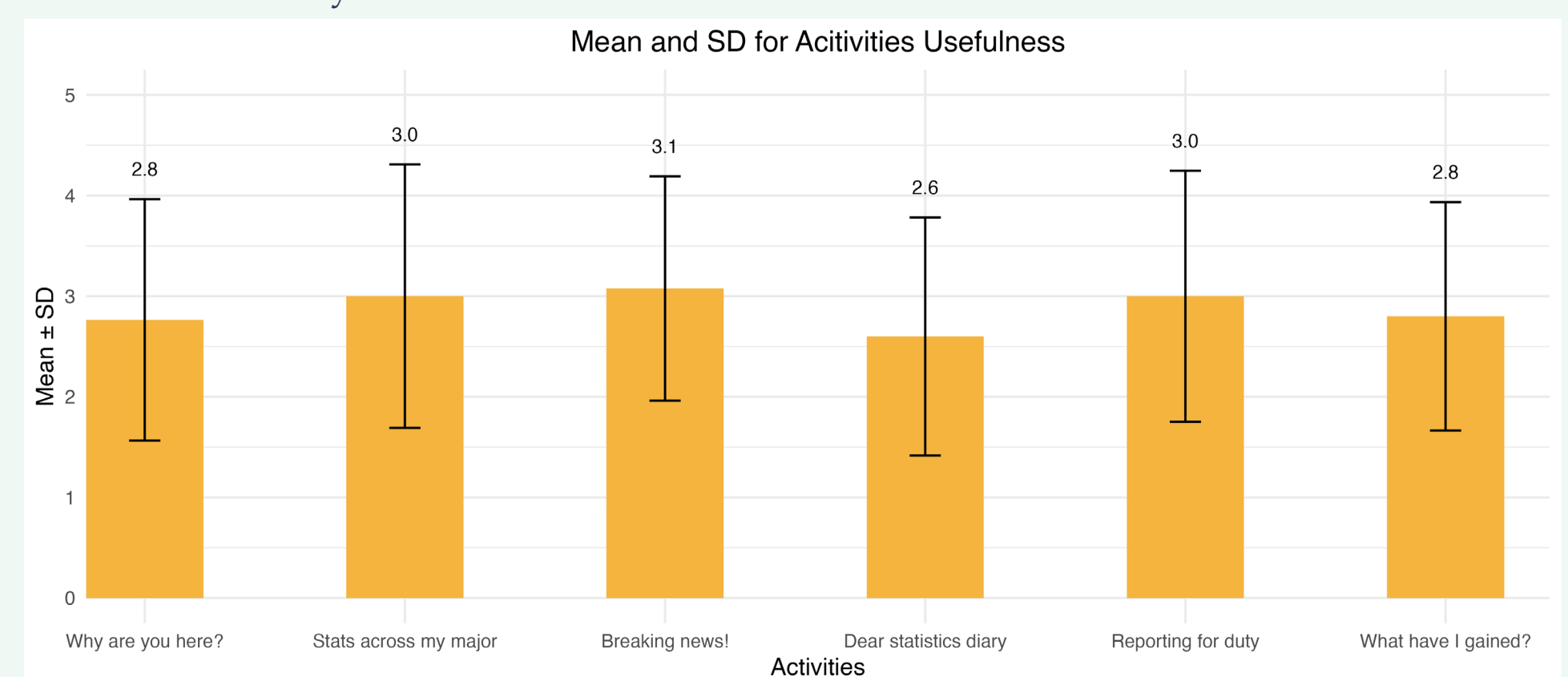


Figure 2 Usefulness ratings: Mean usefulness (1–5; higher = more useful) among respondents who completed each activity; error bars = ± 1 SD; n varies by activity (10–17).

Selected open-ended feedback (post-survey; 3 respondents)

- **What helped students see relevance:**
"The group project was a great example."
"The research project, and how we used analyses to answer our research question and design the study."
- **What students wanted more of:**
"Make examples more interesting and personally relevant"
"More specific examples of what professionals do with these skills, rather than us reflecting based on our imaginations."



Limitations and Future Work

- Group composition differed in semester 1 (higher-year undergraduates concentrated in the control group), which may confound comparisons.
- Future cycles should aim for more comparable groups or adjust analytically.

Acknowledgements References

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[1] Inoferio, H. V., Espartero, M., Asiri, M., Damin, M., & Chavez, J. V. (2024). Coping with math anxiety and lack of confidence through ai-assisted learning. *Environment and Social Psychology*, 9(5). <https://doi.org/10.54517/esp.v9i5.2228>

[2] Jamaludin, A., Jabir, A. I., Wang, F., & Tan, A. L. (2024). Low-Progress Math in a High-Performing System: The Role of Math Anxiety in Singapore's Elementary Learners. *The Asia-Pacific Education Researcher*, 33(5), 1071–1082. <https://doi.org/10.1007/s40299-023-00773-7>