Gender Dynamics in Physics Labs

Dr. Bilas Paul | Department of Physics, SUNY Farmingdale

SUNY The State University of New York

Farmingdale State College
State University of New York

Introduction

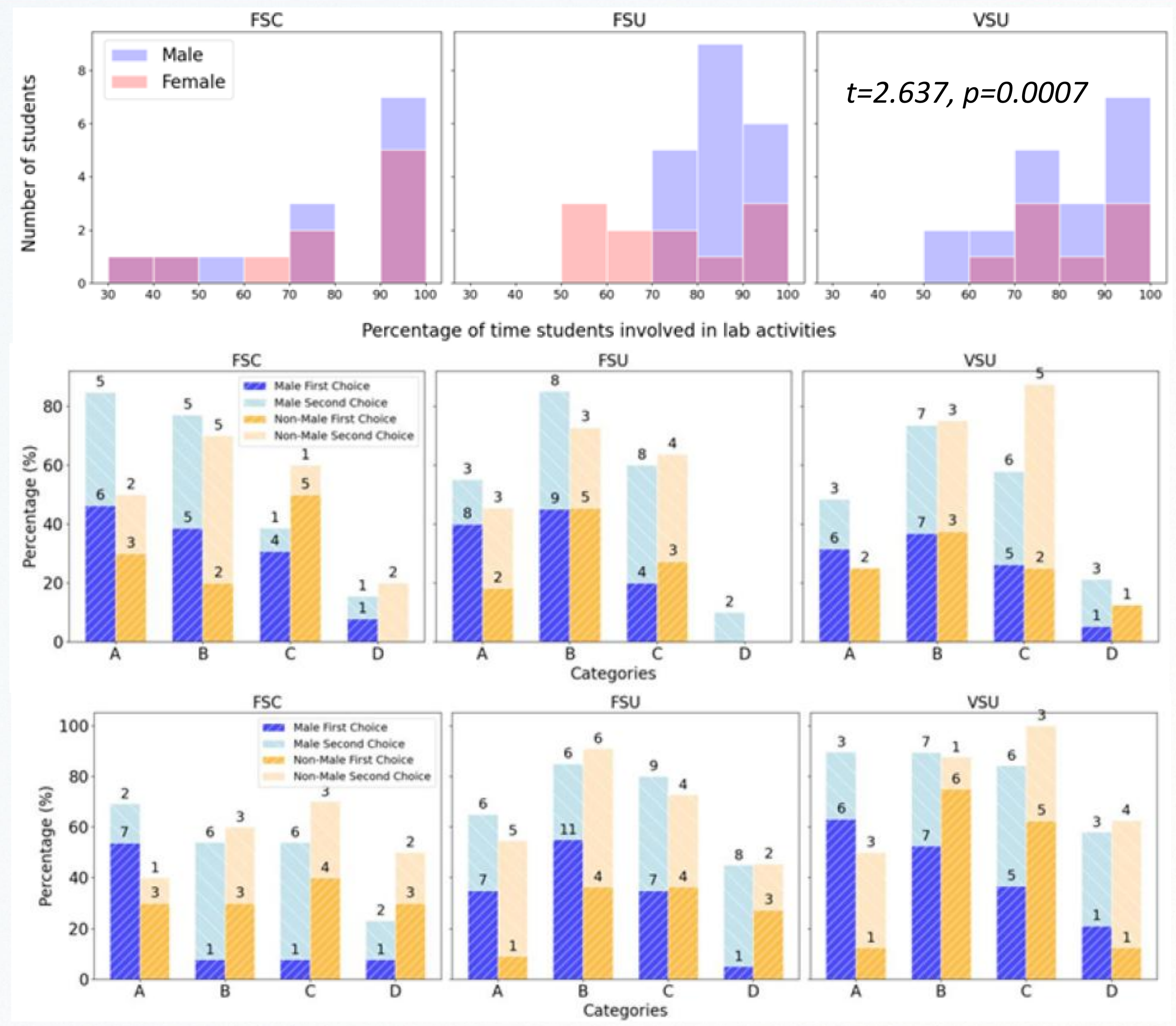
Despite decades of progress, women and gender minorities remain underrepresented in physics and STEM fields. Gender stereotypes, group dynamics, and unequal role assignment, can influence participation in hands-on lab environments. This study explores whether students of different genders equally engage in lab tasks and feel equally comfortable performing them.

Previous Work

A prior multi-institutional study (Paul et al.) found no consistent gender differences in lab participation or task preferences across three institutions. However, one site (Fairmont State) showed significant gender disparities in engagement.

While quantitative results were mostly neutral, qualitative feedback revealed that some female students faced:

- Assumptions of incompetence
- Being overlooked in group work
- Hesitation to voice opinions



These findings highlight the need to explore **contextual gender dynamics** and promote inclusive lab environments.

Quantitative Results

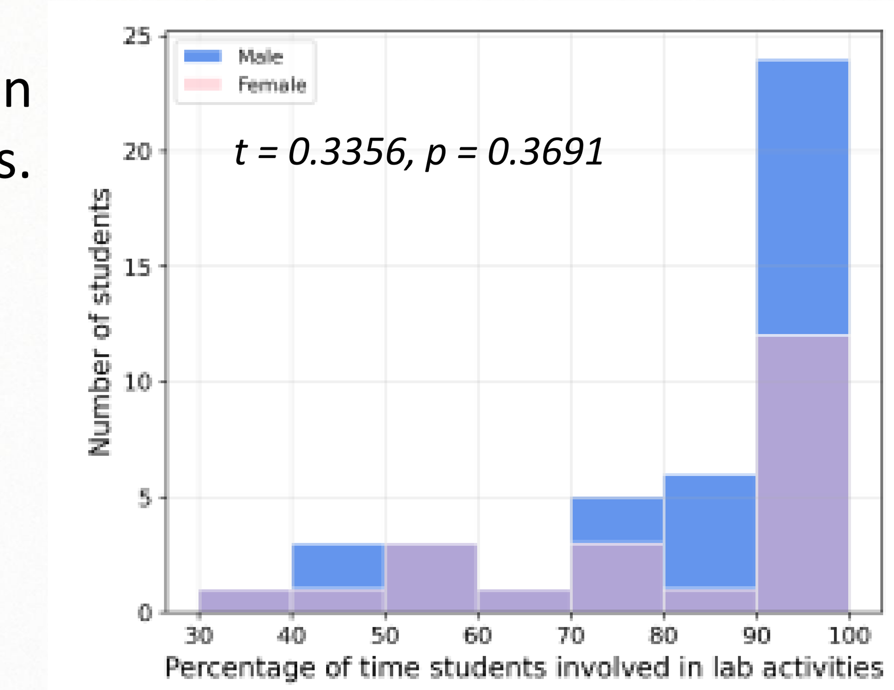
No significant difference in total participation time between male and female students.

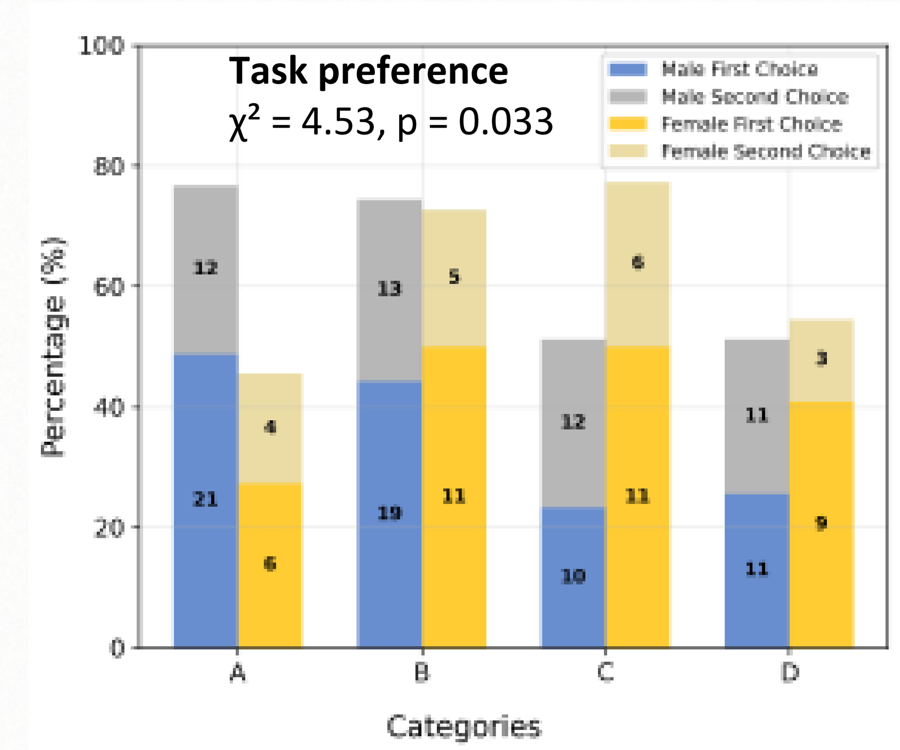
Male students

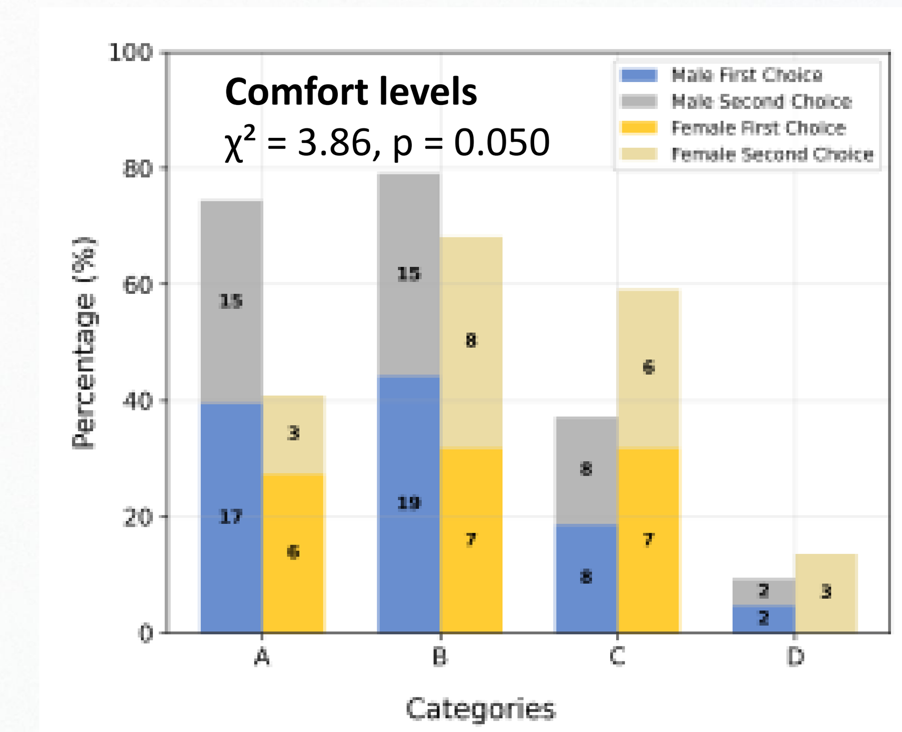
- Preferred equipment handling and data collection
- More comfortable with technical tasks

Female students

- Preferred and felt more comfortable with note-taking, calculations, and graphing







Methods

We conducted a mixed-methods study in introductory algebra-based Physics labs:

Observational data: Time spent on tasks like equipment setup, data collection, note-taking, and analysis.

Surveys: Task preferences, comfort levels, and open-ended reflections.

Sample: 3 sections from Farmingdale State College, New York

Participants: 66 students (43 male, 22 female, 1 non-binary*), mostly non-physics STEM majors.

*Non-binary student excluded from statistical analysis due to sample size.

Qualitative Insights

Female students reported nuanced barriers despite equal task time. Several common themes emerged from open-ended student responses:

🔹 **Perceived Assumptions of Competence**

"*Male partners just assume they know more and don't want to mess up steps.*"

🔹 **Marginalization in Group Work**

"*Being the only woman in a group with all men can be challenging… I'm overlooked and not listened to.*"

🔹 **Hesitation to Speak Up**

"*I was too nervous to correct a mistake—afraid my input would be shrugged off since I'm just a girl.*"

These experiences illustrate how **implicit bias** and **group dynamics** can hinder equitable engagement—even when task time appears equal.

Discussion

🔹 While men and women **spend similar time** on lab activities, **preferences and comfort diverge**, reflecting deeper gendered patterns.

🔹 Task division often mirrors stereotypical roles, potentially reinforcing inequities.

🔹 **Qualitative responses** expose real challenges women face—even when quantitative data appears neutral.

Recommendations

💡 Rotate lab roles intentionally

🗣 Foster inclusive group norms

🧑‍🏫 Train instructors on bias awareness

📋 Encourage equitable task assignment

These interventions can help reduce marginalization and promote **inclusive STEM learning environments**.

Acknowledgment:

- The author extends their gratitude to their students for participation in this study.

References

1. B. Paul, S. Chakraborty, and G. Sharma. Breaking barriers: Investigating gender dynamics in introductory physics lab classes. Georgia Journal of Science, 83(2):3, 2025.