

# Investigating Individual Dominance in Student Contributions in CAD Group Learning Environments

Elizabeth DaMaren, Dr. Alison Olechowski

## Background

CAD is often taught in **group learning environments** (e.g., project-based learning).

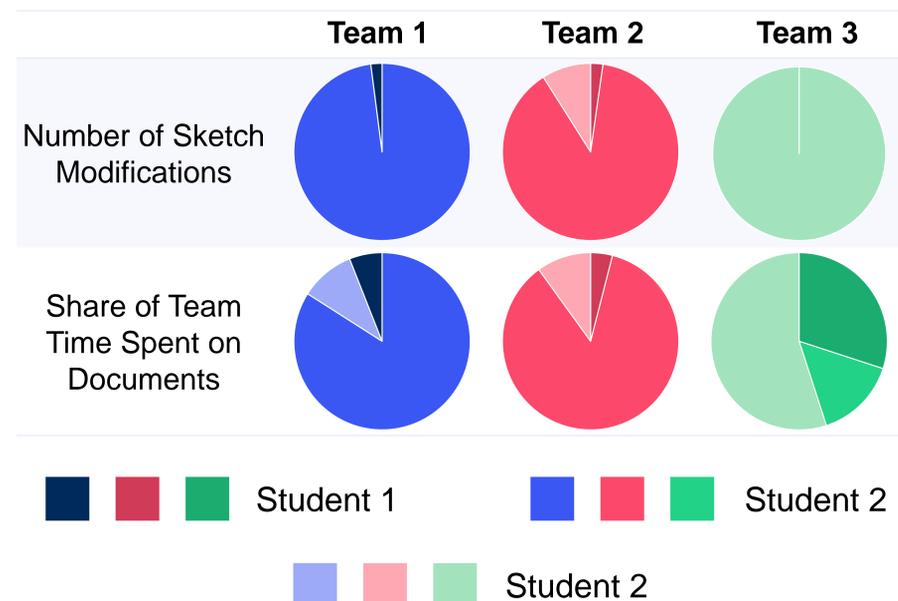


Benefits of this include [1]:

- increased student motivation,
- improved communication skills,
- and strengthened leadership skills.

However, there is much anecdotal evidence on **uneven student work contributions** in CAD group learning settings.

Recent work published in [2] reinforces this anecdotal evidence. An analysis of student actions in a CAD group project revealed evidence of a phenomenon of a **single student dominating team contributions** of key CAD actions:



## Research Questions



**Team workload:**  
How prevalent is the trend of individual dominance?



**Gender implications:**  
Are men more likely to dominate than their peers?



**Learning outcomes:**  
How is skill development impacted?

## Methodology

### Mixed-Method Approaches

Pre- and Post-Course Surveys	Semi-Structured Interviews	CAD Data Analysis
<ul style="list-style-type: none"> <li>Understanding how student demographics play a role in team dynamics</li> </ul>	<ul style="list-style-type: none"> <li>Gathering rich qualitative data on student experiences</li> </ul>	<ul style="list-style-type: none"> <li>Tracking student actions in group learning activities</li> </ul>

### Analysis Tools and Frameworks:

- Onshape's built-in data collection:
  - Audit trails
  - API
- Qualitative coding + thematic analysis
- Ready Lab's Multi-User CAD – Collaborative Learning Framework [3]



## Future Directions

Following this mixed-methods study, there are several subsequent research avenues to be explored:

- Further Observational Studies:
  - Can initial findings be generalized?
- Experimental Interventions:
  - What pedagogical & instructional approaches might help to ensure equitable learning opportunities & outcomes for all students in CAD group learning settings?



## Interested in Collaborating?

We are actively seeking partners for this work and future studies on CAD learning and team dynamics.

Get in touch:

✉ [liz.damaren@mail.utoronto.ca](mailto:liz.damaren@mail.utoronto.ca)

🐦 [@liz\\_damaren](https://twitter.com/liz_damaren)

## References

- [1] H. Nguyen, L. Wu, C. Fischer, G. Washington, and M. Warschauer, "Increasing Success in College: Examining the Impact of a Project-Based Introductory Engineering Course," *Journal of Engineering Education*, vol. 109, no. 3, pp. 384–401, Jul. 2020, doi: 10.1002/jee.20319.
- [2] A. Olechowski, Y. Deng, E. DaMaren, I. Verner, O. Rose, and M. Mueller, "All's not fair in CAD: An investigation of equity of contributions to collaborative cloud-based design projects," Beijing, China, Jul. 2022.
- [3] Y. Deng, M. Mueller, C. Rogers, and A. Olechowski, "The multi-user computer-aided design collaborative learning framework," *Advanced Engineering Informatics*, vol. 51, 2022, doi: 10.1016/j.aei.2021.101446.