

How is the Collaborative Nature of a Group Affected by Gender?

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INTRO

- Previous research suggests that male and female students divide their time in physics lab differently:
 - Male students spend more time on *computer* and tend to take over the *equipment* more (Holmes et al., 2019).
 - Female students spend more time on *activities*, such as *writing/speaking to peers* (Day et al., 2016).
- Understanding how gender plays a role in collaboration can allow group dynamics to be improved in a way that takes this into account.
- This study finds that gender affected not just the *hands-on* division of labor in lab, but also the *cognitive* division of labor.

METHODS

1. Students in a physics lab were filmed while planning and executing an experiment.
2. Video analysis was conducted by creating content logs that made note of changes in activity.
3. Key moments were chosen from content logs to illustrate how gender affects level of critical thinking.

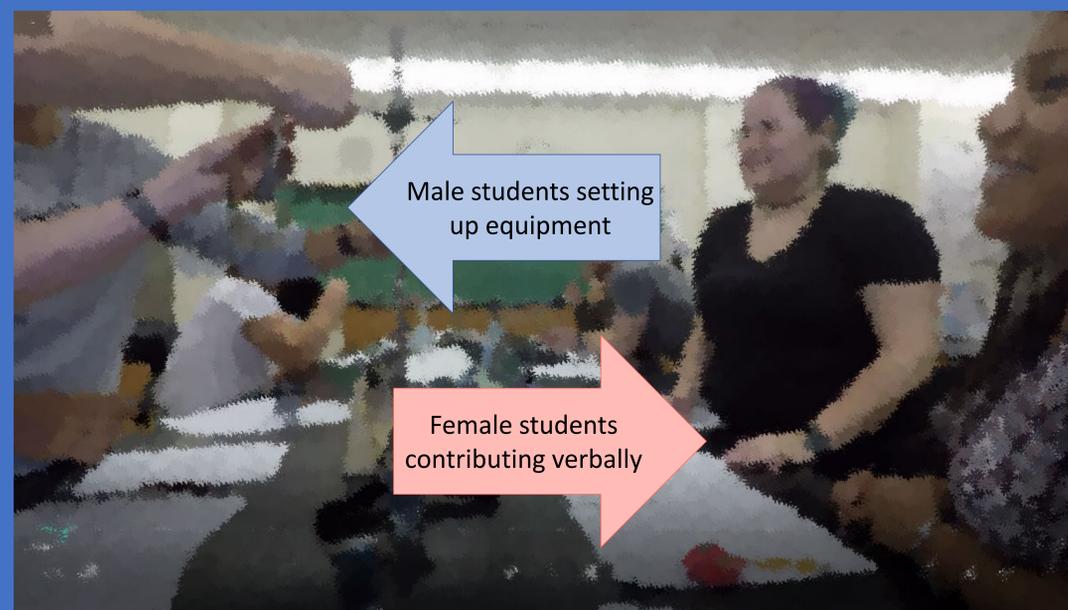
RESULTS

- We found gendered differences in how students *distanced* themselves by *hedging or questioning* (Conlin & Scherr, 2018):
 - Male students tended to provide suggestions *first* and be *confident* in their initial ideas (*LESS distancing*).
 - Female students tended to *question initial ideas* and *think more critically* before beginning experiment (*MORE distancing*).

DISCUSSION

- The interactions in these videos suggest there may be a gender component to the way that the group collaborates to solve a problem. The male students were first to propose solutions, while the female students sought more clarification before agreeing to any plans.
- This is just a preliminary finding from one group's first lab – more research is needed to see if this pattern generalizes to more labs and more groups.

Gender can play a role in the collaborative nature of a lab group when solving a problem.



Male student 1 (front left) and male student 2 (back left) are setting up the experiment, while female student 1 (back right) and female student 2 (front right) are contributing verbally, offering suggestions.

Video Transcription #1

M1 and M2 fiddling with pendulum

F2: Oh okay! So I think I know what.. We can do it like this. **No?**

M1: That's scary.

F1: ***asks question about procedure and M1 shows answer on worksheet***

M1: We need a thing that's not this.

F1: This should work, right? ***referring to support clamp*** this thing you can usually use with that.

F2: **The thing is we need something to hold with this.** ***referring to protractor***

F1: If we turn this upside down, we can probably do it.

F2: That's what I was thinking but.. Whether or not it stays..

M2: ***brings over extension clamp***

F2: I think that will work.

M1: **And then we'll put that [extension clamp] in that [3-prong clamp].**

F1: Yeah.. I mean, we can tighten it a little bit more. ***referring to extension clamp on protractor***

Video Transcription #2

F1: **Although, one thing is the friction may play a role..**

M1: **Nah, it's fine.**

F1: Okay, so it should be fine?

M1 and M2 looking closely at set-up

M1: Uhhh it's touching a little bit.

M2: **Oh yeah... but that's fine, it's not too bad.**

Video Transcription #3

F2: **So are you guys confident with this or..?** ***referring to pendulum set-up***

M1: **Confident enough.**

F2: Okay.

M1: We just have to be..

F1: Yeah, we'll just have to see, but **I think it'll be fine if the friction is gonna be constant. Our measurements will be comparable to each other.**

REFERENCES

- Conlin, L. D., & Scherr, R. E. (2018). Making space to sensemake: Epistemic distancing in small group physics discussions. *Cognition and Instruction*, 36(4), 396-423.
- Day, J., Stang, J. B., Holmes, N. G., Kumar, D., & Bonn, D. A. (2016). Gender gaps and gendered action in a first-year physics laboratory. *Physical Review Physics Education Research*, 12(2), 020104.
- Holmes, N. G., Roll, I., & Bonn, D. A. (2019). Participating in the physics lab: does gender matter? *arXiv preprint arXiv:1905.03331*.