

The Effect of Electronic Platform on Student Participation in Team Design Negotiations

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Problem of Practice

In face-to-face team conversations, contributions are often skewed, with a few members speaking a lot and others speaking very little.

The “silenced” members are often minorities in the class (in my case, female students and non-native English speakers).

Hypothesis

The patterns of privilege that silence speakers might be disrupted by characteristics of online chat.

- Participation on teams in the chat environment will be more balanced, with fewer students contributing much more or much less than their peers.
- Women in the chat environment will participate more than women in the face-to-face environment.
- Non-native English speakers in the chat environment will participate more than non-native English speakers in the face-to-face environment.

Characteristics of Online Chat

- **Less synchronous:** There is time to pause, collect thoughts, and then type. Multiple people can type at once (and so respond to the same thought). There is less jockeying for conversational position. (De Wever et al., 2006).
- **Text-based:** The textual nature of chat may make it easier for non-native English speakers to participate, and it allows for a permanence to the conversation that allows the team and instructors to look back at the conversation (Gunawardena et al., 2001; Morse, 2004).
- **Lower social presence:** The lowered social cues may make it easier for shy students to contribute and for students to provide constructive criticism of others' ideas (McLeod et al., 1997; Zhao, 1998).

General Method and Description of Context

- Multiple sections of “Introduction to Engineering,” Fall 2011-Winter 2013. All sections are design-build-test.



Figure 1. Students work in instructor-assigned teams of ~4 or 5 students. Most meetings happen face-to-face in a lab environment.

Photo Credit: Joseph Xu. Pictured: Neil Syal, Somya Gupta, Botas Boke, Kelly Wojcik.

- Initial team meeting, to which students bring individual design ideas and are instructed to leave meeting with a shared plan to begin building. Teams assigned to meet via Google Collaboration tools (n=39 teams) or face-to-face (n=15 teams).
- Students completed a survey about their perceptions of the experience (n=198 students).

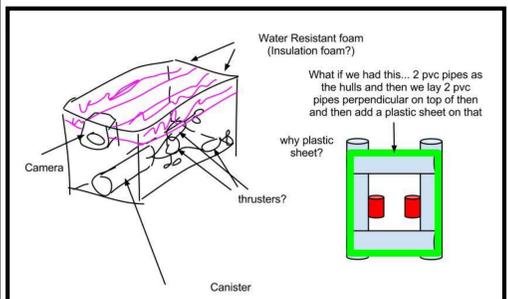


Figure 2. Students in the chat condition used Google Drawing tools plus running chat to brainstorm their design.

Example Transcript

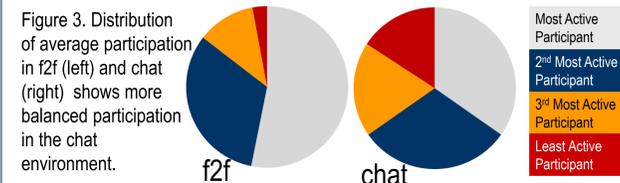
Transcripts separated into t-units and credited to speakers. A t-unit is an independent clause plus all its associated material.

Not reported here, but I'd be excited to tell you more about ongoing coding by rhetorical move and object of discussion.

- S1: I am for a propeller to help move it up and down,
S1: I just don't want that to be the propellers sole purpose
S1: I think it should also contribute to the forward thrust of the vehicle
S2: oh, so at an angle to the horizontal?
S1: exactly
S2: wouldn't that affect the control of the vehicle though,
S2: it may lead to operator error
S3: yeh and with regards to the placement of the thrusters for forward and reverse motion, do you guys think if they were closer to the edges it would help turn it faster?
S4: To have it contribute to forward motion, we'd have to angle it, and then it would make it move up as it moves forward.

Preliminary Results: Balance of Participation

- There are more t-units produced in the chat conversations, but that difference goes away when “politeness/convention” and “expressing agreement” codes are excluded from analysis. I believe that some of these contributions happen nonverbally in the face-to-face conversation.
- Conversations in online chat are much more “democratic,” with more balanced participation among group members. See Figure 3 for the relative distribution of t-units produced by the participants.



- A t-test of the standard deviations of the members' contributions on chat and face-to-face teams suggests that contribution is more balanced (standard deviation is smaller) in the chat condition ($p < .05$).

Preliminary Results: Participation by Gender

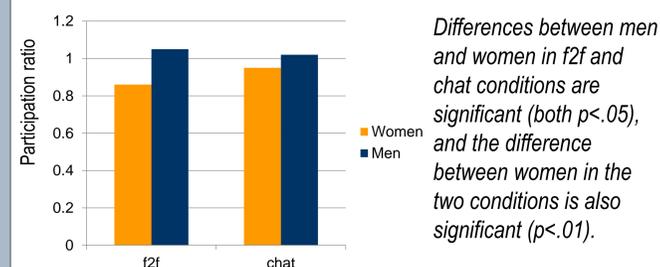


Figure 4. Individual participation divided by team average, expressed as “participation ratio.” Participation is more balanced by gender in the chat environment.

Preliminary Results: Partic. of Non-native English Speakers

There was no significant difference between non-native English speaking students in terms of real or perceived participation. However, the low number of participants (n=12) makes this finding difficult to interpret.

One participant provided open-ended feedback that this meeting was the first time he felt able to contribute ideas to his team.

Research Conclusions

- In the face-to-face meetings, it is common for one or a few team members to speak a lot and for one or a few members to speak very little (in fact, in 4 of the 15 face-to-face transcripts, one team member did not speak at all, except for “politeness/convention” contributions (for example, greetings).
- This imbalance is ameliorated in the online chats. Of the 39 transcripts of teams meeting in the chat space, none of them include a silent team member.
- Female students participate more in the online space. It is expected that a similar result might be found among other at-risk groups, with a larger sample.

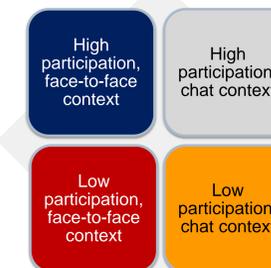
Implementation Notes

- Google Apps interfaces well with UM's system; I invited student teams to Google Drawings using their UM IDs. Setting up 12 documents for a class of 57 students took ~15 minutes.
- Though Google Drawing was a new collaboration tool for students, they picked it up quickly, as they generally have experience with other drawing tools.

Future Work

Ongoing coding for rhetorical purpose and object of discussion to help me answer a series of questions about patterns of participation.

Figure 5. Follow-up focus groups or interviews with students in each of the four categories will help me better understand students' experience with this pedagogical innovation.



Acknowledgments

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