

Gender and Gendered Discourse in Online STEM College Courses

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Abstract: Students' language in discussion forums in online courses can influence their participation and course outcomes. We examined aspects of gendered language to gain insight into men's and women's participation and success in two online science courses. Results revealed that women and men did not differ in their language use along traditionally gendered lines, which has the potential to help subvert the typical result of the negative outcomes associated with the female marker in STEM courses.

Introduction

STEM positions in the United States are suffering from a lack of diverse participation (NMSI, 2014; Noonan 2017). Taking courses online might ameliorate this issue because this allows for students to control more of when, where, and how they participate. However, as Huang, Hood, and Yoo (2013) pointed out, there is a gender divide when it comes to engaging with computer-mediated learning. In this investigation, we examine one potential mechanism affecting women's involvement and success in STEM courses online: use of gendered language in discussion forums. We chose language because it can be a marker of social status (i.e., gender), and thus has the potential to impact how and with whom information is shared in the online environment (Cho, Gay, Davidson, & Ingraffea, 2005). Given that students taking up and owning ideas from others is an important aspect of learning (e.g., Barron, 2000), examining the language used to share those ideas is crucial. The consensus is that there are measurable differences in men and women's use of certain language features (Canary & Dindia, 2009). Patterned differences in words, phrases, and sentences have led researchers to categorize men's communication style, compared to women's, as dominant and information-dense ("report" style of communicating) and women's communication style, compared to men's, as submissive and affiliative ("rapport" style) (Tannen, 1990). These differences continue into the online realm. Following Tannen's classic (1990) work, Newman, Groom, Hanelman, and Pennebaker (2008) analyzed gendered language in a variety of contexts, which we borrow to examine the following factors (previous findings are in parentheses):

- (1) Pronouns – The use of any pronoun implicitly requires shared understanding and meaning. [Females (F) > Males (M)]
- (2) Politeness – Politeness provides a welcoming atmosphere for others to join in (F>M).
- (3) Hedging – Vague language may diminish a person's contribution because it signals being unsure; this marker of insecurity could elicit support and help from others (F>M).
- (4) Personal and interpersonal queries – Focusing more on others than self can build community (F>M).
- (5) Information giving – Relaying facts positions the speaker as an authority, possibly discouraging others' engagement (M>F).
- (6) Confidence – Portraying confidence affords authority, possibly discouraging others' engagement (M>F).

Aiming to advance an understanding of how gendered language is used in two online courses from different STEM disciplines, we examined students' language, with special attention to whether men and women use traditionally gendered language. Specifically, we asked: (1) To what extent do men use a report style of and women use a rapport style of communicating in two online courses? (2) To what extent is the language used similar or different across the two courses?

Methods and data sources

Data for this investigation included the discussion posts from Chemistry and Astronomy. In Chemistry, we had four semesters of data and, in each semester, there were 13 discussion assignments; students had to participate if they wanted to earn the full 5% towards their final grade. The assignments required students to (a) post a solution to the problem, (b) post a question, or (c) answer a question. The instructor's explicit goal for this assignment was to have students "learn how to approach challenging problems from other student explanations, and by teaching other students." In Astronomy, we had one semester of data wherein weekly participation was required and constituted 25% of students' grades. Students were required to post a response to a topic and post a response to 2 other students' postings each week. The instructor's explicit goal for the forums was "to discuss class facts to

better understand the science...” 271 students were enrolled and completed Chemistry (132 women and 115 men). 208 students (51 women, 157 men) completed Astronomy. All identifiable data were removed or anonymized before analysis. The Chemistry students generated 3,121 unique posts (1,677 from women and 1,444 from men). The Astronomy students generated 13,335 unique posts (3,375 from women and 9,960 from men). We used Linguistic Inquiry and Word Count 2015 (LIWC; Pennebaker, Boyd, Jordan, & Blackburn, 2015) to analyze the forum posts. Examples from each category, from each course are at <https://bit.ly/2OpMjK9>.

Results

We found no significant differences between men and women on any variable in either course, with only one exception (men used more tentative words than women in Astronomy). However, we found that all of the summary categories were significantly different *between* the two courses. The posts in Chemistry were significantly more Analytic ($\chi^2 = 90.27, p < .001$); the posts in Astronomy displayed significantly more Authenticity ($\chi^2 = 183.36, p < .001$) and Clout ($\chi^2 = 46.48, p < .001$). The median word count in Astronomy (median = 512) was significantly higher than that in Chemistry (median = 433). Pronouns and Numbers were significantly frequent in Chemistry than in Astronomy. Chemistry students used the categories of Social Process, Affiliation, Certainty, Discrepancy, and Tentative significantly more than Astronomy students (all $ps < .001$).

Discussion and conclusion

That men and women did not use gendered language across gendered lines is promising. The lack of differential use of gendered language between men and women means, at least for these courses, that this marker of gender did not differentiate men from women, and thus did not advantage or disadvantage students based on their gender in the online environment. It is possible that, without gendered language to distinguish men from women, at least one potential barrier for women to succeed in the online environment was absent. Strikingly, even though there were no gender differences in use of gendered language, we found differences between the two courses examined here. The language differences between the two courses highlight the need to study the role of language when analyzing online course discussion forums so that discussion forums—the area of the online environment most crucial to community building—can be as productive as possible for all students.

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