MANIPULATING LINGUISTIC DIVERSITY TO IMPROVE TEAM DYNAMICS IN AN UNDERGRADUATE ENGINEERING DESIGN COURSE

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INTRODUCTION

Engineering design work is often done in teams. Teams work best when they draw on each member's strengths, whereas teams in which members feel excluded or silenced are less likely to succeed. The first-year undergraduate engineering design course we studied is composed of a very diverse student population, with over 40% of students using Mandarin Chinese, and just under 30% of the class regularly using languages other than English. In the past, linguistic clustering among students led to student complaints about social exclusion and a lack of exposure to English.

We manipulated team formation in order to maximize linguistic diversity in work groups, thereby reducing the number of complaints about social exclusion because of differences in language competencies and resulting in English being the main language used during teamwork.

METHODS

We chose to manipulate linguistic diversity in team formation because student complaints about teammates in this class in previous years were most often language-related.

Team formation in this course in previous years was done by self-selection. Students chose their own team members, forming teams of 4 or, less commonly, 5 students. Every year, the patterns of team formation resulted in a few highly cohesive teams and a number of highly dysfunctional teams. Many of the cohesive teams consisted entirely or mostly of speakers of a shared language and, often, culture. Dysfunctional teams, on the other hand, tended to be made up of students hesitant to take the initiative in team formation mixed with students who showed up late on team selection day. These dysfunctional teams tended to start work slowly, have relatively low cohesion, and relatively poorer outcomes relative to teams made up of students who actively chose to work with one another.

These patterns of team formation led to certain team outcomes. Two types of teams in particular caused concern: teams that communicated almost entirely in a language other than English, and language-based exclusion of team members in mixed-language teams. When team members shared a common language other than English, team members communicated exclusively or almost exclusively in that language. This led to strong communication among team members, but made between-team communication in English – e.g. in class presentations – more difficult. Linguistically uniform teams experienced less dysfunction than other teams, but did not benefit from the diversity of the class as a whole or experience what working in today's global workforce is really like. Conversely, when a team contained several students who spoke the same language and who communicated in that language, excluding one or more members who did not speak that language, linguistic/cultural conflicts resulted. This situation includes teams where some students were proficient in English but others were not; the people with lower English proficiency often felt excluded and talked-over.

These two specific types of teams were the subjects of student complaints, specifically, 1. some students in groups that spoke a common non-English language complained about their lack of exposure to English because of peer pressure to speak the other language, and 2. some students felt talked over and excluded by either teammates speaking in a language they did not understand at all or by teammates speaking English too rapidly for them to understand.

In this study, we aimed to reduce the occurrence of these two types of problematic teams by using a team formation algorithm so that, among other things, no more than 50% of the members of any team used the same non-English language, and no more than 50% of team members spoke only English.

While language-related problems with team dynamics have been noted before^{1,2}, and team formation algorithms have also been used in a different faculty at the University of Toronto to reduce their incidence³, previous algorithms were based on citizenship data rather than linguistic data. We chose to look directly at self-assessed language proficiency to ensure that we did not make assumptions about linguistic proficiency based on citizenship; many Canadians regularly use languages other than English and/or French⁴.

An online language proficiency survey developed by S. T. Scharf was administered at the beginning of the course. Participation in the survey for team formation purposes was mandatory but student consent to participate in this research project was optional. Teams were formed on the basis of students' self-professed skill at chatting with friends, since informal speech and/or text messages are the main forms of communication used among students.

The output of the team formation process was expected to be teams roughly equal in terms of language ability and linguistic diversity, such that all students got exposed to teammates from language groups different from their own, and such that English was the only common language in the group, both encouraging the use of English within teams and reducing language-based social exclusion. Unilingual speakers of English would also be encouraged to slow down when they spoke because they would be in the minority in every group.

RESULTS

Initial enrolment in the course was 247; 245 students completed the survey and 30 opted not to consent to share their data. Three students dropped the course, leaving a total of 213 out of 242 students whose language data were available for analysis – an 88.0% participation rate.

Survey results indicate that 93 (43.3%) of the participating students use Chinese, 64 students (29.8%) are unilingual English speakers, and the rest of the class (58 students, 27.0% of the class), regularly use other languages. Students used 26 languages in total (counting all dialects of Chinese as one language).

The teams formed by the algorithm appeared to be linguistically diverse but relatively equally matched. For instance, unlike in previous years, all teams seemed to be hesitant to start making decisions about their projects, whereas, in the past, more linguistically uniform teams started working together as a unit sooner than did more linguistically heterogeneous teams. Also unlike in previous years, there were no highly dysfunctional teams comprised exclusively of shy students and/or students with poor English skills and/or latecomers.

Reports from teaching assistants confirmed that overall student participation in tutorials increased relative to previous years' classes. Unlike in previous years, students did not chat in languages other than English during teamwork, no students acted as translators for other students, and all the students seemed to be more engaged in their work, as evidenced by a lack of students texting or acting disengaged.

DISCUSSION

It appears that taking linguistic issues into account in team formation in highly multicultural classrooms has the potential to improve student engagement and reduce the language-based problems known to occur when students were left to form their own teams. Given the increase in multiculturalism in Western countries in general, and the Canadian government's push to increase the number of international students in Canada to 450,000 by 2022 – up from 265,000 in 2012 – in particular,⁵ this research should be of broad interest to universities striving to increase the quality of students' experiences at their institutions across a variety of disciplines.

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