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Impact of Anonymity of Input in Next-Generation Classroom Networks

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Abstract: This project looked at anonymity of input across a series of classroom activities seeking to answer three research questions. First, did activity type influence students' use of anonymity? Second, did activity type influence students' perception of the utility of anonymity? Finally, did student statements about the use and utility of anonymity match their actions? Analysis of the digital artifacts revealed no significant differences for use of names by activity or gender. Females more frequently made comments about wanting to be confident of their answers before they would attach their names. Males much more frequently expressed that anonymity was not important to them. Yet the use of names by the two groups across activities was virtually identical. Both groups had a use of names across all activities of approximately 60%.

Introduction

This project looked at anonymity of input across a series of four classroom activities done using a next-generation classroom network. Next-generation classroom networks have four important features. First, the networks allow for many different formats of input including free response. Second, the networks perform some sort of meaningful, synchronous input aggregation. Third, the networks display submitted data to the group in a contextually meaningful format. Fourth, the input device for next-generation networks is an able device (graphing calculator, computer, etc.) and not a multiple choice clicker. The three research questions this study explored were: First, did activity type influence students' use of anonymity? Second, did activity type influence students' perception of the utility of anonymity? Finally, did student statements about the use and utility of anonymity match their actions?

Changing What Anonymity Means

Webster's defines anonymous as "lacking individuality, distinction, or recognizability." (Merrian-Webster) Within next-generation classroom networks students are only anonymous in the public space. Public anonymity specifically refers to the ability of the participants to submit data to be viewed in the public display space in a way that identities are not revealed. In next-generation classroom networks, it is explicit to the students that their identities can be viewed by the teacher in the private space. The ability of student data to be viewed by the teacher is private accountability. The participants' identities are only hidden from other participants, not from the teacher.

There is a tendency to talk about anonymity as the ability to avoid negative consequences. It is seen as the removal of identity or the taking away of something. Teachers believe that anonymity, in the display space, will save students embarrassment. There is an expressed feeling that anonymity can save students from being made fun of by their peers (Davis, 2002a). This description of anonymity is subtractive. The individual is deleting their personally identifiable information from the group. Next-generation classroom networks allow for a positive view of anonymity. Anonymity allows for an extension of the students' private space. Private space is the space in which the student feels comfortable experimenting, trying out different types of input without having to take firm ownership of the idea to others (Stroup, personal conversation 2001). In their private space (scratch paper, graphing calculator, laptop, brain) students can work through difficulties, on the way to finding solutions or creating a hypothesis. Previous work in classrooms using next-generation networks indicates that the veil of anonymity extends this private space by allowing students to share (make available for class discussion) their nascent ideas without the fear of ridicule (Davis, 2002a, 2003a).

Anonymity opens the individuals' shared information via the class display for interpretation. For example, if there is a range of answers collected from the students up in the display space, students can talk about any one of the answers as if it was theirs. Or, they can talk about the response as if it was someone else's. It is specifically because the information in the display does not have names attached that students can "try on" other responses. In this way, anonymity opens up the classroom allowing students to try on new roles. Students having submitted a correct answer, if asked how someone might have gotten a different result, can try on being someone who got a wrong answer and explain how the incorrect answer might have been derived. Students can add on to who they are. They can add on to who they talk about and it is not antagonistic because they are not talking about the most popular kid in the classroom or the shy kid or themselves, just generically about the response. Within the network space,

anonymity opens up new ways to participate in affirming ways. Anonymity becomes additive in that it adds to the roles students can play in the classroom and extends the student's private space.

Literature Review

In Education research, the predominance of research on anonymity of input has been done using asynchronous data collection (Cohen & Scardamalia, 1998; Hoadley & Linn, 2000; Hsi & Hoadley, 1997; Scardamalia & Bereiter, 1992). Major results from this field showed that anonymity of input allows for greater gender equity in peer collaborations. In the field of Business Communication research, systems allowing for synchronous data input have been the predominant focus (Connolly, Jessup, & Valacich, 1990; Gallupe & Cooper, 1993; Jessup, Connolly, & Galegher, 1990; Scott, 1999; Valacich & Dennis, 1992). The systems were created to do research on brainstorming in group settings. Major results from these studies showed that larger electronic brainstorming groups were more productive, in terms of participation and quality of input, than verbal brainstorming groups.

Methods

The research for this project was conducted in two pre-calculus classrooms (n=29) at an urban high school on the East Coast of the United States. First a framework by which to select activities was needed. Using the taxonomy for Generative Activities proposed by Stroup, Ares, Hurford and Lesh (in press-b), four activities were chosen that embodied characteristics from different categories in the taxonomy. First Questioning activities, these were situations were the teacher asked a question to check for understanding and students responded electronically. Second, was a connected SimCalc MathWorlds activity. Third was a NetLogo linear regression activity. Forth was the NetLogo Disease simulation. The technological interfaces for all of the activities were modified to give students the option of submitting information to the class display space with or without their names attached. All submitted digital artifacts, across all four activities, were collected and analyzed to evaluate the frequency with which students chose to attach their names to their input. At the end of each activity student were given a questionnaire regarding their use of anonymity in the day's lesson. Finally, at the completion of the four activities, video taped interviews were conducted with the students.

Findings

Statistical analysis of the digital artifacts submitted by the students during each activity revealed no significant differences for use of names by activity or gender. A generalized linear model for repeated sample data was done for each question on the questionnaire. Analysis showed, with statistical significance, that students perceived the activities to be different. Qualitative analysis of the open response portions of the questionnaire revealed that for less generative activities, students' comments about the attachment of names revolved around confidence in the correctness of their answers. As activities became more generative, the quality of comments changed to revolve around strategy and aesthetics. The video interview were transcribed and analyzed qualitatively to identify themes in comments. By far the most common theme in the statements made by students, dealt with anonymity being important for risk mitigation (avoid embarrassment, lack of confidence, etc.). Finally, all three forms of data were compared. An incongruity between statements and actions emerged from this comparison. Females more frequently made comments about wanting to be confident of their answers before they would attach their names. Males much more frequently expressed that anonymity was not important to them. Yet the use of names by the two groups across activities was virtually identical at approximately 60%.

Before a comparison of activities was meaningful, it needed to be determined if the students perceived the activities themselves as different. Questionnaire data showed that students interpreted the activities to be different. Contrary to expectations, there were no significant differences in student use of anonymity across the four activities. Students tendency to reveal their names fluctuated by only 11 percentage points (57% to 68%) across the activities. Students' open ended responses on the questionnaires showed that they perceived the utility of anonymity to differ across the four activity types. For the Questioning and SimCalc activity, a major theme in students' reported reasons for utilization of anonymity was confidence in the correctness of their answer. Both of these activities had the possibility of wrong answers. The two activity types differed greatly in the numbers of possible solutions available to the students, still incorrect answers were possible. In response to their participation in the Disease activity, students refer to using anonymity for strategic reasons. The Disease activity, where there was no possibility for incorrect participation (even if a student did not move his/her icon they were still a valid participant in the activity), was the first time that confidence in correctness of response no longer appeared as a theme. Finally, in

the Regression activity comments of aesthetics emerged. Students' concern for showing their name became about not "cluttering" the screen. This variation of concern changing from right answers, to strategy, to aesthetics indicates a difference of utility of anonymity.

Conclusions

Tying the remarks made about confidence in answer, from the questionnaires, to comments about risk mitigation, from the interviews, anonymity being used to avoid negative consequences was by far the most important feature for the students. Students' perception of the potential, in an activity, for their responses to be right or wrong, was what most clearly delineated differences in activities. Concepts of right and wrong input were the students' way of interpreting differences in levels of generativity. The interaction between Generative Activity design and anonymity was demonstrated by the change in content of the student comments on the utility of anonymity. In the more generative simulation environments, students' ideas about their utilization of anonymity turned from subtractive (risk management) to additive (strategy and aesthetics).

In addition to students' perceptions of anonymity, analysis of classroom videotape showed that when a response was in the display space with no name attached, if the teacher initiated a discussion of the response, the conversation was left open to the whole class. Questions like, "What might this person have been thinking?", were asked. In contrast, if the response the teacher wanted discussed had been submitted with a name attached, he would turn to that specific student and ask them to explain their answer. For this reason, the display of names could be said to reduce student agency. The ability for anyone in the classroom to take ownership of any response in the display space disappeared.

It is important to note that this project was not seeking to identify those situations in which anonymity should no longer be used. The author holds a very strong belief that anonymity is a critical feature of next-generation classroom networks and 40% use of anonymity is a sizable fraction of the students. If, during class discussions, students want to take public ownership of their answers, that is their choice, and that choice should not be taken away. The goal of this study was to better understand anonymity and, oddly, that was best accomplished by exploring its removal.

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