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ANONYMITY TO PROMOTE PEER FEEDBACK: PRE-SERVICE TEACHERS' COMMENTS IN ASYNCHRONOUS COMPUTER-MEDIATED COMMUNICATION

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ABSTRACT

In this quasi-experimental case study, we compared five sections of a basic undergraduate technology course. Within an asynchronous web forum, pre-service teachers wrote short critiques of websites designed by their classmates. This peer feedback was provided anonymously by students in two classes (n = 35) whereas providers and recipients of peer feedback were identified by their real names in three other classes (n = 37). Computer-mediated discourse analysis methods (Herring, 2004) were used to code student written comments according to substance and tone of feedback. Next, we estimated likelihoods of specific feedback patterns through Analysis of Patterns in Time (Frick, 1990). Results indicated that students who were anonymous were approximately five times more likely to provide substantively critical feedback than were those whose identities were known to their recipients. When feedback was given anonymously, students were approximately four times more likely to provide reasons for needed improvement to a website, and then to suggest design alternatives. In light of advantages afforded by this form of pseudonymity, we conclude with a discussion of pedagogical prescriptions for supporting learners' production of feedback.

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Ertmer et al. (2007) and Shute (2008) argue that giving feedback can enhance learning; however, teacher educators hope to teach feedback skills in ways that allow exploration and avoid the pressures that peer feedback can present. In a complex task such as creating a website for learning, instructors may want to support the generation of multiple solutions in learners' peer feedback. Anonymity may create a social context where learners feel freer to express varied ideas, and make the task of giving feedback less inhibited. However, teachers need to know just how anonymity impacts the learning dynamic in order to make informed choices about when anonymous configurations are appropriate in peer feedback.

The use of anonymity is an instructional strategy we do not have available in normal face-to-face classrooms. Technologies such as social network sites, wikis, and other forms of computer-mediated discussion offer educators the choice to make learners' participation in critiques anonymous. However, the way in which this choice plays out in educational contexts remains only sparsely studied (Lin, Liu, & Yuan, 2001; Zhang & Zhao, 2008; Zhao, 1998). While anonymous critiques may help learners address design complexities more openly and fluidly, it may also introduce antisocial behavior and detract from learners' interest or effort in offering quality feedback to their peers.

Teachers must undoubtedly communicate with their students about ways they can improve their work; so for future teachers, the ability to give good feedback is a requisite skill. However, giving good feedback can be very complex in cases where there are multiple correct ways of completing a task (Jonassen, 2008). In these cases, teachers negotiate the criteria they use through their feedback. The negotiation of criteria is the incremental adjustment of concepts and ideas subsequent to interaction with other people and materials (Duffy & Cunningham, 1996; Flower, 1994; Pica, 1991). Pre-service teachers need to grapple with negotiating criteria and exploring possible solutions in complex tasks. However, this process involves social risk; few people want to expose their weaknesses. In this sense, a design critique, where future teachers experience giving and receiving feedback pointed at multiple solutions, is an activity where teacher educators should provide scaffolds. A number of authors advocate the use of scaffolds in ill-structured and complex learning contexts (Jonassen, 1999; Hannafin, Land, & Oliver, 1999; Reigeluth & Moore, 1999). Anonymity might provide a scaffold toward a protected social dynamic for novice feedback. This study aims to inform teachers' choices about incorporating anonymity in critiques where the generation of design alternatives is a goal.

REVIEW OF RELATED LITERATURE

By eliminating social influence, group pressure, status, and power differentials, computer-mediated communication (CMC) has been credited with bridging social boundaries (Postmes, Spears, & Lea, 1998; Rheingold, 2000; Walther,

1996; Warschauer, 2004). Specifically in education, asynchronous CMC often reduces fear of humiliation, allows for less stressful preparation of comments, and provides equity in participation, allowing students who may otherwise be hesitant to become active (Chun & Plass, 2000; Kern & Warschauer, 2000; Stockwell, 2007; Warschauer, 2000). These qualities make commenting via asynchronous CMC an attractive option for group work activities. Some studies point to these qualities even more when learners participate anonymously (Raitman, Augar, & Zhou, 2005).

At the same time, some theories point to negative effects of anonymity. Social network theory (Brown, 2001; Wellman & Frank, 2001) states that connections between members in a community often play a significant role in helping members of that community achieve their goals, so the cost of breaking these connections through anonymous group work may hinder the quality of learning. Postmes et al. (1998) and others have theorized that anonymity in CMC results in conformity, anti-social online behavior, and other de-individuating effects (Postmes, Spears, Sakhel, & de Groot, 2001; Valacich, Dennis, & Nunamaker, 1992; Wallace, 1999). It follows that anonymity may lessen connections between individual members and consequently reduce the probability of achieving course goals.

The Social Identity De-individuation Effect, or *SIDE* Theory (Postmes et al., 1998; Postmes et al., 2001), speaks to the social cost of anonymity, outlining outcomes teachers may want to avoid, such as a larger amount of group conformity, interlocutors becoming less invested, or even anti-social communication. However, the studies into the dis-inhibiting and de-individuating effects of anonymous online interaction also point out that anonymous opinions are more direct, open, frank, and take less time to write (Postmes et al., 1998, 2001; Wallace, 1999). These studies approach anonymity in somewhat general terms. Anonymity can be broken down into levels ranging from no identification at all, *Type 1*, where participation is completely untraceable, to *Type 5*, where one's identity is known through a pseudonym (pseudonymity) by some authority within the system or social group (Flinn & Maurer, 1995; Pfitzmann & Köhntopp, 2001). Teachers can quickly recognize the potential value of anonymous asynchronous conditions to relieve social pressures and let learners critique more openly, but the potential danger that de-individuation (identity-less behavior) poses should be empirically studied before prescriptions about activities using anonymity are made.

Studies we encountered where anonymity was used in peer-to-peer collaborative activities used Type 5 anonymity exclusively; interlocutors were anonymous to each other, but identifiable by a manager, teacher, or moderator known by both. Chester and Gwynne (1998) presented qualitative evidence that learners, when in Type 5 or pseudonymous conditions, can participate more, encourage others, and reveal more of themselves than they would in face-to-face collaboration; yet they also found incidents pointing to the potential for anti-social behaviors such as teasing, greater amounts of aggression, and negative dis-inhibited behavior

causing group distrust. Examples of negative dis-inhibited behavior range from the use of racial slurs and sexual aggression, to "trolling," which is the act of baiting other users with controversial statements in hopes of provoking argumentation. Similar findings have been found concerning anonymous CMC in distance education (Gunawardena, 2004). While the use of anonymity is common in course evaluations and other evaluative systems, it is less common in collaboration (Dreher & Maurer, 2006). Therefore, to inform and develop the pedagogical repertoire available to teachers, research into how anonymity impacts collaborative educational interventions is warranted.

Research Questions

We designed this study to address three questions surrounding the use of anonymity in peer feedback activities:

1. To what extent does anonymity promote or deter students from providing feedback?
2. How does the substance of feedback comments differ when students are anonymous?
3. How do critical feedback patterns differ when students are anonymous?

We expected that anonymous groups would contribute less because students would be less invested—as predicted by the SIDE theory. We further anticipated that there would be substantive and tonal differences in the language artifacts produced among groups of pre-service teachers' asynchronous comments when they were anonymous. Anonymous comments might be less inhibited and thus become more negative. Critical feedback, as we define it, implies that improvement is needed and suggests constructive ways that improvements can be made.

METHODS

Participants and Context

Participants were undergraduate students in their first 2 years at a large Midwestern university. The students were enrolled in a required basic technology skills course that is a prerequisite to entrance into the teacher education program. They signed an IRB-approved consent form if they agreed to participate in the study. The researchers did not know which students had agreed or not agreed to participate until after the course was complete and final grades were submitted. Thirty-five out of 37 students agreed to participate in the research study in the two anonymous classes (class sizes were 22 and 15). Thirty-seven out of 48 students agreed in the three classes where names accompanied posted comments in the discussion forum (class sizes were 9, 20, and 19). Overall, 72 out of 85 students agreed to have their work included in this study. Nineteen of the 72

participants were male (26%); there was a larger percentage of males in the known identity group, 33% (12), as compared with 20% (7) in the anonymous group. We had no control over which students were enrolled in each section; rather, these were intact classes and it was a convenience sample.

This one-credit, pass/fail course lasted 8 weeks. All class sessions were taught in a computer lab in which students had access to a variety of software applications and the Internet. A key purpose of the course is to ensure that students entering the teacher education program have a basic level of proficiency in a variety of technologies (e.g., word processing, storage and retrieval of files online, presentation software, basic web page development).

The Activity

The entirety of the mid-course and final class sessions were devoted to a whole-class online critique in an asynchronous online discussion forum. The second of two whole-class critiques was used for this study. Because this was the second time the students had done an online critique, facility with the media and familiarity with the task was assumed. Before the critique, students had created websites for instruction. In their wikis, they also had written introductory paragraphs in which they reflected on their own technology proficiencies to guide peer viewers of their website.

Students were instructed to comment for the whole 50 minutes and to not review comments they had received until after the session had ended. Students gave feedback only to members of their own section; they did not critique across sections. Class members viewed each other's sites by following links provided in their wikis. They commented directly to each other using the comment tool within the wiki. No directions about how to comment were given. The assignment for creating the website is provided in Appendix A, a screen capture of a student's website introduction in Appendix B, and a screen capture of the wiki in Appendix C.

The assignment given to all five sections was identical. In all five sections the sequence of the presentation of students' assignments was randomized into a list, and students were told to begin commenting on the assignment appearing after their own. This helped to distribute feedback, so that students would receive comments on their websites from a variety of their classmates. Time did not permit comments from all classmates.

Research Design

The design was a quasi-experimental case study in which we compared two conditions over five sections of students. The first two authors, who were also teachers of the course, each arranged for one of their classes to provide feedback anonymously. In those sections, all critiques were done in Type 5 anonymity. Both the creators of the websites and the feedback givers were anonymous.

Students' real identities were known only to their teachers and not visible on the individual wikis where the students posted their work and gave feedback.

The anonymous condition was created by sending students a numerical log-in name which they used to comment on peers' work. The websites themselves were checked for identifiable information and a computer-generated URL masked the actual URLs, making the receivers also anonymous. In the anonymous group, no information was available which could be used to decipher who created which assignment, nor who wrote which comments. Students were e-mailed their anonymous login names, and the instructors kept track of the associations between the login names and the actual students. Every effort was made to ensure the groups differed only in the anonymous condition.

Data Collection Instrument

The university learning management system (LMS), an instantiation of SAKAI[1] software, afforded an asynchronous feedback platform that collected student comments. The system was used simultaneously by an entire class during the feedback sessions. It allowed all students in the class to comment at the same time on other students' individual wikis. The LMS recorded time stamps that allowed the researchers to check that comments had actually been written during the 50-minute class time devoted to giving feedback.

Measurement of Utterances

Student feedback comments were divided into *utterances*—i.e., units of semantic meaning. Examples of this method include Yates (1996) comparisons of asynchronous computer mediated conferences with spoken language and Cherny's (1999) analysis of register in online chat. Ko (1996) investigated the depth and complexity of synchronous CMC at the utterance level as well by using the combination of word count and utterance to distinguish complexity between speech acts. Herring and Nix (1997) use a modified speech act analysis to assess structural aspects of different groups using the same CMC mode, an educational discussion about pharmacy, and a social group. While the frequencies of utterance types in each category were assumed to show the number of illocutionary acts in the comments, the number of words in each speech act category represented the amount of time and effort used to express each type of communication. Utterances naturally vary in length across substance types; greetings are typically one or two words while elaborations consist of strings of words.

[1] SAKAI is a free, open-source, learning management software system available for universities and learning organizations. It is assumed here that readers are familiar with wiki technologies and the SAKAI environment in particular. For more information about SAKAI, see their website at: http://sakaiproject.org/portal.

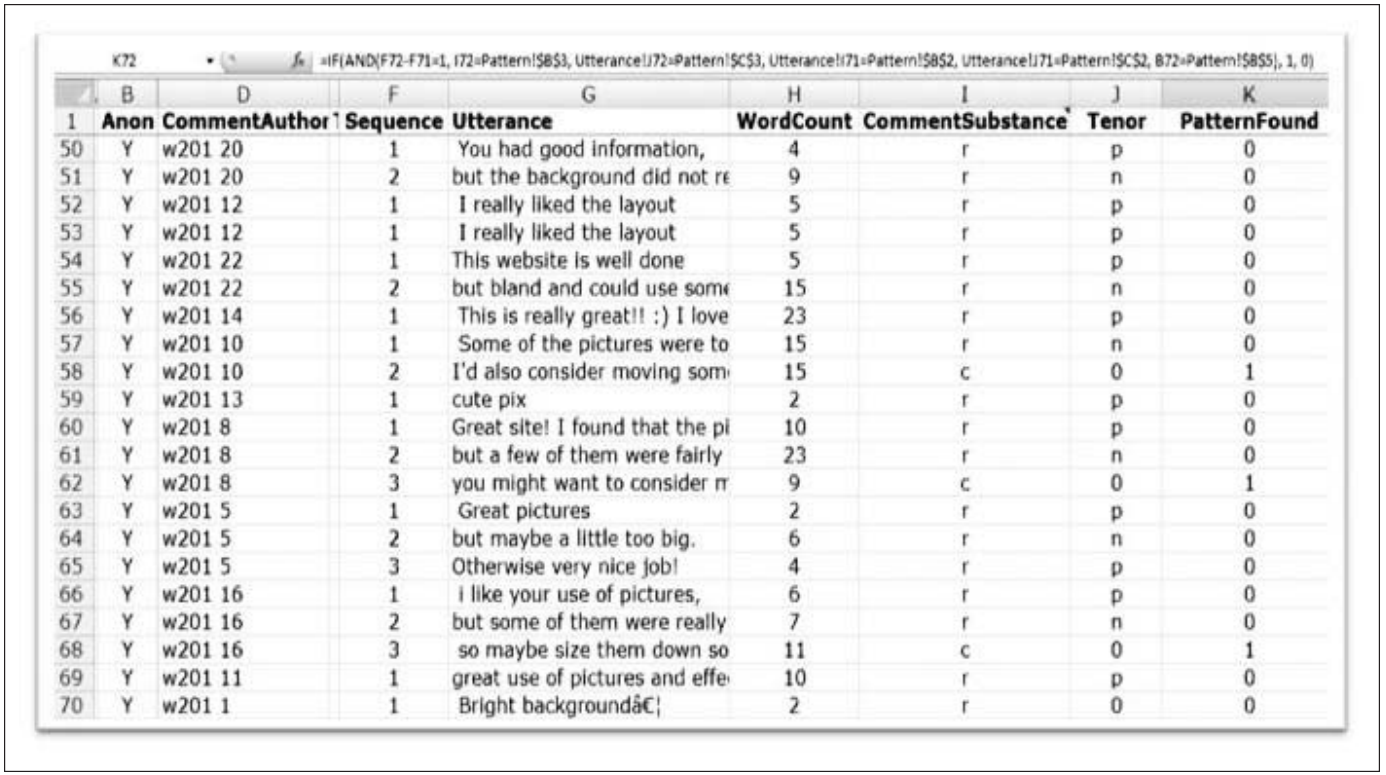
Therefore, word counts were assumed to be a more accurate measure of how much time learners spent expressing the notions in each category.

McLaughlin provides a taxonomy of substantive speech acts which was modified into four categories to identify the substance of feedback utterances as either *constructive, reactionary, clarifying a standard,* or *other* (McLaughlin, 1984). Operationalizations for these codes are included in the codebook in Appendix D. The utterances were also coded for tone (*positive, negative* or *neutral*). In this schema, each utterance received two codes, creating joint-occurrences of the two categories. The utterance, "Great website!" is positive in tenor and a reaction to viewing a website, so it was coded as a *positive reaction*. A *negative reaction* implied a need for a change, but did not explain how that improvement would be made. For example, "You [sic] pictures did not show up" was a negative reaction because the utterance implied the graphic should be repaired to be viewable, but the utterance does not suggest how that could be done. Utterances of any tone that explicitly offered or suggested a design change were coded as *constructive*. For example, "I suggest you check the picture, and maybe even get some more" is explicit, and would be coded as *constructive.* Because the utterance has no positive or negative tenor, the tone of that utterance was coded as *neutral*. Utterances referring back to the assignment or to some authority were coded as *clarifying a standard*, and off-topic utterances were coded as *null*. Any of these codes of substance could be jointly coded with *positive, negative,* or *neutral* tenor.

Data Preparation

Students' online comments were imported into Excel and broken into utterances of semantic meaning according to computer-mediated discourse analysis guidelines (Herring, 2004). As comments were broken into utterances, the sequences were preserved with numbers. Utterances were then coded with mutually exclusive codes in two categories: substance and tone.

Separate columns were inserted to track word counts, anonymity, authorship of utterances, receivers of feedback, and each of the two patterns used for analysis. A screen capture of the coding in the Excel spreadsheet is reproduced in Figure 1. Figure 1 also illustrates a temporal map, which is required for Analysis of Patterns in Time (APT; Frick, 1990). A temporal map preserves the joint and sequential occurrences of observed events to prevent what is called aggregation aggravation (Frick, Howard, Barrett, Enfield, & Myers, 2009). When such temporal maps are preserved, it is possible to analyze patterns of occurrence instead of separately aggregating variables and then attempting to measure relations statistically (e.g., via linear correlation or regression techniques). APT maps relations directly and permits analysis of patterns of both sequential and joint occurrences. For example, Koh (2008) used APT to determine the likelihood that teachers in an educational technology class would respond to questions using demonstration rather than explanation—a probability of 0.60. The counting of patterns allowed us to look at



K72 =IF(AND(F72-F71=1, I72="Pattern!$B$3, Utterance!J72="Pattern!$C$3, Utterance!I71="Pattern!$B$2, Utterance!J71="Pattern!$C$2, B72="Pattern!$B$5), 1, 0)

	B	D	F	G	H	I	J	K
1	Anon	CommentAuthor	Sequence	Utterance	WordCount	CommentSubstance	Tenor	PatternFound
50	Y	w201 20	1	You had good information,	4	r	p	0
51	Y	w201 20	2	but the background did not re	9	r	n	0
52	Y	w201 12	1	I really liked the layout	5	r	p	0
53	Y	w201 12	1	I really liked the layout	5	r	p	0
54	Y	w201 22	1	This website is well done	5	r	p	0
55	Y	w201 22	2	but bland and could use some	15	r	n	0
56	Y	w201 14	1	This is really great!! :) I love	23	r	p	0
57	Y	w201 10	1	Some of the pictures were to	15	r	n	0
58	Y	w201 10	2	I'd also consider moving som	15	c	0	1
59	Y	w201 13	1	cute pix	2	r	p	0
60	Y	w201 8	1	Great site! I found that the pi	10	r	p	0
61	Y	w201 8	2	but a few of them were fairly	23	r	n	0
62	Y	w201 8	3	you might want to consider m	9	c	0	1
63	Y	w201 5	1	Great pictures	2	r	p	0
64	Y	w201 5	2	but maybe a little too big.	6	r	n	0
65	Y	w201 5	3	Otherwise very nice job!	4	r	p	0
66	Y	w201 16	1	i like your use of pictures,	6	r	p	0
67	Y	w201 16	2	but some of them were really	7	r	n	0
68	Y	w201 16	3	so maybe size them down so	11	c	0	1
69	Y	w201 11	1	great use of pictures and effe	10	r	p	0
70	Y	w201 1	1	Bright backgroundâ€¦	2	r	0	0

Figure 1. Screen capture of the APT temporal map in Excel, which shows how comments were sliced into utterances and code columns.

learner behavior *in sequence*, and determine if frequencies of desirable patterns of discourse, namely those resulting in design alternatives and suggestions for change, were more common in the anonymous or known identity groups.

Inter-Rater Agreement

The first two authors initially coded joint-occurrences of 250 utterances to clarify the codebook. Then we coded 50 randomly selected utterances separately to determine inter-rater agreement. We were in total agreement on codes of substance, but differed on two of 50 utterances in the tenor category. This 96% raw agreement represented a Cohen's Kappa of .95 for 50 jointly-occurring codes. We interpreted this as "almost perfect agreement" and considered it sufficient to proceed with coding the rest of the approximately 1800 utterances across the five classes (Frick & Semmel, 1978; Landis & Koch, 1977).

Measures of Utterance Patterns

We identified two utterance patterns that we deem important to the teaching of feedback skills. Those patterns were a *negative reaction followed by a constructive utterance of any tone*, and a *positive reaction followed by either a negative reaction or constructive utterance of any tone*. Computer-mediated discourse analysis assumes that the speakers are not necessarily aware of the language artifacts they produce, and that measures taken directly from online behavior are more representative of the role of configurations of medium and situation than self-reports (Herring, 2001, 2007). To incorporate both implicit and explicit styles of communication into the frequencies of desired feedback we measured, the authors aggregated patterns of negative reactions with constructive utterances to form a *critical feedback* measure. While some students may not be fully aware of having given explicit suggestions or stating negative opinions, aggregating both these styles into one measure was deemed to be more inclusive of the types of feedback which the activity hoped to solicit. Gee and Green (1998) placed these methods of structural discourse analysis into their logic-of-inquiry framework for education, arguing that these methods are key factors in the study of social activities in learning contexts.

Counting these utterance patterns and estimating APT probabilities required some inventive programming within the Excel spreadsheet. When an instance of a pattern within a student comment was found, the spreadsheet formula generated a code of 1 into the column and row where that pattern occurred (e.g., see Figure 1, column K); otherwise a code of zero was generated. The probability of each pattern was then estimated by a formula which calculated the proportion of instances where the target pattern was observed relative to the total number of relevant patterns.

RESULTS

Words, Utterances, and Comments

Frequencies of utterances and words addressed research question 1: To what extent does anonymity promote or deter students from providing feedback? Between the anonymous and known identity groups, the mean number of comments was not significantly different, but the mean number of words and utterances written was significantly different (see Table 1). Anonymous participants wrote significantly more words ($p < .05$) and utterances ($p < .01$). On average, 71 more words and 9.5 more utterances were written over the course of the task under conditions of anonymity. Effect sizes for Cohen's *d* are considered "large" if greater than 0.8, and we found an effect size of 1.019 in the case of utterances (Cohen, 1988). Effect sizes for Cohen's *d* are considered "medium" if between 0.3 and 0.8, and we found an effect size of 0.531 in our sample of written words (Cohen, 1988). However, some individual differences may be worth considering. Not all participants in the anonymous group wrote more than those in the known identity group. In fact, anonymous participants whose number of words written was one standard deviation below the mean wrote less than half as many words as known identity participants whose number of words written was one standard deviation above the mean. Standard deviations were greater for both number of words and number of utterances in the anonymous group, which implies that while anonymous participants wrote more, they also varied more in their participation from person to person. Table 1 compares the two groups' total

Table 1. Frequencies of Words, Utterances, and Comments per Student within Each Identity Group

	Anonymous ($n = 35$)		Known identity ($n = 37$)		Equality of means (2-tailed *t*-test)		Effect size
Measure	*M*	*SD*	*M*	*SD*	*t*	*df*	Cohen's *d*
Number of words	311.37	148.86	240.11	117.52	2.26*	70	0.53
Number of utterances	30.11	10.24	20.62	8.28	4.34**	70	1.02
Number of comments	13.49	3.46	12.57	5.63	0.84	60.27***	0.20

*$p < .05$; **$p < .01$; ***degrees of freedom were adjusted downward due to inequality of within-group variances.

participation, whereas Table 2 breaks down how they participated by substance of the comments.

Comment Substance

Analyses of the substance of the comments addressed research question 2: How does the substance of feedback comments differ when students are anonymous? Across the sections, anonymous groups wrote significantly more critical feedback and off-topic words than did the known identity group but there were no significant differences in the mean number of positive reaction words written. See Table 2 for substance type descriptive statistics and results of independent samples *t*-tests.

The most common joint occurrence of substance and tenor across both groups was *positive reactions*. While the known identity group wrote more positive reaction words and the difference in the number of positive reactions between the two conditions could be assumed to have equal variances, the difference was not statistically significant.

Students in the anonymous group wrote significantly more ($p < .01$) critical feedback words per website compared with students in the known identity group, an average difference of 4.5 critical feedback words per comment. In known identity groups, critical feedback utterances were slightly longer, about half a word on average, 13.5 compared to 12.9. Only a very small percentage of the words were spent on clarifying standards or on off-topic utterances that make up the "Other" substance type in Table 2. The total percentage of words in these

Table 2. Frequency of Substance Type (Words per Comment per Student within Each Identity Group)

Substance type	Anonymous ($n = 35$)		Known identity ($n = 37$)		Equality of means (2-tailed *t*-test)		Effect size
	M	*SD*	*M*	*SD*	*t*	*df*	Cohen's *d*
Positive reaction	10.33	5.45	12.87	7.44	–1.51	70	–0.39
Critical feedback	11.62	7.44	7.13	5.07	3.01**	70	0.71
Other	1.52	.15	1.14	0.10	2.22*	70	3.03
Total	23.47	11.11	21.14	11.49	0.88	70	0.21

*$p < .05$; **$p < .01$.

two categories only made up 4.5% of the approximately 20,000 word corpus. The anonymous group wrote significantly ($p < .05$) more words that fell into this aggregated "Other" substance type. Although only a very small part of the data, anonymous commenters referred to standards and went off-topic over 1.5 times more often than the known identity group.

Analyses of Patterns

Analyses of patterns addressed research question 3: Do critical feedback patterns differ when students are anonymous? Probabilities of sequences showed that critical feedback was situated differently between the two groups. We limited our analysis of patterns to sequences of utterances leading to critical feedback and within critical feedback strings, namely *a positive reaction followed by critical feedback* and *a negative reaction followed by a design alternative or suggestion*. Of course, some critical feedback fit neither pattern—for example, critical feedback beginning a comment. Keeping in mind that the anonymous groups had a higher percentage of critical feedback overall, means of probabilities (relative frequencies) per comment of both patterns showed significant differences between the two conditions (see Table 3). The probability of positive reactions followed by critical feedback was significantly higher ($p < .05$) in the anonymous group as was the probability of the pattern of a negative reaction followed by a design alternative or suggestion ($p < .01$). Anonymous commenters produced 10% more occurrences of the *positive reaction then critical feedback* pattern, and more than four times as many *negative reaction followed by a design*

Table 3. Probabilities of Utterance Patterns (per Comment per Student within Each Identity Group)

Utterance pattern	Anonymous ($n = 35$)		Known identity ($n = 37$)		Equality of means (2-tailed *t*-test)		Effect size
	M	*SD*	*M*	*SD*	*t*	*df*	Cohen's *d*
Positive reaction followed by critical feedback	0.44	0.22	0.34	0.22	2.05*	70	0.48
Negative reaction followed by a constructive utterance	0.10	0.10	0.03	0.05	3.79**	49***	0.91

*$p < .05$; **$p < .01$; ***degrees of freedom were adjusted downward due to inequality of within-group variances.

alternative or suggestion patterns than the known identity group. Thus, in the anonymous condition in these critiques, students were about four times more likely to provide reasons, or at least negative reactions, before their constructive criticism, and more likely to couch their critical feedback as well.

Similar to the *number of comments* in Table 1, equal variances were not assumed in the rates of the *negative reactions followed by a constructive utterance* pattern in Table 3. The more conservative *t*-test with fewer degrees of freedom was used in both cases. Means of the comment pattern rates of the *negative reactions followed by a constructive utterance* pattern are smaller than the standard deviations because the distributions of the pattern rates are positively skewed (and a rate cannot be less than zero, creating a "floor effect"). Many students (34% of anonymous students and 73% of known identity students) never used this pattern. The relatively equal group sizes and use of the more conservative *t*-test where equal variances are *not* assumed, supports the use of the *t*-test under these conditions, despite the violated assumption of a normal distribution (Cohen, 1988).

If we look at the percentages of design alternatives preceded by positive reactions, 70% of the known identity groups' design alternatives and suggestions were preceded by a positive reaction, whereas only 50% of the anonymous groups' design alternatives were preceded by a positive reaction. Not only were the anonymous commenters 20% less likely to preface their design alternatives with compliments, they were also 3.98 times more likely to support their design alternatives with reasons for the change. Thus, not only were the anonymous groups more than five times as likely to produce critical feedback overall, but the design alternatives that they did produce were almost four times as likely to be preceded by reasons.

DISCUSSION

To what extent does anonymity promote or deter students from providing feedback?

In our study, the larger quantity of feedback given by the anonymous groups overall indicates that anonymity promoted, rather than deterred, students from providing feedback. The fear that anonymity causes disinterest does not appear to be present in this sample of Type 5 anonymous CMC groupings. The SIDE theory's prediction that interlocutors would be less inhibited in their communications appears to be shown in the anonymous' groups greater percentage of critical feedback and lower frequencies of positive reactions used to introduce critical feedback. However, the theory also predicts interlocutors' comments to be shorter, and that did not bear out in the sample. Anonymous groups provided a higher percentage of critical feedback, and, more generally, wrote more than the known identity groups. Anonymity in these cases appeared to promote feedback in peer critique.

How does the substance of feedback comments differ when students are anonymous?

The nature of the communications appears to be substantially different between the two conditions. Anonymous comments were more pointed at design alternatives, and more efficient in expressing their critical feedback. By looking at the number of utterances in each category versus the number of words in each category, we can see that constructive utterances were, on average, longer than reactions. Even without speculating that a reaction is more formulaic than a suggestion would be, we see simply from the word count averages per utterance that critical feedback would likely take more time to write (and perhaps more mental investment) than compliments. While the range of investment in critical feedback varied more greatly in the anonymous condition, the sum total of investment in critical feedback given was greater in the anonymous group. That known identity groups wrote slightly more words *per* critical feedback utterance—about half a word on average—is consistent with the SIDE theory, but does not appear to produce the dramatic social disadvantages of which the theory warns. The finding that critical feedback utterances in the anonymous group were, on average shorter but more numerous, suggests the anonymous groups made more suggestions and may have given less attention to softeners.

How do critical feedback patterns differ when students are anonymous?

Under conditions of anonymity, both feedback patterns we investigated increased in frequency. The more dramatic increase was in the negative reaction followed by a design alternative or suggestion pattern. Anonymous groups were approximately four times more likely to preface their ideas for change with negative reactions; we interpret these negative reactions as reasons for the changes they suggest. While it is of course possible that a student would mention a negative aspect of another student's work and then suggest a solution completely unrelated to their observation, we assume this is not a common scenario. However, even in such circumstances, the anonymous condition may be valuable for learners to experience feedback and make their own judgments about the value of the feedback they receive. While anonymous groups provided more critical feedback prefaced by compliments, the fact that this pattern made up a smaller percentage of the total amount of critical feedback they gave, suggests the real impact of anonymity was in other patterns resulting in critical feedback, not patterns where they introduce their suggestions by complimenting their peers.

Implications

As a pedagogical prescription, we can see a basis for suggesting Type 5 anonymous feedback in introductions to basic critique skills. To what extent the

SIDE Theory speaks to Type 5 anonymity, where the interlocutors both know a third party can trace their participation, is not explicit in the literature, especially as it relates to educational CMC. In this sample, the negative aspects of de-individuation did not appear. Not only were anonymous groups' comments more frequently constructive and less tied to complimenting and giving face, but the higher frequency of negative reactions followed by suggestions and design alternatives might imply the configuration better addresses the heart of design critique and may make feedback more meaningful. Furthermore, meaningful engagement, including meaningful online interactions, are key elements for novices to enter communities of practice (Schwier, Campbell, & Kenny, 2004). While solitary negative reactions or unjustified suggestions for change have the potential to dissipate discourse rather than build it, the pattern analysis shows that the anonymous condition seemed to provide a safe explorative space for learners to try out more reasons for their multiple solutions. Teachers will rarely give anonymous feedback, but the experience of giving anonymous feedback may open a social space where learners can try out the reasons for their suggestions. Also, the experience of getting anonymous feedback might provide a more direct route to realizing the value of well-supported arguments. Formative feedback is intended to modify thinking or behavior, and this implies that the suggestions must be based on reason, rather than simply preferences or whim (Shute, 2008).

The lower number of positive reactions in the anonymous groups implies that anonymous critiques may be more time-efficient. Anonymous groups spent less time typing out compliments and more time giving suggestions. The known identity groups' greater reliance on positive reactions to introduce their suggestions illustrates the significance of the social dynamic. The fact that the anonymous feedback was four times as likely to support design alternatives with reasons suggests Type 5 anonymity encourages the exploration of design alternatives and the thinking behind them. We interpret this as a more efficient use of time spent on learning feedback, especially as it also reduced the amount of time spent on politeness.

However, we must also consider that asking beginning teachers to provide unguided feedback is unfamiliar territory. While the design literature sees complexity as an inherent part of design and design learning, focus is also a desirable quality of formative feedback (Cross, 2004; Schön, 1985; Shute, 2008). In this study, the anonymous groups made more use of their freedom to provide criticism, but we do not know if the choices they made were in fact the most productive places to provide feedback. For example, anonymity may solicit less positive feedback than is optimal for students who have made significant gains but still produce lesser quality work relative to members of their class. Students who find the activity challenging may find anonymous feedback, because of its frankness, discouraging and invest less effort in the future. We do not normally judge and analyze each others' work so frankly, and wise teachers often make feedback decisions based on the individual cases of the students as opposed to the

general level of the class. Surely students who start off with more skill may advance more quickly than the rest of the class and warrant higher standards. Teachers recognize that novice learners may have "trouble with their emotional reactions to critique" (E. Boling, personal communication, April 2008). Confidence may be low, coupled with defensive feelings, resulting in failure to emotionally comprehend that the collaborative process of critique involves the entire group grappling with design tensions. Ultimately, people give and receive feedback with known identities in the vast majority of circumstances, and therefore the teacher who contemplates using anonymity must consider the contrived nature of anonymous feedback.

Conclusion

If learners are new to critique, we see anonymity as a scaffold to generating critical feedback. Learners can practice giving feedback knowing they are not vulnerable to social repercussions. Less than perfect expressions, unwarranted negative reactions, and fruitless ideas are bound to be part of novice feedback, but teachers hope to create learning configurations that support both the giver and the receiver of feedback, especially if the commenters are novices. Of course, anonymous feedback could develop bad habits because learners need not take full social responsibility for what they said, but we found no indicators that disinterest impacted this sample. While keeping in mind that feedback in anonymity robs speakers of the social credit they may seek, an anonymous introduction may provide a less stressful route to developing feedback skills aimed at generating ideas.

LIMITATIONS AND FUTURE RESEARCH

This study and the activity it addresses speak only to Type 5 anonymity or pseudonymity (Flinn & Maurer, 1995; Pfitzmann & Köhntopp, 2001). We can say little about how these students would have behaved if there were no accountability measures at all. Our prescriptions about creating Type 5 anonymous critiques as an introduction to critique skills are, at the moment, limited by the relative difficulty in creating the Type 5 anonymous space. The current peer feedback tools in Sakai, the forums, and the wiki commenting feature do not offer an anonymous option. For this study, pseudonyms needed to be created, assigned, and tracked. Regardless of instructions, students' work still must be checked for indicators of identity in anonymous groups. This construction of the anonymous activity was clearly more laborious than facilitating the known groups' critiques. In future instructional platforms, having a Type 5 anonymous mode within the LMS would enable this type of critique more easily. This study's results point to developing Type 5 anonymous conditions within an LMS as a desirable outcome of formative design research in educational software.

Weaknesses within the study are the lack of reference to how the critical feedback was received and used, and the gender imbalance within the sample. Researchers have found that the negotiations of meanings increase learning (Jeong, 2003). Knowing to what extent anonymous feedback is disregarded would be a valuable direction for future research. While the asynchronous comments may simulate part of the feedback experience, the dialogue aspect of critique was not included in the activity. This feedback, while simultaneous, was one-sided. Since the sample was primarily female students, the finding may only be relevant to largely female groups as gender does play a significant role in the kinds of discourse which dominate an online space (Herring, Johnson, & DiBenedetto, 1998). True discourse relies on proposals made by reviewers as well as designers' explanations; however, this study looks only at the first half of those exchanges.

APPENDIX A:
The Assignment Instructions

Assignment Overview:
Design and create a website using the guidelines below.

1. Select either Google Pages or NVu to complete your chosen site.
2. Answers the five reflection questions below.
3. Submit a draft version of the assignment before the feedback session.
4. Participate in the required peer feedback session-this cannot be done remotely.
5. Compile the feedback you received
6. Revise your draft presentation based on the feedback.
7. Submit your revised final website.

Assignment Guidelines:

1. Create a website resource aimed at teachers in your discipline.
2. Create an "index.html" HTML file with:
   -The title "Home"
   -A purpose section that explains the purpose of your website
   -A target audience section that explains who your website is for
3. Create a "resources.html" HTML file with:
   -The title "Resources"
   -Links to other websites that contain information on your topic
   -Links to other files (e.g. PDF, Word, PowerPoint) that you uploaded to your website
   -Create an appropriate number of HTML files that display the content that you want to convey.

4. All pages must:
   -Contain original content. Reference any content that isn't yours.
   -Each page must link to all the others
   -You may use graphics, charts, and/or pictures
   -Have a consistent look and feel (uniform design)
   -Apply appropriate colors and fonts to help structure content and aid navigation
   -Have readable text
5. Do not use excessive scrolling. Each page should be limited to one screen.

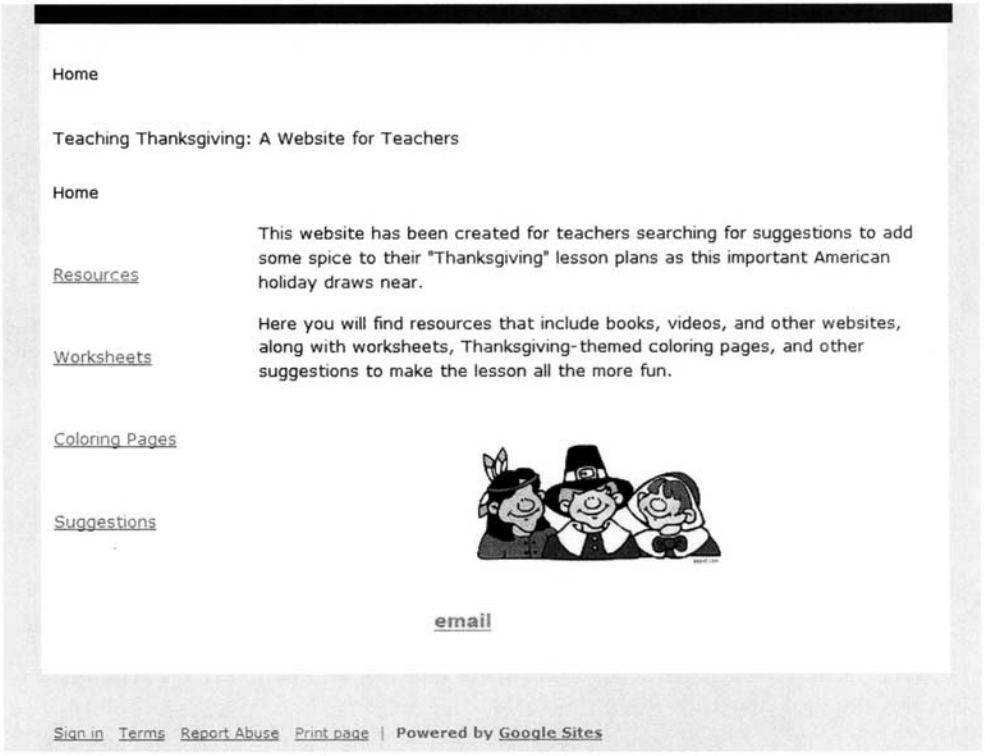
Reflection Questions:

1. Why did you choose this software over the other choice (Google Pages vs. NVu)?
2. Would you recommend this software to other beginning teachers? Why or why not?
3. Do you see how it could be used in teaching? Give an example.
4. Given your experience on this assignment, what type of web development software will you likely use in the future? Please explain your answer?
5. Do you think you will use web development software as a teacher? Why or why not?

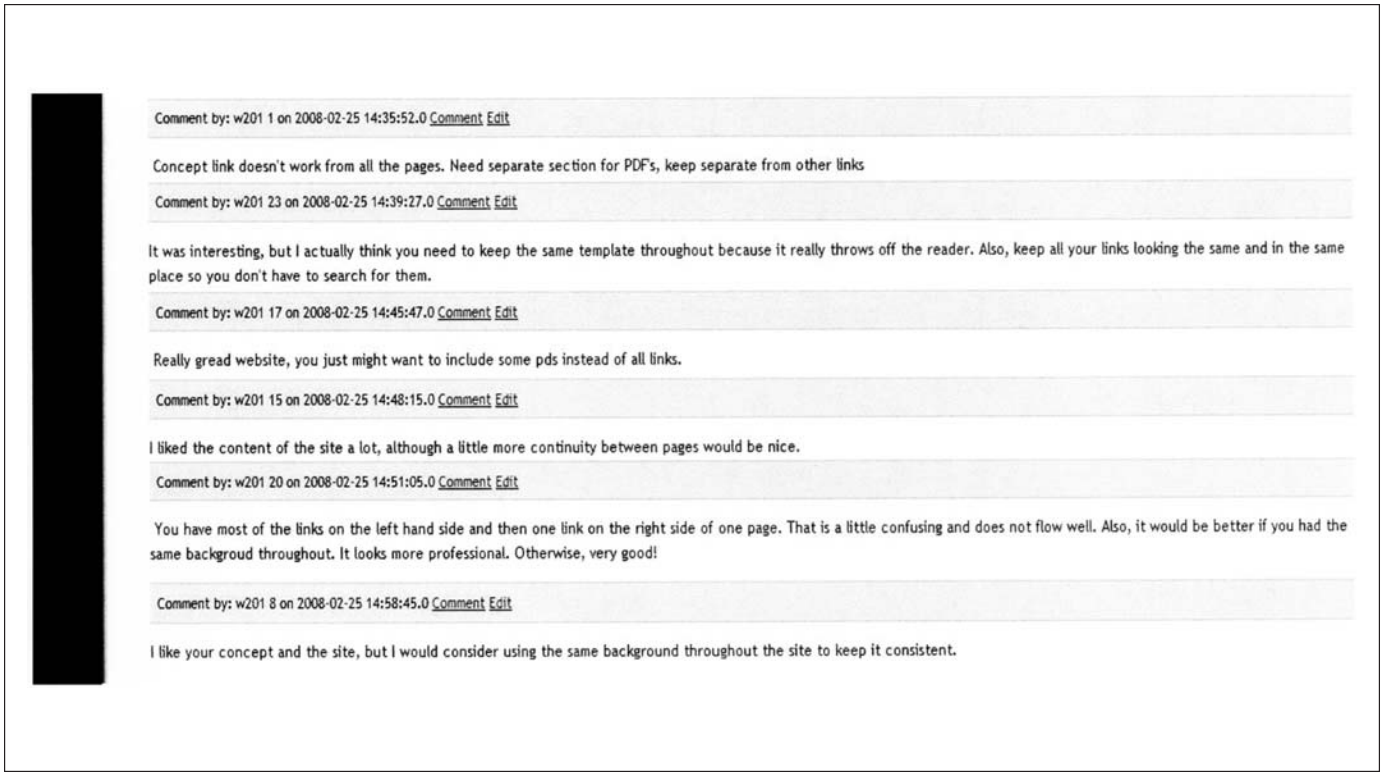
Submission Instructions:

To submit your website you must post your URL to your wiki. Remember to post your reflections and upload ALL files to either your Oncourse space or your Google pages account.

APPENDIX B:
A Screen Capture of a Student's Introductory Page to their Website



APPENDIX C:
A Screen Capture of Anonymous Comments on a SAKAI Wiki



Comment by: w201 1 on 2008-02-25 14:35:52.0 Comment Edit

Concept link doesn't work from all the pages. Need separate section for PDF's, keep separate from other links

Comment by: w201 23 on 2008-02-25 14:39:27.0 Comment Edit

It was interesting, but I actually think you need to keep the same template throughout because it really throws off the reader. Also, keep all your links looking the same and in the same place so you don't have to search for them.

Comment by: w201 17 on 2008-02-25 14:45:47.0 Comment Edit

Really gread website, you just might want to include some pds instead of all links.

Comment by: w201 15 on 2008-02-25 14:48:15.0 Comment Edit

I liked the content of the site a lot, although a little more continuity between pages would be nice.

Comment by: w201 20 on 2008-02-25 14:51:05.0 Comment Edit

You have most of the links on the left hand side and then one link on the right side of one page. That is a little confusing and does not flow well. Also, it would be better if you had the same backgroud throughout. It looks more professional. Otherwise, very good!

Comment by: w201 8 on 2008-02-25 14:58:45.0 Comment Edit

I like your concept and the site, but I would consider using the same background throughout the site to keep it consistent.

APPENDIX D:
The Codebook for Substance and Tone

The operationalization of comment divisions followed the following rules. Text is split into utterances according to changes in semantic meaning, not syntax. Therefore, an utterance ends when either the tenor or the substance changes. The end of a comment always ends an utterance. Utterances are then marked for substance and tenor.

Possible codes for substance include:

2. Reactionary—the student recounts their experience in viewing the page, not giving further direction as to what action should follow, e.g. "*Great website, loved the information.*" or "*your links don't work.*"
3. Constructive—the students offers a design choice, an alternative, or a suggestion, e.g. "*You might try loading a smaller picture, that way it doesn't cover the text on your main page.*"
4. Clarifying a standard—student references some outside source, accepted design practice, configuration or the course assignment guidelines, e.g. ". . . *using different places on the screen generally helps to grab attention*."
5. Null—the utterance is off-topic or only tangentially related to the design of the web page e.g. "*I love unicorns!*"

Possible codes for feedback tenor, or tone:

1. Positive—expresses encouraging or upbeat feelings toward the topic, e.g. *great site!*
2. Negative—expresses an undesired consequence or disapproving position in relation to the work, e.g. "*I couldn't see any of the pictures you posted on your page. It was really annoying.*"
3. Neutral/Null—no identifiable tone, e.g. "*but make sure to cite it at the bottom if it wasn't original.*"

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