

Assessing Students' Wiki Contributions

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Abstract

Perhaps inspired by the growing attention given to Wikipedia, instructors have increasingly been turning to wikis [1, 2] as an instructional collaborative space. A major advantage of a wiki is that any user can edit it at any time. In a class setting, students may be restricted in what pages they can edit, but usually each page can be edited by multiple students and/or each student can edit multiple pages. This makes assessment a challenge, since it is difficult to keep track of the contributions of each student. Several assessment strategies have been proposed. To our knowledge, this is the first attempt to compare them. We study the assessment strategies used in six North Carolina State University classes in Fall 2007, and offer ideas on how they can be improved.

1. Introduction

As an instructional medium, wikis have many advantages. Their collaborative nature enables a class to tackle projects larger than a single individual could attempt. The ability of students to view their colleagues' work allows cross-fertilization of ideas, which can help individuals improve their contributions. The fact that students are posting their work in a public place encourages them to be reserved in what they say, and careful about how it will look to others. This in itself makes it resemble a real-world environment.

The very fluidity of wikis makes assessment difficult. First, there is a question of when assessment is to take place, since pages can be edited at any time. Then there is the difficulty of deciding which contributions should be attributed to which student, because many people may have edited a single page. Finally, students' work may be spread across many Web pages that are not necessarily directly linked to each other, so it is difficult to grasp how much each individual has contributed.

Several assessment strategies have been suggested.

- Self-assessment: Students write up summaries of their contributions to the wiki and submit them to the instructor.
- Group-based assessment: Students work in groups, and rate the contributions of each group member, as well as suggesting a grade for the group as a whole.
- Instructor/TA assessment: The instructor or teaching assistant assigns a grade and gives feedback without any outside assistance.
- Expert assessment: Links to the wiki pages are provided to outside experts, who assess the contributions.

- Peer review: Each student is assigned two or three other students' contributions to assess, based on a rubric.

Strategies relying on students' assessment of their own work may not offer as much critical feedback and guidance for improvement as assessment by independent observers. The traditional approach of assessment by the instructor and/or TA is also problematical, because of the volume of material that can be generated by students, especially when it is repeatedly revised.

Peer review seems to provide a scalable solution: Regardless of the number of students, there will always be enough reviewers. It also forces students to analyze others' writing just like others will analyze their writing. In this way, they gain insight into how others see their own work.

2. The Courses and Their Use of Wikis

Six courses were surveyed in this study. Three of them were engineering and science courses, and three were humanities courses.

- CSC/ECE 506, Architecture of Parallel Computers, is a masters-level course that is a core course for both computer engineering and computer science courses, but is taken primarily by computer engineers.
- CSC/ECE 517, Object-Oriented Languages and Systems, is a popular elective course for masters students in computer science and engineering, with the majority of students coming from computer science.
- TOX 415, Environmental Toxicology and Chemistry, is a senior-level course.
- COM 598W, Gaming and Social Networks, was a masters-level special-topics course offered in the Communication department.
- HI 216 is a freshman course on Latin America since 1826.
- HI 453/553 is a dual-listed advanced undergraduate/graduate course on the U.S. and Latin America.

In the two computer science and engineering courses, students were assigned a topic of current interest that was not covered in depth in the course. For example, the parallel-architecture class was assigned topics such as cache organization in multicore architectures; and a comparison of SCI, the Scalable Coherent Interface, with the coherence protocols covered in class. They were to research these topics on the Web and write a high-level description, citing other Web pages for details. They were allowed to work in teams of two, but by late in the semester, most students decided to do their pages individually.

In the toxicology class, students were given two topics to debate at different times during the semester: the worldwide ban on DDT, and the safety of CCA-treated wood. The whole class was randomly divided into two groups, one on the affirmative and one on the negative of the topic. Thus, approximately 11 students cooperated to produce each set of wiki pages. The teams were

allowed to read the other team's pages as they developed, but they could only edit their own pages. There was only a single deadline for submission. There was no set rebuttal period, and thus no guarantee that the other team would post soon enough that their opponents could respond to their arguments. Interestingly, the instructor says that in both cases, the team with the weakest position in his assessment (that CCA-treated wood is safe, that DDT should be banned worldwide) ended up winning the debate because they did a better job of supporting their position.

The communication students were assigned to find one scholarly or popular article about the class topic of the week and post a one-or-two sentence summary and a link on the wiki. The history students selected a topic on Latin American history or culture from a list provided by the instructor. In the lower-division history course, the first assignment covered a topic in Latin American culture or politics, e.g., political or social commentary in literature. The second assignment covered human-rights abuses, among other contemporary problems. Sample topics from the advanced course included "impact of US direct military interventions before 1950" and "human-rights problems: US and Latin American responses."

In the communication course, the students worked individually, and in the history courses, they worked in groups of 3 to 5, with 4 being the modal size.

The graduate-only classes (viz. the computer science/engineering and the communication class) were beginning a wiki site that will be enhanced by future classes to become a more comprehensive resource. The instructors of the undergraduate classes did not express an interest in building on the work of their current classes.

After receiving feedback, the computer science and engineering students were asked to revise their submission along the lines suggested by the reviews. Their reviewers were then asked to review the revision, and assign scores based on the rubric. After review and occasional modification by the instructor and TA, this became the student's grade for the assignment. Students in the other classes were not asked to revise their submission after being provided feedback.

3. Assessment methodologies

The computer science and engineering students used our Expertiza [3, 4] project (<http://research.csc.ncsu.edu/efg/expertiza>) is a Web-based system that facilitates peer review. It was first used to review wikis in Summer 2007, and has been used in courses in parallel computer architecture, object-oriented programming, and ethics in computing, among others. The software spiders the wiki to find all the contributions by an individual user, and then creates a page of links to each user's material. This material is then assigned to specific other students to review.

The toxicology students were reviewed by an outside team of experts, colleagues of the instructor in the course. These outside judges were asked to pick a winning team. Many of them provided feedback as to why they deemed one team's effort better than the other's, though this was not a requirement, since the judges were very busy.

The communication course spent the first 10 to 20 minutes of each class discussing and critically analyzing the submissions. They were graded by the instructor, based on such factors as the quality of the sources and how well the article was connected to the topics that were being discussed in class. Each student received either no credit (if not submitted), half credit (if wiki contribution submitted but deemed off topic, and full credit (if OK).

The history courses used instructor assessment, based mainly (2/3) on the quality of the wiki pages, but partially (1/3) on the oral report given on each group's wiki pages. The wiki pages were evaluated on the quality of sources (e.g., whether they were primary and/or scholarly sources), how well they were integrated into each paragraph, how well they were analyzed, and whether they linked to any audio or video sources.

4. Results

All students were asked to fill out a 5-question survey on their experiences. Results are shown in Table 1. The overall response rate was 72 out of 161, or 45%. Individual classes had response rates between 32% and 50%.

Table 1. Results from the student survey

Question	COM 598W	ECE 506	CSC 517	HI 216	HI 453/553	TOX 415	Mean
1. The experience of using a wiki helped me to think critically about the subject matter of this assignment.	2.25	1.94	2.07	2.00	2.50	3.00	2.24
2. Using a wiki made it easy to collaborate with other students.	2.00	2.18	2.21	2.11	3.00	3.38	2.40
3. I received adequate feedback on the quality of my work.	2.25	2.82	2.93	2.00	2.33	2.75	2.52
4. The feedback I received on my work was logical.	2.00	2.71	3.14	1.78	2.50	2.88	2.49
5. The feedback I received helped me to improve my work.	1.75	2.41	2.54	2.11	2.33	3.13	2.35
Number in class	9	35	56	18	19	24	161
Number responding	4	17	28	9	6	8	72
Response rate	44%	49%	50%	50%	32%	33%	45%

Responses were on a scale of 1 to 5, with 1 indicating “strongly agree” and 5 meaning “strongly disagree.” The mean for each question is shown in the rightmost column. Squares shaded in green indicate class average scores that were above (better than) the overall mean for the question, and squares shaded in pink highlight class average scores that were below the overall mean.

Several tentative conclusions can be drawn. First, students think that these wiki assignments

promote critical thinking. However, it is a mystery why the toxicology students seemed to disagree. Wikis are best for collaboration among large groups of people, where the effort of managing competing updates would otherwise be prohibitive. One might surmise that the large size of the teams (about 11 students) made it less necessary for each individual student to think critically; or since the response rate was low, perhaps the students responding to the survey were not the ones who did most of the work on the wiki.

Second, students seem to prefer small wiki teams. The most favorable responses on Question 2 came from the communication students, who worked individually. Next most enthusiastic were the computer science and engineering students, who were given the option to work individually. A representative comment from these students:

Yes. It was nice to know that the edit history was always available, in case my partner made a change I didn't agree with. It was easy to see what changes he made, and also for re-review it was easy to see if the student had corrected his mistakes.

The least pleased were the toxicology students, who worked in the largest groups. A prose comment indicates that the groups may just have been too large for students to collaborate effectively.

In theory you're "working together" but practically I don't think the students working on the wiki's ever communicated about the wiki project. Everyone did it on their own, and the last person on the wiki got to make any edits they wanted independent of anyone else.

Though it seems ironic that the highest scores were given by students on small teams, note that in several of the classes, the students did have other ways to interact on their wiki assignments—either class discussion, peer review, or group presentations in class. So these interactions may have figured into their answer, not just the interactions through the wiki software.

The students who were least pleased with the feedback on their work were those who used the peer-review system. This could've been either because the peer reviewers were less competent, or because these were the only classes that were required to revise their work in response to the feedback received. The prose comments indicate that it was some of both. Two comments serve to illustrate the range of student reaction:

"Feedback was provided by students who didn't know the material themselves, so they had no objective way of evaluating our work. They didn't know what was available on the web, nor the intricacies of the subject being covered. Also many evaluations rated various metrics less than 100% but provided no comment as to what needed improvement."

"I think it should be made more clear that the purpose of giving feedback is to help the student improve his/her work. If someone does not explain why he/she scored a feedback question in a particular way, then the student does not know how to improve the work."

It's hard to gain insight on why the HI 216 students were most pleased with their feedback. There were only two prose comments, one mildly favorable ("I always understood what I did wrong, but I would have benefited from hearing how others before me did good/bad in order to help me in my work.") and one unfavorable. And the only comment from the runner-up communication class was, "I don't know if anyone ever edited or commented on anything I posted." So the relatively good performance of these classes may simply indicate that the

students did not receive any feedback that displeased them.

Similarly, on the question about feedback helping students improve their work, the highest scores were garnered in the communication class, but the prose feedback does not indicate why. There were three prose comments, one of which indicated that no feedback was received. One mildly unfavorable comment stated, “The feedback was primarily about the mechanics of using the wiki. The assignment was just to find a citation and post it. It was a ‘you did it, or you didn’t’ assignment. There really wasn’t that much to ‘improve.’” However, one student did appreciate the feedback: “If I headed in the wrong direction with my research it was easy for my professor to point out and lead me in the right direction of focus.”

On the other hand, the computer science and engineering students worried about receiving conflicting feedback:

I spent a lot of time on my assignments to make sure they were high quality before I turned them in the first time. The feedback I got from other students was almost always too vague to be of any use. I also often disagreed with what they had to say. Sometimes students would recommend some very off-topic info to add to the wiki. I didn't want to add this info to please one reviewer for fear of then losing points with the others in the stays-on-topic category.

But there were those who were pleased with their feedback too, indicated by this comment:

Yes in one assignment I had paid very little attention to minute details regarding formatting, readability etc. My reviewer exactly pointed where I was losing out on and it was very helpful in raising the standard of my work.

5. Summary

This has been a very interesting experiment exploring the use of wikis in classes. The good news is that students in the majority of classes feel that wiki assignments promote critical thinking and make it easy to collaborate with their peers. Indeed, most of the negative comments on wikis themselves were on having to learn a new piece of software, something that will be less of a problem as wikis become more widespread in education.

But there is clearly room for improvement in assessment of wiki contributions. The students who felt most positive about their feedback were those who had received the least feedback. The students who made the most negative comments were those who received peer reviews. From this experience, we can conclude that the peer-review system needs to be improved so that students are reminded by e-mail about the work they have to review and the deadline for reviewing it, and there needs to be a way to inform reviewers that their review is lacking in some respect. We have already added a facility for the author to give feedback to his/her reviewers. We are working on a mechanism to automatically bring “outlier” scores to the instructor’s attention, so that students can be asked to correct errant reviews in a timely manner.

However, despite the fact that the peer-reviewed students were more critical of their reviews than other students, they still were among the most enthusiastic about wiki assignments from the standpoint of critical thinking and collaboration. This offers hope that peer review may prove to be a scalable and effective means of assessing wiki contributions.

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