AC 2008-2132: USING VIDEOS TO TEACH THE ETHICAL USE OF ENGINEERING INFORMATION

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Using Videos to Teach the Ethical Use of Engineering Information

Abstract

The engineering profession has always valued ethical behavior. However, it seems that unethical behavior is more and more prevalent in our classes. The rising incidence of plagiarism is and should be a concern to educators not only to ensure academic integrity but also because of the implications for our profession. The ethical use of engineering information is important for our students to learn.

This article describes the production of a series of videos intended to give engineering students a foundation in the ethical use of engineering information. Topics covered by the videos include copyright, plagiarism, and citing materials. Camtasia software was used to create short videos in Flash format. Flash format videos are easy to place on the web, and can also be inserted into a course on BlackBoard. Scores from tests for the videos can be directly inserted into the grade book.

From its inception the project relied on cooperation between the faculty of the college of engineering and the library. The faculty were consulted at every stage of the creation process. The feedback they provided was invaluable. Pre and post tests were used to evaluate the effectiveness of the videos.

The Plagiarism Issue

Ethics has always played an important role in the engineering professions. According to the Code of Ethics for Engineers presented by the National Society of Professional Engineers, "engineers are expected to exhibit the highest standards of honesty and integrity."[1] In fact, the document gives as one of its fundamental cannons that engineers should, "conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession."

Unethical academic practices commonly occur in the university setting. It would be nice to think that engineering students are more ethical than their counterparts, but one study has shown the opposite to be true. Donald McCabe found that 72% of engineering students admitted to "one or more acts of serious cheating in the past year" compared to 66% of other students.[2] We need to do all we can do to instill ethics into the engineering students at our institutions. Learning to use information in an ethical manner should not be overlooked when teaching about ethics.

Plagiarism is not new to the academic environment, but it seems to be on the rise. Even publishers of scholarly journals are worried about the rising occurrences of plagiarism in articles submitted for publication.[3]

The Internet has changed way students plagiarize to some extent because it has changed the way they research. A wealth of information is now at the researcher's fingertips. A library of information is brought straight to their desks. The phrase "cut and paste plagiarism" expresses

the ease of copying a sentence, paragraph, or more from an article into a term paper. Additionally, many in the upcoming generation view materials retrieved online differently than those obtained from other sources. Clifton Poole stated "there is a tendency to think that cutting and pasting from the Internet is a form of good research and not plagiarism."[4] Several students are further confused because of online access to scholarly journals and conference reports through their library's web sites. Townley and Parsell note that "the Internet presents mixed messages that may confuse people as to what is and what is not acceptable appropriation practice."[5]

In order to understand how to combat plagiarism, we must understand why students plagiarize. The list of reasons is long and varied. One of the first reasons is that students don't realize they are plagiarizing. Granitz and Loewy studied the files of several students who were caught plagiarizing at a major university. Over 40% of the cases fell into this category.[6] Students often do not know what plagiarism is and what the plagiarism policy is at their university. We cannot assume that students were taught about plagiarism in high school. It may be covered in a freshman English class, but many students test out.

Students may lack the skills needed to avoid plagiarism. Many students don't believe it is necessary to provide citations for paraphrased materials. Pamela Jackson found that "students did not see using direct quotes or paraphrasing as a means to validate and support their ideas. Rather, they viewed using the work of others as a means to communicate their ideas better than they think they can."[7] Even when students know they should give credit to another source, they may not know how to cite the source properly.

Unfortunately, not all plagiarism can be attributed to ignorance. Students may consciously plagiarize for several reasons. Procrastination is a trap that many students fall into. Failing to manage time wisely can lure the student who would not usually plagiarize to employ unethical practices to complete an assignment.[8] Some feel that taking the words and ideas from others is the best way to obtain a high grade. Scanlon and Neumann found that although only 8% of students admitted to frequently using "cut and paste plagiarism" they felt that over 50% of their peers did so.[9] As a result, students may plagiarize to level the playing field and get the grade they would have gotten if everyone else wasn't cheating.

Project Overview

When the author first started working at Wichita State University (WSU), he attended a faculty meeting for one of the engineering departments. Faculty members requested help with a plagiarism problem. An offer to teach a bibliographic instruction session was accepted by one of the faculty, but others had needs that would not be met by the librarian coming into their classes. Most had concerns about giving up lecture time. One wanted all of their graduate assistants to receive training. Offering training sessions in the library presented other problems including accurately reporting to each faculty member which students attended and which did not. By the end of the meeting the seeds for a video project had been planted in the author's mind.

During 2007, the Public Services Group at WSU's Ablah Library had a goal to create several Wutorials, web-based video tutorials (Wu is the name of WSU's mascot.). Most provided

instruction on teaching students how to use a specific database, but the author felt that a Wutorial on plagiarism would help the engineering students.

Four goals were set:
1. The product should teach the ethical use of engineering information,
2. The product should be web-accessible,
3. The product should be a brief introduction rather than a complete course, and
4. Professors should be able to use it in a BlackBoard course.

Initially, a single video discussing plagiarism was envisioned. The project quickly expanded to cover copyright in addition to plagiarism, because many students confuse these two areas. It was also decided to include citations since they are necessary to avoid plagiarism. To impress upon the students that these issues are still valid after college it was decided to include statements from the "Code of Ethics for Engineers."

The author wanted to keep the four teaching goals first and foremost in the development of the product, especially education about what plagiarism is and what it is not. Brown and Howell found that providing detailed information to students about plagiarism and its consequences has positive effects on their behavior.[10] The impetus driving the project was to help reduce the amount of student plagiarism.

Web accessibility required that the video content be created in a widely-used format. It also required the video to be small enough to be quickly downloaded by users without broadband access. To ensure small files, the single video was divided into four separate videos. Two added benefits of having several videos were that it is easier to edit a small video than a large one when changes need to be made and the user is given more freedom on what to view and review.

It was decided to limit the coverage of each topic to a brief introduction. Trying to completely cover each topic would have required much longer videos. By keeping each video as a brief introduction, smaller videos were generated.

The final goal entailed more than having the videos accessible via a BlackBoard page. Web links can be easily added to a course page. Faculty wanted a way to easily track when students had viewed the videos. Having some way to automatically record "attendance" at the video lectures would be ideal.

Product Development

The most difficult part of the project was the background preparation. Deciding what to include in each segment and what to throw out took a long time. The plagiarism video's script took the most time. One of the difficulties lay in providing enough information to help the students recognize plagiarism in their own work. It was decided that something in addition to the videos was needed to encourage active learning of plagiarism concepts. With permission, a link was created to Cecilia Barnbaum's "Plagiarism: A Student's Guide to Recognizing It and Avoiding It." This page provides examples of common plagiarism miscues.

Once a script was written for each video, PowerPoint presentations were developed. Camtasia Studio 4 software was used to record the PowerPoint presentations, edit the footage, and convert the video into Flash format. The videos include a table of contents feature which facilitates skipping to certain segments of the video. This allows students to easily review topics. The test would be added once faculty input was received.

With the initial set of videos loaded on the server, the author attended another faculty meeting with the department who originally requested help. The videos were positively received, but the faculty mentioned several areas in which the videos could be improved. For example, WSU's policy on plagiarism from the student handbook should be included. Editorial changes were suggested. They even suggested presenting the videos at a conference. Some volunteered to help gather data on the effectiveness of the videos. A final suggestion was to present the videos to the entire faculty of the College of Engineering once the videos were updated.

The meeting with entire college faculty generated more interest as well as additional feedback. The faculty were excited that I was partnering with them to help them solve a difficult problem. The main request that they made was to create a test with results that could be recorded directly into the grade book.

At first, the author planned to incorporate a quiz into the video itself. Camtasia software allows questions to be inserted into a video which can even be reported directly into a BlackBoard course's grade book. However, four videos would mean four tests, each of which would have to be connected to each BlackBoard course's grade book. It was determined to separate the test from the videos. The solution was simply to create a test directly in BlackBoard's test manager. The test was then exported and sent to each faculty member. While some professors are using the test as part of their grade for the class, others are using it simply as a tool to see if the students have watched the video.

Measuring the Effectiveness

In order to measure the effectiveness of the videos, the author received permission to give pre and post tests to students during the 2007/08 school year. The pretest and posttest used the same twenty question test that was created to accompany the videos. The test consisted of nine multiple choice and eleven true/false questions which were weighted equally. The questions were purposely designed with varied levels of difficulty, both easy and hard, to help measure the understanding of the concepts covered by the videos.

In addition to the normal test questions, three demographic questions were included concerning gender, nationality, and whether the students had completed the professional ethics class. Many articles have discussed how different cultures have diverse interpretations of what constitutes plagiarism.[11,12] Since WSU has a large percentage of foreign students, it was a logical point to study. Also, it would be interesting to see the effectiveness of the professional ethics class in covering the issues related to the videos.

Three professors asked their students to take pre and post tests. Students were given the pretest in class, instructed to watch the videos, and then given the posttest the next time the class met.

Participation was voluntary to stay within guidelines set by WSU. Since the classes were taking the test anyway as part of their grades, participation didn't mean much more work for the students.

The pretest also asked if the students had previously seen the videos or taken the test. Some of the students took the tests in more than one class. Only the initial pretest and its associated posttest were used for each student. Also, since the pretests and posttests were administered on different days, some students took the pretest without the taking the posttest or visa versa. Only matched pretests and posttests were used in the study.

Sixty-three sets of usable tests were gathered. The results showed the videos to be a modest success. The average pretest score was 10.63 and the average posttest score was 13.30, an increase of 2.67 correct answers per test. Foreign students missed an average of almost two more answers than their American counterparts on both the pretest and posttest, but the improvement was almost exactly the same.

Changes in Average Scores				
	Number	Pretest	Posttest	Increase
Overall	63	10.63	13.30	2.67
Foreign Students	37	9.84	12.51	2.67
U.S. Citizens	26	11.77	14.42	2.65
Females	17	10.00	14.00	4.00
Males	46	10.87	13.04	2.17
Ethics Class	8	9.63	14.50	4.87
No Ethics Class	55	10.78	13.12	2.34

Female students scored lower on the pretest, but higher on the posttest with an average improvement of four points. Similarly, students who had taken the ethics class scored lower than their counterparts on the pretest but scored higher on the posttest.

The results of the pretest and posttest suggest some changes should be made in the videos. The videos were least effective in teaching about citations. A question about the necessary parts of a journal article citation was answered correctly only 11% of the time on the posttest. That was down from 14% on the pretest. Students did not recognize that the journal publisher is not needed. The video covered the topic so quickly that the students confused the elements needed for a book citation with those needed for a journal article. The citation video needs to be lengthened to provide better coverage. A worksheet should also be developed giving examples of different citations. A link to a PDF version of the worksheet could easily be added to videos webpage.

One of the questions was worded ambiguously, and should be reworded for future tests.

Conclusion

The videos are useful in teaching about the ethical use of engineering information. They take advantage of an underused medium to teach needed information. Are they better than a face-to-face lecture? Probably not, but they do have three major advantages. One, students do not need to be in any particular class to take advantage of the videos. If a teacher doesn't cover the topic students can still view the videos from the library's web page. For the professors who do want to cover the topic, they do not need to take up class lecture time. Two, the videos allow the

students to view the materials when it is convenient for them. Third, students can work at their own pace, reviewing a video several times if they like.

The success of the videos cannot be measured solely by the results of the tests given. Just by including the videos as part of their class professors are addressing plagiarism and other ethical topics. Students are reminded that it is an issue. Research has shown that academic dishonesty is increased when the issue is perceivably ignored by faculty.[13] Students are less likely to use the excuse of not knowing about plagiarism, because plagiarism education has been included as part of the course.

Working so closely with the engineering faculty on a project that they feel strongly about has deepened ties between the library and the college. The author had just started at WSU when the video project began. Because of this project, the author is already viewed as a colleague, a relationship that often takes years to develop.

So what happens to the videos now? They will remain on the web at http://library.wichita.edu/aveng/Ethics_vid/Ethics.htm, and each semester faculty will be reminded of the videos and accompanying test. The videos will continue to be tweaked to help improve their effectiveness. Even though the videos were designed for engineering students, they will be presented to faculty in the sciences. If the faculty are interested another set of videos will be created for non-engineering students. Optimistically, a similar partnership can be created with the non-engineering faculty.

The ethical use of engineering information is an important issue. It won't be solved by simply using instructional videos. However, every effort should be made to improve the situation. These videos provide one more way to reach students and teach them how to ethically use information.

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