AC 2009-1566: CONTINUING LIBRARY INSTRUCTION VIA ON-LINE TUTORIALS

Megan Tomeo, Colorado School of Mines

Continuing Library Instruction via Online Tutorials

Abstract

At Colorado School of Mines, students are required to take an engineering design course their freshman and sophomore years (Engineering Practices Introductory Course Sequence or EPICS). The library provides face-to-face instruction to each of the freshman sections. This is our main point of contact with the students and often our only point of contact. In order for engineering students to be competent information consumers and life-long learners, they need more than one 50-minute instruction session.

The sophomore engineering design course (EPICS 251) is student-driven with faculty acting as guides, unlike the structured freshman course (EPICS 151) where all sections follow the same schedule and faculty serve a more traditional role. Because of this, using traditional face-to-face instruction is not practical. However, instruction delivered via online tutorials is a realistic method. In addition to fitting the structure of the course i.e., student-driven, online tutorials allow students to learn at their own pace, to complete the lessons when it is convenient for their schedule, and to review as they need.

Spring 2008, Colorado School of Mines' Trefny Institute for Educational Innovation offered curriculum development mini-grants. With approval from the appropriate constituencies, I sought and was awarded a mini-grant for adding an information literacy component to EPICS 251. I proposed building on the skills gained in EPICS 151 as well as assessing the skill level of the student before and after the tutorials. To achieve this, pre- and post-surveys and six online tutorials were created using Adobe Captivate™.

Spring 2009, several sections of EPICS 251 will participate in a study to test student's retention from EPICS 151 library instruction as well as determine the impact of the online tutorials. The surveys ask the students to self-assess their information literacy skills and to answer practical questions in the areas of the research process, using library resources, evaluating information, and copyright. This assessment data is critical as we currently lack any measurement of the effectiveness of the instruction delivered in EPICS 151. With the data, we will also be able to make a stronger case for the need of information literacy. Faculty often assume their students are savvy information consumers and typically this is not the case.

A subsection of the sections participating in the study will complete the online tutorials in addition to the surveys. The online tutorials were developed around the previously mentioned areas. The tutorials start to delve into the engineering literature (where in EPICS 151 students use a general multidisciplinary database), focus on the use of technical reports or patents (dependent upon the project for the course), and discuss their professional responsibility in using information.

Discussion will focus on the project e.g., the pitfalls of Captivate™, the assessment data and what it means, and future implications.

Introduction

At Colorado School of Mines (CSM), there is not an information literacy component integrated into the curriculum nor is there a for-credit library instruction class. Instruction is limited to two freshman courses and a few upper level courses in some departments. One-shot instruction a couple of times during students' tenure at a university will most likely not produce information literate students.[1] Due to the skills needed by today's engineer, ABET includes life-long learning as a criterion for

accreditation. Information literacy plays a key role in life-long learning.[2]

Working with faculty to add an information literacy component to a course can be sometimes rewarding and sometimes not. Among their chief arguments against adding information literacy is the lack of class time. This is understandable as the engineering curriculum is already perceived as overloaded with content. Are there other ways to add information literacy to a course?

One possibility is to change the delivery method. Online tutorials allow the students to learn at their own pace and at their convenience without impacting class time. Online tutorials cater to the typical personality and learning style of engineering students. Of all the Myers-Briggs personality types, engineering students are most often Introverted, Sensing, Thinking, Judging (ISTJ).[3] Online tutorials provide a self-paced environment for quiet contemplation (addresses Introversion), a linear, step-by-step concept instruction (addresses Sensing), interactivity (addresses Sensing), and the ability for quizzing to test concepts learned with instant feedback (addresses Thinking and Judging).

The CSM's Trefny Institute for Educational Innovation sent request for proposals for curriculum development mini-grants during the Spring 2008 semester. I proposed addressing the lack of class time and the assumed lack of information literacy skills in our students by developing online tutorials for the sophomore course in the engineering design sequence (Engineering Practices Introductory Course Sequence or EPICS). Instruction is already delivered to the freshman course (EPICS 151) in the more traditional classroom setup. The traditional classroom set up does not work as well with the sophomore course (EPICS 251) because the course is student-driven and the faculty serve as guides. The schedule for EPICS 251 is not as rigid as the freshman course. The online tutorials continue upon the topics introduced in EPICS 151 and add depth. And for the first time, there is a planned sequence of library instruction and a small part of the curriculum has been infiltrated.

A second component is assessment data. Students answer pre- and post-surveys. The intent of the pre-survey is to determine a baseline as currently there is no measure of what the students gain from the library instruction during EPICS 151 or other library instruction classes. The post-survey measures the impact of the tutorials (two groups are compared, a group that does not complete the tutorials and a group that does complete the tutorials). In addition, students' bibliographies from their final reports for the course will be collected to determine the quality of citations. Assessment data aids in educating faculty about the importance of information literacy as well as helps improve instruction.

Online Tutorials

Six online tutorials were developed using the demonstration authoring software, Adobe Captivate™ during the summer break of 2008 and Fall 2008 by library staff. The Trefny curriculum development mini-grant was used to outfit the reference section of the Arthur Lakes Library (reference is responsible for instruction) with Captivate™, microphones, and audio software. They cover finding books, etc. in the library, searching the journal literature, finding articles, searching government publications, evaluating information, and citing sources. All of these are topics covered in EPICS 151 to a much lesser degree.

Information Skills for the CSM Graduate in Science and Engineering includes ten competencies with half obtainable at the sophomore level and all necessary upon graduation for savvy information consumers. These competencies were developed from Association of College and Research Libraries (ACRL) Science and Technology Section (STS) Information Literacy Standards and ASEE "Information Literacy Competencies for Engineers" and are used to develop the instruction for EPICS

151 as well as the other one-shot sessions delivered in a few departments. Specifically the sophomore level competencies focus on being able to develop a search strategy, identifying what type of work will fit the need and what tool will find that type of work, evaluating information, and citing and using information.[4] In addition to further expanding upon the topics from EPICS 151, each tutorial includes one or more competencies.

Authoring Software used to Create the Tutorials

Captivate™ was selected for creating the tutorials due to its integrated functionally (e.g., quizzing features were included and not an extra add-on module), capturing and editing features, and relatively moderate educational price. It was also attractive due to it being supported and produced by Adobe. Captivate™ allows for audio in addition to video, includes closed captioning, and is 508 compliance which makes it accessible to everyone. There are several output options including an Adobe Flash file with accompanying HTML code.

Originally, the tutorials were to include audio and closed captioning. As the project developed, it became clear that prioritizing tasks was necessary to get the tutorials online. Content was the main priority with text based tutorials.

Captivate™, like any software program, has its quirks. The most startling at first are the rather large file sizes. The biggest culprit is importation of slides/objects from other projects. This can cause slowness in opening projects and transferring projects to the Web server; however, it appears to have no bearing on playback online (when the bandwidth is properly adjusted). Even massive deleting of slides within a project does not shrink file size. This is a concern with the need to update tutorials as research tools change.

The original timeline was to debut the tutorials in the Fall 2008 semester. Technical difficulties delayed the completion of the tutorials; therefore, the debut was not until Spring 2009. Several campus network and software based limitations caused the tutorials not to play on the Web. First, settings on the campus network limited the tutorials to a bandwidth of 14.8 kilobytes per second (kB/s) or less. The bandwidth in Captivate™ is adjustable by changing the run time of the captions and other objects on a slide (note that file size has no real bearing upon this). Also tutorials will not play unless the output is Flash Player 8 (still not sure if this had to do with the campus Web server or not). The video quality in Captivate™ should be set to "standard." The best guess at what this means is BMP image quality of low (8 bit) and a JPEG image quality of 50 percent (these are set within the preferences). Lastly, Flash has the limitation of 16,000 frames per file. If a Captivate™ project has a lot of slides, it can exceed this limitation. A good rule of thumb is 25 to 35 slides per project. For larger projects, they can be chained together easily overcoming this obstacle.

The previously mentioned technical difficulties were not included in any Adobe documentation. It took many Internet searches, hours of trial and error, and help from offsite experts to determine how to get the tutorials working on the Web. Of course all of this took time, hence the long delay in deploying the tutorials.

Pre- and Post-Surveys

Originally, the students were to complete the surveys online using the quizzing functionality of Captivate™, however, due to the technical difficulties surveys were conducted during class time using pen and paper. The surveys were developed around the sophomore level competencies. A short

demographic section asks for the name (for matching pre- and post-surveys), year (despite this being a sophomore course many are juniors and seniors), and previous library instruction. Students self assess their information literacy skills. For example, one question is "How skilled/efficient are you at using the library's online catalog to find books, etc. and databases to find scholarly literature (journal articles, conference proceedings, etc.)?" There is a Likert scales described as 1: I only use the Internet, 5: I use them on occasion and sometimes have to ask for assistance, and 9: Very, I use the online catalog and databases to find information all the time and I very rarely have to ask for assistance. For a complete list of self assessment questions, see Table 1. Table 1 also includes short designations for each question that help indentify data provide in the "Assessment Data" section. Last, students' skills are tested with a short series of questions ranging from identifying parts of a citation to where materials are in the library. A complete list of questions is included in Table 2.

Question	Short Designation
1. Do you think of key search terms, develop search strategies, make a research schedule, make use of the proper research tool for the job, and seek the type of information that will fit the need?	Search Strategy
2. How skilled/efficient you are at using the library online catalog to find books, etc. and databases to find scholarly literature (journal articles, conference proceedings, etc.)?	Using Tools
3. How critically do you evaluate the information you use for papers, presentations, etc.?	Evaluating
4. Are you aware of what it means to plagiarize?	Citing
5. Your overall rating as an information consumer (the ability to find, use, evaluate, and cite information).	Overall

Table 1: Self-Assessment Questions

Questions
1. If looking for current, concise, scholarly information on a topic, what would you search for?
2. If you wanted to find a book, you would use?
3. How do Boolean operators modify a search?
4. Match the holdings information with the correct floor in the Library.
5. Identify parts of the citation.
6. What is one reason why you cite your information?
7. What is not a reason for a publication to be considered authoritative?
8. Determine the scholarliness of different publications.

Table 2: Questions Testing the Information Literacy Skills of Students

Assessment Data

Gathering assessment data by visiting each section is problematic for the same reason traditional face-

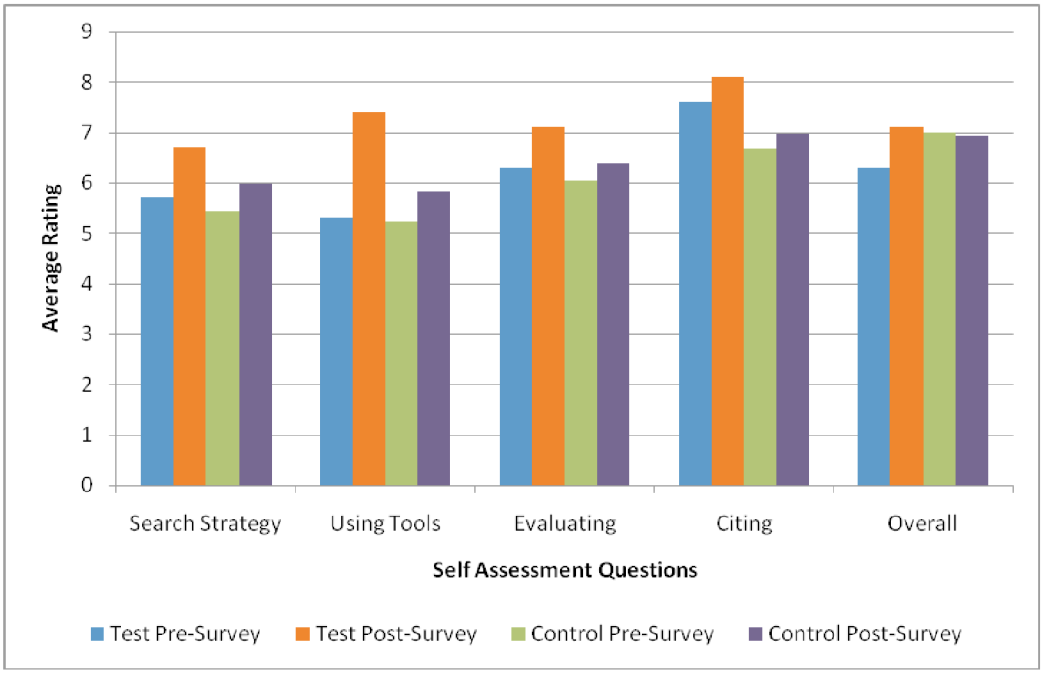
to-face instruction is problematic. The section that completed the online tutorials or the test group had 25 students. Seventeen consented to be part of the study and only 10 completed both the pre- and post-surveys (40 percent return rate). In the control group, i.e., the section not responsible for completing the tutorials, there were 34 students. Of those students 27 consented to be a part of the study; however, only 21 completed both the pre- and post-surveys (62 percent return rate). The breakdown by class year for the 31 students is 3 freshman, 13 sophomores, 10 juniors, and 5 seniors. This is not unusual for the sophomore engineering design course to have a large constituency of upper class.

On average, the 31 students had 2 instruction classes in the past. The past instruction classes included K-12, EPICS 151, NHV (the second freshman course where librarians deliver instruction), and other. Eighty-four percent of the students remember the session from EPICS 151 and 51 percent remember instruction from an NHV class. This demonstrates that many of the students have received the same type and amount of library instruction (there are of course other factors to consider) and should be at about the same skill level.

Student Self-Assessment

Average rankings for the pre-survey between the test and control groups are fairly consistent. Slightly notable, but still small, differences appear in the average ranking for citing and overall. The test group ranked their knowledge about citing 12 percent higher than the control group; however, they ranked their overall ability 11 percent lower. See Graph 1. This helps to indicate the students are starting relatively at the same skill level, at least in their opinion.

Post-survey data, I believe, shows the impact of the online tutorials on students' confidence in their abilities. The test group experienced at least a 7 percent increase in all their average rankings with the highest increase in using tools at 40 percent. In comparison, the control group experienced a small, insignificant decrease in overall and other small gains with the largest in using tools (11 percent). See Graph 1.



Graph 1: Average Self-Assessment Rating by Test and Control Groups (Pre- and Post-Surveys)

Where pre-survey data had relatively insignificant differences between the test group and the control group, there are significant differences in the post-survey data. Most notable is the 21 percent difference between the test group's average rating and the control group's average rating of their ability to use research tools (see Graph 1). The online tutorials specifically targeted the resources of the library —the online catalog, e-journal manager, and subject databases—so the test group was exposed and felt they learned something about these tools. The control group in their uncontrolled environment (they could talk to friends, librarians, or faculty for research help) must not have used the research tools any more than what they have done in the past.

Testing Student's Skills

On the pre-survey, overall students excelled at identifying parts of a citation, why you cite information, and Boolean operators. The largest confusion is over where materials are located in the library. Second area of concern is determining whether a publication, based upon title, is scholarly or not. Less than half of the students recognized that you would look for a book in an online catalog, and less than half recognized current, concise, scholarly information is most often found in a journal. A popular answer to these questions was the Internet, in my opinion reflecting the belief that everything is on the Web.

The post-survey in many cases showed similar strengths and weaknesses. Identifying scholarly publications changed based upon a specify title (some increased 9 to 20 percent and others slightly decreased 3 to 9 percent). Other notable differences were increases in searching for a book in an online catalog (47 percent) and finding current, concise, scholarly information in a journal (33 percent). The majority of the increase for where to search for a book can be attributed to the test group (5 of the 7 students who answered incorrect on the pre-survey and answered correctly on the post-survey were from the test group). The online tutorials focus on research tools and their use which probably contributed to the students increased score in the test group. This is not the case with where to find concise, scholarly information. It is undetermined why the control group did better on the post-survey in this area.

Most questions on the survey had multiple parts, hence a total of 25 possible points. The test group has an average score of 16.8, and the control group average score is 16.8 on the pre-survey (see Table 3). This is yet another indication that the students in each group are starting at relatively the same skill level.

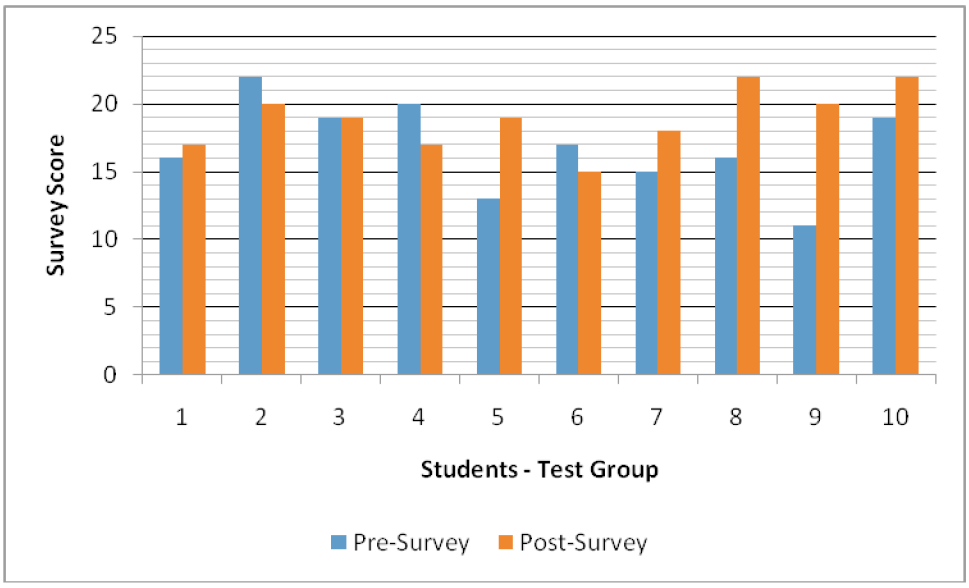
The test groups average score increased by 13 percent, whereas the control group slightly decreased (2 percent). Two points is a small increase for the test group; however, this has more significance when coupled the fact that the control group had no change. The online tutorials did have a measurable impact. See Table 3.

Group	Average Score Pre-Survey	Average Score Post- Survey
Test	16.8	18.9
Control	16.8	16.4

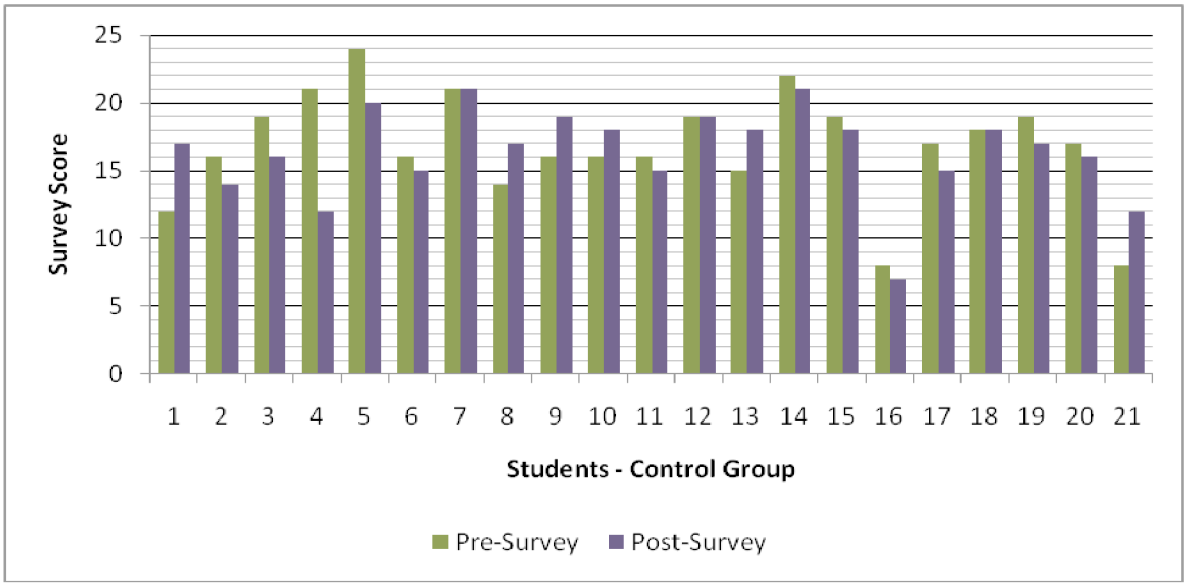
Table 3: Average Scores by Group

Looking at the finer detail, the largest improvement in pre-survey and post-survey scores is within the

test group (82 percent). See Graph 2. Sixty percent of the test group had an increase in scores from the pre-survey to the post-survey (see Graph 2), whereas 29 percent of the control group increased their scores (see Graph 3).



Graph 2: Test Group Pre- and Post-Surveys Scores



Graph 3: Control Group Pre- and Post-Surveys Scores

Bibliographies of Final Reports

At this time, bibliographies have not been collected (as the semester is not yet over). Once bibliographies are collected, each citated source will be given a weighted value (e.g., a scholarly, peer-reviewed journal artcile will receive 3 points). Total scores from each bibliography will be normalized and compared. It is hoped that bibliographies from the test group will have a larger total score adding further evidence that the online tutorials had an impact.

Conclusion

This is a step towards integrating information literacy through the curriculum. Just as it takes a series of carefully crafted courses for the students to develop a strong foundation in math and science as well as skills in their specific engineering discipline, it will take a sequence of library instruction throughout students' careers at a university for them to be savvy information consumers.

This is also a step towards gathering assessment data. Currently there is no all-encompassing assessment plan. At the very least the method of gathering assessment data will need to be improved. The return rates for both groups were poor and a major weakness of the data is the small sample size. It is possible to integrate the tutorials into Blackboard™, the surveys could be placed online, and data gathered through Blackboard™. If an official assessment plan is developed, the survey questions could possibly be adjusted.

From the feedback received from students, the tutorials will be further enhanced. Thus far, students' comments have been that they like the online delivery method but at times found the pace of the tutorials to be too slow. Though there was one comment that the student preferred the 50-minute session with a librarian. Lesser priorities, such as adding audio, will be included as time permits.

Thus far only one section of EPICS 251 completed the tutorials. They were an added piece to the section that the EPICS mentors encouraged the students to complete. No grades were assigned for completing the tutorials. The goal is to make the tutorials an integrated component of all EPICS 251 sections once major issues are improved and it is proven delivery method for information literacy. And of course, other opportunities for utilizing online tutorials will be explored.

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