

Hands-On Laboratory-Driven Electrical Engineering Curriculum (Pandora)

Student Review of Online Material¹

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BACKGROUND

The Hands-on Laboratory-driven Electrical Engineering Curriculum Project (Pandora) seeks to address the need for skilled workers in the fields of electrical and computer engineering. The Pandora project creates distance learning (DL) online curriculum with initial motivating experiments that use reasonably priced instrumentation tool kits. Funded by FIPSE, the DL courses map to the ABET Learning Outcomes and are designed for both two- and four-year post-secondary institutions. As part of the Pandora Project, UW EDGE, the distance learning program for the College of Engineering, is developing an online version of the Electrical Engineering (EE) 215 course using materials supplied by EE faculty.

On November 7, 2001, the Office of Educational Assessment (OEA) conducted a focus group session with five undergraduate engineering students. The purpose of this focus group was to gather information about the new online EE 215 course materials as part of the formative program evaluation. This process addressed the following project question:

- How do students rate quality and satisfaction with instructional components of the online format?

METHODS

Two weeks prior to the focus group, an OEA researcher visited a current on-campus EE 215 class to invite students to participate in the evaluation of the online curriculum. Students were informed that they would be viewing the online version of the course and would be asked to discuss their opinions and thoughts of it. Students were told that pizza and soft drinks would be provided after viewing the course for 30 minutes, and then they would participate in a 30-minute discussion to allow the OEA to gather information for website improvement. Eleven students volunteered to participate in the review, two of which were female. Five male students attended the review session on the scheduled date.

In preparation for the focus group, Pandora Project team members, including OEA staff, UW EDGE staff, and EE professors, collaborated on topic areas and appropriate questions for the activity. An EE computer lab was reserved, as was an adjacent room in which to conduct the focus group. Email reminders were sent to the volunteer students a week before the focus group and the day prior.

Two OEA research assistants conducted the session that included viewing the website for the online material and conducting a focus group with the student volunteers. The online curriculum viewing took place in an EE computer lab that was reserved for focus group participants. Prior to viewing the website, students were provided with an informed consent form and a description of the project. They were asked

¹ Submitted as part of the evaluation of the Pandora Project.

to sign the form if they consented to participate. OEA staff also provided the students with a personal "note page" that would assist them in guiding their curriculum review and recording their observations (see Appendix). The students had 30 minutes to review the materials. The UW EDGE distance learning designer directed students to the website and was present throughout the viewing to address technical difficulties. Due to time constraints, most students were only able to view the first three of the ten lessons.

After reviewing the online material, the UW EDGE staff member left and students were directed to the conference room to begin the focus group and enjoy their pizza. Prior to commencing the group, OEA staff reminded the participants that the group was confidential and no names or identifiers would be used in reporting results. Handwritten notes were taken, but there was no audio recording of the conversation. The focus group lasted approximately 40 minutes.

Participants

All five participants were male undergraduate electrical engineering students currently enrolled in EE 215 on the University of Washington campus. It was felt that these students would be able to provide a unique perspective on the online course materials because they were familiar with the content and were able to compare their in class experience with the online course.

RESULTS

The focus group addressed the following questions developed by the OEA in conjunction with the UW EDGE Director and the distance learning designer. The semi-structured questions were used to stimulate conversation among group members.

- ***Does the site function well? Do links work? Do animations play correctly?***

Participants reported that the site animation worked correctly and that they enjoyed this aspect of the site compared to their in-class demonstrations. Unfortunately, the URL for the main page was not working as planned, and there were technical difficulties with the site. Students had to manually key-in the lesson number in the URL each time they wished to access a lesson, which should have been a point-and-click process.

Participants believed that functioning links are very important for optimal site performance. One student noted that there was no link at the bottom of each page that redirects DL students to the top of the page to avoid scrolling. Students also reported that not all of the links were working, but dismissed this problem as they were aware that the site was still under construction.

- ***Is the site navigation clear and consistent? Were you able to move easily through the lessons?***

Students thought the site could be better organized by providing a table of contents and specific subject terms that correspond to each lesson. This table of contents would allow to students to move directly to the lesson of interest. They could then move to lesson terms and assignments quickly from both the table of contents and the actual lesson using links. Students believed that each lesson

should provide navigational links to other parts of the site in an effort to save time. This would allow them to use the mouse less frequently for scrolling.

- ***Did the animations add meaning, clarify concepts, and extend your thinking OR did they distract you and not help very much? Which ones were most helpful and why?***

Students responded positively to the animations included in the lessons they reviewed. Overall, the students thought the animations enhanced the functioning of the site. They believed that these were fun and a good way to teach concepts.

- ***If you were to design a web-based version for this course, what else would it include?***

Students suggested that an email link to the professor would facilitate student learning. They also suggested an exercise at the end of each lesson that included 20-30 problems and supplied answers and details of how to approach each question. All of the students wanted a thorough summary of key points and practical exams at the end of each lesson.

Students suggested an e-post format where they could send ideas and questions to a message board and discuss difficult concepts with other students taking the DL class, similar to a chat room.

- ***Did you like using the online course materials? How did the experience differ from being in class? (both positive and negative differences)***

Students expressed a good deal of concern regarding the process by which students taking this DL course would go about obtaining extra assistance on difficult concepts. They asked if each student was assigned a professor with whom to communicate throughout the duration of the course.

The students reported that they preferred an in-person lecture course as opposed to one online. The presence of a professor to answer questions immediately as they arise was one reason cited for this preference. Another reason for this was the interaction with the professors and other students and their enjoyment of listening to the lectures in class and seeing the professor in person.

Students expressed concern over the possibility of getting stuck on a concept in the DL course and having to wait several days to receive clarification from an instructor. They also mentioned that there is no way to tell on the website what the most important concepts are for each lesson.

- ***Is the material consistent with what you learned in your on-campus course? Did you notice any important material missing that was included in the on-campus course?***

Students varied in their perceptions of the pressure analogy used in the first lesson. One student liked it, but another thought it would confuse students. Since the website did not contain a definition for this concept, they believed this would be important to include.

Students pointed out that the bottom of the first lesson included a link to a lab. They were surprised that the lab followed the same format as their on-campus course and were concerned about how the lab process would operate for DL students since their on-campus labs consist of group collaboration and teamwork.

Students also noted that for the questions that asked about number of nodes in Lesson 2, the pop-up answers did not make sense.

Another student concern was that Kirchhoff's Law was cited several times, but there was no definition given to explain the concept. They thought they would need more information to fully understand the concept.

- ***What did you think of the writing style? What did you think of the informal comments that were included? Did you find these helpful, distracting, or difficult to understand?***

Some students found that the writing style overall was too basic or simple. One student mentioned that the lesson text kept using the term "this is obvious" and found this wording offensive. "Repetition," "beating around the bush," and "muddled" was mentioned when the subject of writing style was discussed. Other students were indifferent to the writing style and did not necessarily notice the informal language used in the text. Some students felt that the writing style in Lesson 2 was confusing due to the fact that sentences were choppy and the material presented did not seem to flow well.

- ***How did the pacing of the lessons feel? Are the lessons too long or too short?***

Students said it would take them 15 minutes to read through a lesson, which they believed was equivalent to two lecture classes. This made them feel as though they were missing critical thinking and learning opportunities. Another student said that he would actually take more time than an in-class lecture to absorb the online material and read it for understanding.

- ***Would these materials be sufficient to learn from if you did not attend class?***

Students believed that the online materials would be sufficient for learning, although not an optimal learning environment. They wanted to know if a textbook would be assigned for use with the online materials; they did not notice the textbook listed on the syllabus. They thought that the addition of a textbook and practical exams would be necessary for optimal learning through a DL course. It was not clear to students if the DL course would include exams and how this would be coordinated.

Students also stated that they believe they learn more from interacting with their fellow students than they do from a professor. They were concerned with how such group learning would take place in the DL environment. They also stressed the importance of DL students getting quick responses to their questions, just as they are able to get in an on-campus course, in order to be able to move through the material.

- ***Did you find any typos or mistakes?***

One student remarked that in Lesson 1 the diagram for the VCVS, voltage controlled voltage source, was incorrect.

A student also noted that in Lesson 1 the 4th diagram relating to passive sign convention had a mistake in it.

Several students noted that the lesson that discussed currents changing directions contradicted information they had read in their textbooks.

- ***Other issues addressed by participants:***

Students believed the online lessons were similar to their lecture notes. They also felt that a textbook is an important learning tool for the online material covered.

Students also wanted to know if it would be possible to videotape the lectures so that DL students could view them.

CONCLUSIONS

- Students want to have control over the flow of information as they learn. It appears that wherever possible, students want to be able to click on an important term and get a definition. They also want to be able to skip to the place in the text where the term is used. The students suggested including a table of contents to ease navigation. They wish to avoid scrolling through the site as much as possible.
- Overall, the students observed that the site animation worked correctly and they enjoyed using it when reviewing the material.
- Students felt that exercises at the end of each lesson with explanatory notations should be included.
- Students were very concerned that DL students would have the benefit of group learning (whether through an online discussion or other means) and that they have access to a professor to receive prompt feedback.
- These students seemed to prefer in-class learning to the online materials. This perception might be because of a lack of experience with distance learning courses.
- It is important to note that the focus group included only five students, and these on-campus students' views may not be representative of DL students. On campus, 4-year college undergraduates may be more accustomed to group interaction and DL students may be more comfortable with less interaction.

RECOMMENDATIONS

- It would be beneficial to have the website proofread in order to identify spelling and grammatical errors as well as broken links and other site options that could impede student learning. This would aid in smoothing navigation through the site. Given that the OEA researchers were impressed with the insights and maturity of the undergraduate reviewers, it might prove beneficial to hire undergraduate reviewers to proof the DL materials.
- EE 215 professors also should review the website content for accuracy. The OEA researchers were not knowledgeable of electrical engineering concepts and could not judge the accuracy of students' responses concerning EE content.

- A priority is to make sure that DL students feel connected to an instructor and interact with other students. Possibilities for interaction include online discussions, e-post, chat rooms and interactive projects.

APPENDIX

**PANDORA
EE215 Student Review**

November 7, 2001

Things to Focus On

Does the site function correctly?

- ✓ animations
- ✓ links
- ✓ clear and consistent navigation

Is the content clear?

- ✓ writing style and clarity
- ✓ lesson length
- ✓ typos and mistakes
- ✓ animations

Is the content complete?

- ✓ Do you notice any important material missing that was included in your campus course?
- ✓ Are there other things you would like to see included?

Notes: