Work in Progress - A Study of the Effect of Instructional Media in an Undergraduate Electrical Circuits Course

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Abstract - Studies have demonstrated that instructional media play an important role in instructors’ teaching and students’ learning. The purpose of this study is to assess the students’ preferences for different instructional media and the impact of different instructional media on the students’ learning and course-related behavior in an undergraduate electrical circuit’s course. The instructional media under study are: Computer-based PowerPoint presentation, whiteboard only, combination of PowerPoint and whiteboard and combination of printed handouts and whiteboard. In this study, nine sections of Introduction to Electrical Circuits sections were taught by 6 instructors using different instructional media. All the instructors used a common syllabus, labs, homework, and tests. Two midterm exams and one final exam were used to assess the learning effectiveness of different instructional media. At the end of the quarter, a questionnaire was collected from participating students to measure their preference for the instructional media. To understand the course related behavior, each of the instructors were asked to assess their students’ behavior in terms of attendance, amount of classroom interaction, percent of homework completion and web logins.

Index Terms – Instructional Media, PowerPoint, Students’ learning

INTRODUCTION

In the last 15 years, PowerPoint has become more popular in college classrooms [1]-[4]. Many professors still prefer the traditional “chalk-and-talk” lectures. Although there has been much discussion concerning using PowerPoint in lectures [5]-[8], there is limited evidence to support the positive impact of a PowerPoint presentation on the student’s learning, attitude and his/her course-related behavior (attendance, classroom participation and so on). Few studies exist to show the benefit of combining PowerPoint with traditional whiteboard lectures and reaping the benefit of both of them. One advantage of using PowerPoint is that it saves the students’ time in taking notes so that the instructor can cover more material and examples in the class. An alternate way is to give the students printed handouts in class. This study will focus on the following four instructional media and assess the effectiveness of them:

1. Whiteboard only (The instructor uses the whiteboard mainly and doesn’t use any multimedia equipment. No printed handouts are given for most of the lectures.)
2. Computer-based PowerPoint presentation only (The instructor gives PowerPoint presentations in lectures and rarely writes on whiteboard.)
3. Combination of PowerPoint and whiteboard. (The instructor uses PowerPoint for key concepts and principles but whiteboard for examples.)
4. Combination of printed handouts and whiteboard. (The instructor uses the whiteboard for examples and gives the students a copy of printed handouts which contains the basic principles and problem statements)

The study is expected to run for a total of two years and the final results will include data for more than 200 engineering students who completed the electrical circuits course.

PRELIMINARY RESULTS

The study was started in fall 2007. At the end of the quarter, 134 students completed a questionnaire which is used to measure their preference for the instructional media. The students were asked to rate their preference for each of the four instructional media based on their experience in the electrical circuits course as well as other courses which they are taking or have taken. 5 is the highest rating and 1 is the lowest rating. The result of the survey showed that students rank their preferred medium choice, in order of most preferred to least preferred as: Combination of printed handouts and whiteboard (average score: 4.15), Combination of PowerPoint and Whiteboard (average score: 3.87), Whiteboard only (average score: 3.23), and Computer-based PowerPoint presentation (average score: 1.91). FIGURE 1 shows the distribution of the students’ rating scores. Among the four instructional media, the two combinational choices received better scores than either PowerPoint only or Whiteboard only.
To understand why the students are in favor of a specific instructional media, the questionnaire also contains some items that assessed the students’ attitudes towards the instructional media. Responses were on a 5-point scale, where 5 indicated strongly agree and 1 indicate strongly disagree. Table I shows five sample questions and the average scores of the students’ responses. The survey results showed that the students like having a copy of the handouts and it makes their notes more organized.

Table II shows the average students’ grade corresponding to different instructional media that is used by the instructor/s. Regardless of the students’ preference, their grades on classroom assessments indicate that there was no significant difference in learning due to the type of instructional media used.

**REFERENCES**


[8] Robert A. Bartsch and Kristi M. Cobern, “ Effectiveness of PowerPoint presentations in lectures”, *Computers & Education, Volume 41, Issue 1, August 2003, Pages 77-86*