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ALIGNING TEACHING STRATEGIES WITH AVAILABLE RESOURCES

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Abstract

In this paper we report on our experiences from aligning teaching strategies with available resources when constantly redesigning an introductory course to business information and communication technologies at a North American university. The examination results of 148 students have been analyzed to better understand the impact of redesigning the course in a way that uses fewer university resources. We have managed to adapt our teaching strategy and to create a learning environment that achieves comparable learning outcomes without jeopardizing quality.

Keywords: Teaching strategy, learning outcomes, computer-based learning, resources, education

1.0 Introduction

In 2008 members of the Information Systems faculty at a North American university redesigned its introductory course to business information and communication technologies for first-year students. The new course design placed the students in the middle of the learning experience. This was achieved by an explicit teaching strategy that focused on actively intertwining theory with practice. Further a range of topics were covered to introduce new business students to the multifaceted subject of information systems.

Although the course received much positive feedback from students, it soon materialized that that it was too expensive to run. With several hands-on elements, training sessions, and assignments, the course was rather resource intensive. Management quickly perceived it as too resource intensive. As a consequence parts of the course needed to be redesigned to account for the demands of making it less

expensive to run. These restrictions required a redesign to align our teaching strategy with available resources.

In this paper we account for our choices to align our teaching strategy with available resources. We describe and analyze the results of these choices by evaluating the students' learning outcomes. We show that over the years we have managed to adapt our teaching strategy and to create a learning environment that achieves comparable learning outcomes without jeopardizing quality.

The remainder of the paper is organized as follows. In the next section we provide a brief overview of the introductory course to information and communication technologies that we have redesigned and taught. This is followed by a description of the modifications made to how the course was organized to align it with available resources. The methods used for measuring, collecting, and analyzing data are given and the paper concludes with a discussion of the findings.

2.0 The course

The curriculum for first year students in a Bachelor of Commerce program at a North American university includes a compulsory introductory course to business information and communication technologies. The course aims to facilitate the development of management and analytic skills using modern information and communication technologies in organizations. It focuses on breadth rather than depth, allowing the students to get familiar with a number of different areas of business.

Previously the course was a programming course for business students, and it focused on solving business problems using computers. By 2008, the content of this course was deemed to be inappropriate for general business students, and the course was completely redesigned, covering the latest technologies used in business (Ramirez, Hine, Ji, Ulbrich, & Riordan, 2009; Ramirez, Ji, Riordan, Ulbrich, & Hine, 2010). The redesigned course was introduced in the fall term of 2008. It requires three hours per week of lectures and one hour per week of tutorials in a computer laboratory to gain practical skills. These laboratory sessions are conducted by Teaching Assistants (TAs).

The course assessment consists of four assignments, three quizzes, one media report, a midterm assessment, and a final examination. The assignments are used for both learning and assessment (Biggs & Tang, 2011; Newby & Nguyen, 2010). From a learning perspective, their purpose is to allow students to develop skills that will help them not only in their studies but also later in their career. They also advise students about their current standing at a certain point in time, allowing them to improve/adjust their learning process. Formative assessment feedback was given on the assignments based on the set criteria specified and so that student can understand where they are on the learning curve and what they should be doing to improve themselves in the subject or to attain the next level, while the summative assessment feedback on the exams would be the accountability measure that establishes whether or not the students have the skills necessary to pass the course (Anglin, Anglin, Schumann, & Kaliski, 2008; MacLellan, 2001).

The first assignment deals with the use of information to solve identified problems. Assignment 2 helps with the development of skills in using social software to collaborate with other people within a business. The third assignment is about problem solving using Microsoft Excel. The fourth assignment is a stock-market group project. The quizzes are held in class, and cover topics from the lectures and readings. The media report is a group work based on a current news report and presented in class. The final examination has two components: a computer-based test that involves using Microsoft Excel to solve business problems, and a traditional paper-based examination covering the remaining parts of the course.

The course as a whole is integrated, but some of the components are more closely linked than others. This applies particularly to Assignment 3 and the Microsoft Excel test of the final examination. The third assignment is designed to enhance the students' problem-solving skills by giving students opportunities to use Microsoft Excel to solve specific business problems. Although such a skill has been viewed as a rather tangential skill related to the strategic role of information systems (Ives et al., 2002), it is still widely considered important as to learning about productivity tools (Firth, 2008). To develop these skills, students were given four separate mini cases in Assignment 3. For each mini case students were required to identify related business

problems, potential solutions to the problems, and then implement their solutions using Microsoft Excel. To facilitate this, TAs run computer laboratory sessions to allow students to gain experience through hand-on exercises. In addition to the hands-on labs, instructors give lectures on problem-solving concepts and methods using Microsoft Excel. The in-class material covers amongst others statistical analysis, relational and logical operations, what-if and sensitivity analysis.

The assignments are marked by TAs, except Assignment 4 that is marked by the instructors. Marking in all cases follows a grading rubric that is available to students when the assignments are posted online at the beginning of the course. This means that the students know exactly from the beginning of the course what is expected in each assignment. The Microsoft Excel component of the final examination, referred to as the Excel Skills Test, covers material similar to that of Assignment 3.

3.0 Teaching strategies

Over the years three different teaching strategies were applied to deliver the Microsoft Excel component of the course to the students. We refer to the three periods as phases in our account below and outline the impacts on Assignment 3 and the Excel Skills Test in particular.

3.1 Phase 1

The course was run as described above. During that time, the Excel Skills Test was conducted in several consecutive sessions in the university's computer laboratories. To minimize the possibility that students would leak the exam questions, each Excel Skills Test session used tests comparable in difficulty but not identical to each other.

3.2 Phase 2

After running the course in this way for three terms, the university management announced that the course was using too many resources. In particular, they stated that the use of TAs was not in proportion with other courses and we were asked to reduce TA hours.

Grading Assignment 3 was a very cost intensive TA task (measured in TA hours used for grading). Since we did not see much chance of redesigning this part of the course at such short notice, we decided to adapt a teaching strategy that has been applied by other universities. Namely, we put more responsibility on the student and encouraged more self-study.

In this phase we kept Assignment 3 in the course outline, but we made it optional. We stressed to the students the importance of this assignment and that it would help them prepare for the Excel Skills Test. However, we were afraid that the new design might negatively influence the learning outcomes and had mixed feelings about this particular design choice. It certainly would satisfy management, but what about the students?

3.3 Phase 3

We ran the course as described in Phase 2 with Assignment 3 for three terms, but as it was optional, we had no idea of how many students actually did it. We strongly believe that testing their skills makes them learn better, so we had to find a way that would allow us to reintroduce Assignment 3 without using any TA resources. This could be done if we could automate the marking of the assignment. For this purpose we evaluated different platforms and the result is that we adopted MyITLab (www.myitlab.com), which, as stated previously, is a platform for online training, learning, and assessment for Microsoft Office Applications. We now made Assignment 3 compulsory again, requiring students to use MyITLab to complete it, so that it can be graded automatically (Napier, Dekhane, & Smith, 2011; Speckler, 2010).

4.0 Methodology

4.1 Sample selection

The population of interest for this study consists of all students in a particular introductory course to business information and communication technologies at a North American university. Because some of the design changes to align our teaching strategy with available resources needed some time to implement, we decided to

eliminate any potential distortion in the results by excluding results other than from the winter terms. Any teething problems with a new design could usually be resolved during the fall, and as a result the winter term better represented stable design changes.

In our study we included only freshmen. In practice, few sophomores, juniors, and seniors are taking this course. We chose to exclude these students because the course is designed and meant to be an introductory course that should be taken during the first year of university studies. Most of the students at a higher level had taken the course before and retaken it to improve their results. If we had included those students, average values would probably increase.

The population used for this study thus consists of those students who met the following criteria: students (1) were freshmen, (2) completed Assignment 3 when it was mandatory, (3) completed the Excel Skills Test, and (4) took the course in one of the winter term sessions between 2009 and 2011. The sampling frame was obtained from official records (grade books). The final sample consisted of 148 freshman-level students (43 from Winter 2009, 62 from 2010, and 43 from 2011).

4.2 Measuring the effectiveness of teaching strategies

Considerable debate has ensued regarding the most appropriate method of assessing the effectiveness of a teaching strategy because of the multi-dimensional nature of teaching. Looney and Akbulut (2007), for example, have accounted for various approaches, including measuring the various dimensions of teaching and subsequently evaluating their effects on student learning (referring to Feldman, 1997). Although different approaches have all their supporters and detractors, scholars generally agree that effective teaching cultivates student learning (Looney & Akbulut, 2007). Measuring student learning with the help of formal tests is a widely accepted and applied procedure in higher education (Biggs & Tang, 2011). We therefore follow Looney and Akbulut's (2007) suggestion and use learning outcomes as proxy for measuring the effectiveness of a teaching strategy.

Learning outcomes were measured through assessing the students' performances in the Excel component of the final examination, the Excel Skills Test. Learning

outcomes were assessed by applying common marking rubrics. Applying these rubrics helped in establishing similar grading rules and results when manually marking. Points were assigned on the basis of a fine-meshed grid that allowed us to record results on a scale that is close to a ratio scale.

5.0 Results

5.1 Descriptive statistics

Table 1 summarizes the descriptive statistics; sample size, mean, and standard deviation for the Excel Skills Test for Winter 2009, 2010, and 2011.

	Excel Skills Test		
	Sample size	Mean	Std. deviation
Winter 2009	43	49.8	30.5
Winter 2010	62	45.4	27.9
Winter 2011	43	54.8	22.7

Table 1. Descriptive statistics for scores on Excel Skills Test

5.2 Excel Skills Test

Independent samples *t*-test were carried out to compare the means of the Excel Skills Test scores for each of the terms: Winter 2009, 2010, and 2011. Table 2 shows that the mean for the Excel Skills Test dropped to 45.4 in 2010 from 49.8 in 2009. As aforementioned, a drop was expected, but turned out not being significant ($p = .449$). There was a not significant increase ($p = .072$) in the mean from 45.4 in 2010 to 54.8 in 2011. Comparing the change in the means between 2009 and 2011 shows a not significant increase ($p = .392$) in the mean from 49.8 to 54.8.

Mean 2009	Mean 2010	Mean 2011	<i>t</i>	<i>p</i>
49.8	45.4		-0.76	0.449
	45.4	54.8	1.82	0.072
49.8		54.8	0.86	0.392

Table 2. Comparison of means of scores on Excel Skills Test

6.0 Conclusion

In this paper we have described the modifications in the design of an introductory course to business information and communication technologies. Changes became necessary because of restrictions in available university resources. The original course had a mandatory Excel assignment marked by TAs. This assignment was made optional because of financial resource constraints, although students were encouraged to do it. The assignment was reinstated as being mandatory when MyITLab was adopted. The course has a summative assessment of a final examination which included an Excel Skills Test, which is based on the Excel assignment.

It was found that the difference in the means of the marks obtained by students in the Excel Skills Test using the three approaches were not significant, although there was a drop in the mean when the assignment was optional. This could be because some students did not bother with the assignment, and this affected their performance in the Excel Skills Test.

The most important finding is that the difference in the means for the Excel Skills Test marks between 2009 (when the assignment was marked by TAs) and 2011 (when MyITLab was used to mark the assignment) was not significant. This would imply that technology to assist learning can help universities to do more with less. It shows that we can achieve comparable learning outcomes with different learning strategies, and progress towards a lower-cost teaching strategy without jeopardizing quality.

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