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Relevance of Student Resources
in a Flipped MIS Classroom

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Abstract

Flipped classrooms are gaining popularity in various educational settings as proponents report several benefits. In order for flipped classrooms to be successful, students must take responsibility for certain assignments outside of class time. In this study, Management Information Systems students were to learn textbook material by reading the chapter or lecture notes and/or listening to the audio lecture in preparation for a quiz at the beginning of class. Class time was then used for learning activities. Positive relationships were found between reading the textbook, reading the lecture notes, and time spent preparing for the quiz and the dependent variable, quiz grade. Discussion of results, limitations, and suggestions for future research are also included.

Keywords: flipped classroom, textbook reading, active learning, quizzes, learning styles

1. FLIPPED CLASSROOMS

Interest in flipped classrooms seems to be growing even though no established research base demonstrates that student learning is always positively impacted (Goodwin & Miller, 2013). A flipped classroom can be described in multiple ways. Often instructors may record lectures and post them online for students to view outside of class time (Goodwin & Miller, 2013). In addition, flipping a classroom allows class time for interactive engagement, peer teaching/learning, and collaboration during what was once the traditional lecture time in class (Berrett, 2012; Carpenter & Pease, 2012). Other reasons for flipping a classroom include students can work at their own pace, the availability of new technologies that support flexible learning, more student-teacher interaction and the more effective and creative use of classroom time (Fulton, 2012; Goodwin & Miller, 2013).

Some instructors pursue flipped classrooms as a way to transfer some responsibility for student learning back to students. Students in a flipped classroom are expected to view lectures or study material outside of class time (Berrett, 2012). A flipped classroom might increase student responsibility for learning as well as provide the avenue for class time active learning where students tend to learn more (Carpenter & Pease, 2012).

Bergmann and Sams (2012) recommend beginning a flipped classroom journey with one question: What's the best use of face-to-face time. The Management Information Systems (MIS) course at a Midwest regional state university was flipped to add active learning activities to the classroom. PowerPoint files with lecture notes and audio lectures had been created and posted for the online MIS class, and the links had been added to the course web sites for the sections that met on campus. Rather than lecturing over the PowerPoint slides in class, instructors decided to use class time to lead discussions over relevant topics, guide research activities, and facilitate collaborative learning tasks. Active learning allows students to engage with the material through discussion, application of prior knowledge, and connections

between past experiences (Ueckert & Gess-Newsome, 2008).

2. ASSIGNMENTS

In order to use class time for active learning exercises, students need to complete assignments outside of class time. The assignments included reading a chapter from an MIS textbook, listening to an audio lecture, and/or reading the instructor lecture notes. Literature shows that students do not read for a variety of reasons including lack of motivation, poor study habits, time demands, and instructor behavior (Starcher & Proffitt, 2011). While educators are often frustrated with the low rate of reading completion, they often play a role in the poor completion rate. Some describe students' noncompliance with reading as part of a vicious cycle where instructors assign reading and then recognize that students don't complete it so they end up covering the material in class, thus reinforcing the idea that students do not need to complete reading assignments (Brost & Bradley, 2006). The quantity of reading may influence this cycle. If students feel like they have been assigned too much reading, they may look for a summary or wait for class to hear a synopsis (O'Connor, 2012). In another study where students were to read MIS textbook chapters, O'Connor (2012) found that the average number of minutes and the interest in the reading material decreased from the beginning to the end of the semester. Getting students to read the MIS textbook appears to be a challenge.

Quizzes seem to be the most commonly used assessment to motivate students to complete reading assignments, producing significantly higher rates of student completion of reading assignments. (Starcher & Proffitt, 2011). Carney, Fry, Gabriele, and Ballard (2008) found that quizzes motivated students to learn the material.

Instead of reading the textbook, students in the MIS course could use other teacher-generated materials to learn the most important content covered in the textbook chapters. The course instructors divided the textbook chapters and created a PowerPoint file with instructor notes for each chapter. To comply with recommended Quality Matters standards (for online classes), the instructor notes and the audio lecture used the same words to provide equivalent alternatives for auditory and visual content.

Each audio lecture was approximately 10 minutes since research shows learners tend to check out after about 10 minutes (Goodwin & Miller, 2013). Another reason for providing multi-modal content is to recognize the role of various student learning styles (Birch, 2006). Students were encouraged to consider how they learn best and then use the study material that matched their learning style. Understandably the lecture notes and audio lecture did not have the same level of detail as the textbook chapters.

3. HYPOTHESES

The purpose of this study was to learn what support materials (textbook, teacher notes, and audio lecture) were positively related to the chapter quiz grades. In addition, the researcher wanted to know if simply briefly reviewing the chapter was enough preparation to do well on the quiz and whether greater amounts of time spent with the chapter material was associated with higher quiz grades.

The hypotheses for this study stated in null form include:

H1: There is no difference in quiz grades between subjects who read the textbook chapter and subjects who did not read the textbook chapter. Students are motivated to complete reading assignments when it impacts their grade (O'Connor, 2012). This hypothesis will test whether reading the textbook chapter impacts their quiz grade.

H2: There is no difference in quiz grades between subjects who read the instructor lecture notes and subjects who did not read the instructor lecture notes. These notes are generated for the audio lectures. Management Information Systems instructors want to know if the use of these notes positively impacts quiz grades.

H3: There is no difference in quiz grades between subjects who briefly reviewed the textbook chapters and subjects who did not briefly review the textbook chapters. This hypothesis tested to see if students who quickly looked through the chapter did better than those who did not. This option was added to the survey for those students who did not read the chapter or notes or listen to the lecture but did review the textbook before the quiz.

H4: There is no difference in quiz grades between subjects who listened to the audio lecture and subjects who did not listen to the audio lecture. Hypothesis results can help instructors know if recording the lectures is a worthwhile activity.

H5: There is no difference in quiz grades between subjects who prepared for the quiz and subjects who did not prepare for the quiz.

H6: There is no difference in quiz grades between subjects who prepared for the quiz for varying amounts of time. Hypotheses 5 and 6 could help validate whether the preparation outside of the classroom as expected in a flipped class has a relationship with quiz grades.

4. METHOD

Students in spring 2013 MIS sections were invited to participate in the study. The MIS course is a junior-level course in the common professional component for the business school. Students in the course are accounting, finance, economics, marketing, management, business education, business technology, international business, or management information systems majors. All students had copies of the course textbook since the university has a textbook rental system.

Students electing to participate in the study were offered a total of 10 points extra credit for completing all of the surveys. Students were assigned the chapters the class period before the chapter was covered in class. The same lectures and notes were available to students in all sections of the course. At the beginning of the next class period when the chapter was to be covered, students took a 10-question multiple-choice and true/false quiz over the material. The questions came from a test bank developed for all sections of the MIS course. Following the quiz, participating students completed a survey (Appendix A) regarding their preparation for the quiz. Students were identified by their student number which they wrote on each survey. They placed completed surveys in an envelope so instructors could not see the student responses to the survey, ensuring that student grades were not impacted by their responses to the survey.

A total of 83 students enrolled in the spring 2013 MIS campus-based sections agreed to participate in the study. While the MIS course is

also offered online, the data in this paper only includes students who completed the course on campus. All nine chapters of an MIS textbook were covered in the class for a possible 747 surveys.

5. DATA ANALYSIS

A total of 660 surveys and quiz scores were used in the data analysis. Two classes had technical issues which impacted one quiz so the number of surveys and quiz scores was slightly fewer than the 747 expected.

In this study, the quiz grade was the one dependent variable. Quiz grades were grouped by letter grade, A, B, C, D, and F. The responses to the first 5 questions were grouped into two groups as subjects answered yes or no to indicate whether or not they participated in the activity. A chi-square test of independence was performed to examine the relation between the quiz grades and the use of the various study aids. In addition, a phi or Cramer's V test was computed to determine the strength of the association between statistically significant variables. A phi coefficient was used on the 2 x 2 variables while Cramer's V was used on the table larger than 2 x 2. Since sample size also influences significance, the additional test helped confirm the existence of a relationship (Muijs, 2004).

H1: There is no difference in quiz grades between subjects who read the textbook chapter and subjects who did not read the textbook chapter. There was a significant relation in these two variables, X^2 (4, N = 660) = 13.16, p = .001, Phi = .14. The null hypothesis is rejected, and the alternative hypothesis that higher quiz scores are associated with reading the chapter is accepted.

H2: There is no difference in quiz grades between subjects who read the instructor lecture notes and subjects who did not read the instructor lecture notes. There was a significant relation in these two variables, X^2 (4, N = 660) = 9.52, p = .049, phi = .12. The null hypothesis is rejected, and the alternative hypothesis that higher quiz scores are associated with reading the lecture notes is accepted.

H3: There is no difference in quiz grades between subjects who briefly reviewed the textbook chapters and subjects who did not briefly review the textbook chapters. The null

hypothesis could not be rejected as there was no significant difference between the group who briefly reviewed the chapter and the group who did not, X^2 (4, N = 660) = 2.97, p = .563.

H4: There is no difference in quiz grades between subjects who listened to the audio lecture and subjects who did not listen to the audio lecture. There was a statistically significant relationship between the variables, X^2 (4, N = 660) = 20.29, p = .000, phi = .18 so the null hypothesis is rejected. The cross tabulation table showed the statistically significant relationship existed between listening to the audio lecture and lower quiz grades.

H5: There is no difference in quiz grades between subjects who prepared for the quiz and subjects who did not prepare for the quiz. This hypothesis tested to see if those students who did nothing to prepare for the quiz performed the same as those who did some preparation. There was a significant relation in these two variables, X^2 (4, N = 660) = 23.98, p = .000, phi = .19. The null hypothesis is rejected, and the alternative hypothesis that preparing for the quiz is positively related to the quiz grade is supported.

H6: There is no difference in quiz grade between subjects who prepared for the quiz for different amounts of time. Students selected one of the following choices for each chapter quiz: 0 minutes, 1-15 minutes, 16-30 minutes, 31-45 minutes, 46-60 minutes, or more than 60 minutes. There was a significant relation in these two variables, X^2 (20, N = 660) = 73.67, p = .000, Cramer's V = .17. The null hypothesis is rejected, and the alternative hypothesis that preparing for the quiz is positively related to the quiz grade is supported.

The Phi coefficient and Cramer's V score for each statistically significant relationship was between .1 and .3 indicating a modest relationship (Muijs, 2004).

6. DISCUSSION OF RESULTS

Students in this study read the assigned chapter prior to the class when it was discussed 47% of the time. Phillips and Phillips (2007) found that only 17% of students in an introductory accounting class read the assigned chapter before it was discussed in class. The percentage in this study was higher than expected but may be explained by the short chapters in the

textbook as chapters are only approximately 20 pages each. In addition, the quiz at the beginning of the class period likely served as an incentive to read the chapter. Reading the lecture notes was also positively related to the quiz score. Only briefly reviewing the textbook prior to the chapter quiz did not positively impact the resulting quiz grade. Instructors can tell future MIS students that the use of the textbook and lecture notes were associated with higher quiz grades while only briefly reviewing the textbook or not preparing at all were not.

Surprisingly students in the study listened to the audio chapter only 18% of the time. The low audio usage rate was probably a factor in the unexpected direction of the statistical results. Given the expectation that an audio alternative be made available for students who need it, instructors will probably continue to provide this resource.

Students who spent more time preparing for the quiz earned higher quiz grades. This finding was expected and helps to validate the study aids and the quiz questions.

7. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Wording of a few items on the survey could be improved for future studies. The item "briefly reviewed the chapter" could have been interpreted by the students in various ways. Some students who read the chapter in its entirety may have also indicated that they briefly reviewed the chapter, perhaps right before the quiz. Others who did not prepare prior to class may have also indicated they briefly reviewed the chapter right before class started. The last question asked students to select a category related to the time they studied; this limited the data analysis to categorical tests. Another study could ask them to record the number of minutes they prepared. The questions on the quiz came from a test bank and may not have been the best measure of student learning.

Future research could examine other methods that students use to prepare for class assessments. One student shared with the researcher that students use online resources not provided by the instructor to prepare for the quiz. For example, on the web site quizlet.com, students can type in a course name and see if

another student has created study materials for that class at their school.

Other studies that have examined student reading have used learning journals to get a better idea of exactly how students read the material (Phillips & Phillips, 2007). This could be done to see if students are reading at a surface level to memorize concepts or at a deeper level.

The reason for flipping the MIS classroom was to add collaborative, active learning activities to the class. The activities done in class were directly related to the essay questions on the next exam. A future study could examine student responses on those essay questions to determine if the learning activities are effective.

8. CONCLUSION

The results of this study have indicated there is value to reading the textbook and using the lecture notes provided by the instructor to learn material necessary to do well on the quizzes. While lecturing over the material in class might be the typical, traditional way to teach material, flipping this classroom increased student expectations, a necessary shift in college classrooms (Carpenter & Pease, 2012). Engaging students in meaningful dialogue over current events, scenarios, and research related to the course content can enhance the student classroom experience.

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Appendix A

Management Information Systems
Chapter Preparation

Snumber: _____

Chapter: 1

I prepared for this chapter quiz by doing (check **ALL** that apply):

_____ Listened to the audio lecture
_____ Read the textbook chapter
_____ Read the online instructor lecture notes
_____ Briefly reviewed the chapter
_____ Did not prepare for this chapter

The amount of time spent preparing for this chapter quiz is (check **ONE**)

_____ 0
_____ 1-15 minutes
_____ 16-30 minutes
_____ 31-45 minutes
_____ 45 minutes – 1 hour
_____ More than 1 hour