Flipped Classroom: Effects on Achievement and Student Perception

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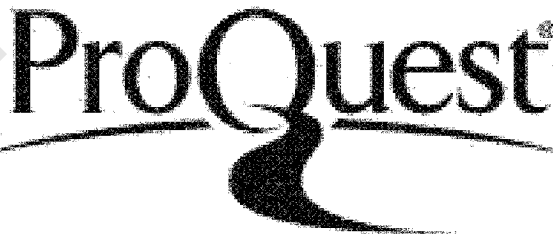
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Abstract

This action research investigated the impact on student learning and students' perceptions when instruction was delivered by the flipped-classroom delivery method. One section of Integrated II Mathematics received instruction through traditional means while another section received instruction through a flipped-classroom delivery method. Both sections received the same pretest, posttest, and set of six quizzes which were compared using independent-samples t tests. Additionally, the flipped-classroom instruction completed a survey at the end of the unit on basic trigonometry concepts. Three of the six quizzes had significantly higher scores for the students who received instruction through the flipped-classroom. Survey responses yielded no significant differences, but all scores were higher for the students who received instruction by the flipped-classroom instructional method. The study suggests some material may be better delivered by the flipped classroom method of delivery and students have an overall more positive attitude toward their learning in a flipped classroom.
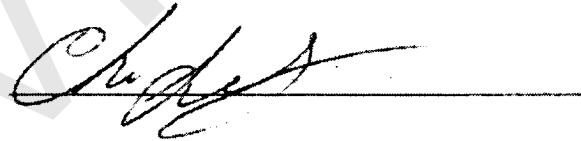
Action Research Committee

The members of the committee appointed to examine the action research of

Eric Schwankl find it satisfactory and recommend that it be approved.

Dr Debbie VanOverbeke

Dr. Debbie VanOverbeke, Chair

Chris Seiling

Chris Seiling

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Thank you to the students who participated in the study. Your willingness to participate and for those in the flipped classroom section of students for taking on a new teaching method allowed this study to happen. The experiences you have provided has allowed me grow as an instructor.

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CHAPTER 1

Introduction

The presence and increase in blended learning, and more specifically the "flipped classroom," addresses two current topics at the forefront of society at this time: increased presence of technology and the need for higher levels of student achievement in education. For this study, a flipped-classroom is the presentation of information via a prerecorded lecture and traditional classroom time used for assignments. The availability and types of technology are rapidly changing from exclusively meaning computers or calculators in an educational setting, to include smart technology and tablets. This has also changed the means in which information is delivered and when it can be delivered. As society shifts its expectations of the delivery and accessibility of information, schools must also adapt to meet these changing expectations. Additionally the last two presidential administrations have put forth measures to change education. Former President George W. Bush was instrumental in the implementation of the No Child Left Behind Act and current president Barack Obama has facilitated the Race to the Top initiative, indicating the increased national focus on education.

The use of blended learning and the "flipped classroom" address the changing expectations of society in respect to technology, as well as the possibility to increase student learning through increased social interaction when problem solving during traditional classroom time. Research has shown that students have a higher level of satisfaction with their learning experience when lessons are recorded and made available to them for review (Abrams & Haefner, 2002). In addition, research has shown that

students perceive their level of deep thinking and problem solving to be higher when blended learning has been used (Lo, Johnson & Tenorio, 2011).

Chapter 1 will include the statement of the problem, research questions, the significance of the study, and a definition of key terms. This will be followed by limitations, delimitations and assumptions made in the study as well as the organization of the study.

Statement of the Problem

This study investigated the effect of blended learning on students' achievement levels and students' perceptions of their learning in a rural Southwestern Minnesota high school.

Research Questions

The researcher answered the following questions within this action research study.

1. What is the impact on student achievement, as measured through a pretest, posttest and quizzes, when blended instruction is used in teaching mathematics to secondary students?

2. What are secondary students' perceptions of their learning experience, as measured through a survey, when blended instruction is used in mathematics?

Significance of the Study

This study is important to investigate due to the increased use of blended learning, specifically at the secondary and postsecondary levels. In addition, this study will investigate the blended learning practice of presenting prerecorded lectures and using

traditional classroom time for assignments. This blended learning practice has recently become more prevalent at the secondary level.

The audience for this study is educators interested in learning more about blended learning. The results will be beneficial to teachers creating and implementing a blended learning method to increase student learning and student perceptions of their learning.

Definition of Terms

Definitions that follow have been provided to ensure clarity as it pertains to this study. The definitions include cited and researcher developed definitions.

Blended learning. Blended learning is the incorporation of traditional and online learning (Garrison & Vaughan, 2008; Thorn, 2003). Blended learning will also include the flipped classroom as one blended-learning tool.

Flipped Classroom. A flipped classroom is the presentation of information via a prerecorded lecture and traditional classroom time used for assignments.

Student Perceptions. Student perceptions will include the students perceived level of learning.

Limitation, Delimitation, Assumption of the Study

The researcher has identified the limitation, delimitation, and assumption in regards to the study conducted on blended learning.

1. The population of this study was limited to students in two Integrated II classes in southwestern Minnesota.

2. The study was limited to students who agreed to participate in the study.

3. The study assumes that the students responded to the survey honestly.

Organization of the Study

This action research is organized into five chapters. Chapter 1 addresses the problem, the research questions, definitions of important terms, the significance, and a limitation, delimitation, and assumption of the study. Chapter 2 contains a review of literature and research on blended learning as they relate to the research questions and the problem the researcher is examining. Chapter 3 describes the action research design, the instrumentation, and the data analysis procedures. Chapter 4 presents the findings of the study. Finally, chapter 5 provides a summary of the study and the conclusions, a discussion, and recommendations for practice and further study.

CHAPTER 2

Review of Selected Literature and Research

Chapter 2 provides an extensive review of literature and research related to blended learning. This chapter is divided into sections including (a) blended learning systems, (b) technology available for use in blended learning, (c) blended learning course creation, design, and implementation, (d) student perceptions when blended learning is used, and (e) research regarding the effects on achievement when blended learning is used.

According to Garrison and Vaughan (2008), "Students expect a relevant and engaging learning experience" (p. ix). There are various ways to address the expectations of students, one of which is through the use of blended learning. Blended learning is described by Garrison and Vaughan (2008) as "distinguishable by way of the integration of face-to-face and online learning that is multiplicative, not additive" (p. 7). Thorne (2003) stated "blended learning which, like its name suggests, blends online learning with more traditional methods of learning and development" (p. 2). According to Yilmaz (2010), blended learning offers the advantages of distance learning, which includes the ability to review material at anytime and anyplace, and the advantages of face-to-face learning, which includes classroom discussion and direct interaction.

Blended Learning Systems

Blended learning is the incorporation of traditional and online learning (Garrison & Vaughan, 2008; Thorn, 2003). Systems for online mathematics instruction have been broken down into two categories: Learning Management Systems and Interactive

Learning Systems (Kennedy, Ellis & Benoit, 2007). Where Learning Management

Systems are the means for instruction to be delivered, Interactive Learning Systems

deliver the instruction (Kennedy et al., 2007). Distinctions between the two exist in the

types of features they offer. Learning Management Systems facilitate the presentation of

information; provide a means of communication, grading and reporting through the use

of email; discussion sessions; and importation or creation of quizzes, and exams

(Kennedy et al., 2007). Interactive Learning Systems may offer all or some of the

functionality of Learning Management Systems, but Interactive Learning Systems also

are usually specific to a course of study and provide instruction (Kennedy et al., 2007).

By these definitions, Moodle and Desire to Learn (D2L) have the classification of

Learning Management Systems, while the product Accelus is an Interactive Learning

System. Moodle and D2L have the functionality to correspond through discussion links

and email. In addition, assignments can be posted and the instructor can provide

feedback. Moodle and D2L do not come with lessons premade. These two systems are

platforms for courses to be presented rather than providing the lessons, which is the

major difference between Learning Management Systems and Interactive Learning

Systems. In addition to the functionalities of Moodle and D2L, Accelus has lessons

provided, which defines an Interactive Learning System.

<center>**Technology Available for use in Blended Learning**</center>

McPherson and Nunes (2004) stated there are three main categories of online

learning tools which include: workstations, communication tools, and software tools.

Technology that has been used in blended learning includes but is not limited to: tablet,

internet and the web, student-created audio, teacher-created audio, social networking tools, and everyday technologies. McPherson and Nunes (2004) have indicated that "efficient and educationally sound use of these technologies needs careful planning, resourcing and support" (p. 25).

Tablet

The tablet personal computer (PC) is defined by Galligan, Loch, McDonald, and Taylor (2010) as "a laptop computer equipped with a touch-screen and a stylus to enable the user to write on or manipulate the screen" (p. 38). According to Galligan et al. (2010), disciplines such as mathematics heavily rely on the use of symbols and the use of a tablet allows the teacher to display questions and solutions which were previously created with the ability to react to student questions and record the additional details along with voice recording. At the University of Southern Queensland located in eastern Australia, 120 students were surveyed and 54 responded regarding the use of the tablet in algebra and calculus via face-to-face lecture. Of the students who responded, 98% indicated writing during lectures helped their understanding (Galligan et al., 2010). The University of Southern Queensland also used the tablet computer in conjunction with the software Elluminate Live! during 2006/2007 in algebra, calculus and data analysis delivered online. This software on a tablet allowed for immediate visibility of writing and audio which students identified in a survey as the most useful tools for understanding in the classes (Galligan et al., 2010).

Internet and Web

In addition to the tablet, the web and internet have been shown to be useful tools for the blended learning experience. According to Fulkerth (2009), the web has provided content in web-based or downloadable videos which engage students and their use should be encouraged due to this value. Computer system demonstrations have been particularly useful (Fulkerth, 2009).

Student-Created Audio and Teacher-Created Audio

Student-created and teacher-created audio can be challenging for staff but engaging to students. Fulkerth (2009) pointed out that some staff members were ashamed to admit they did not know how to create audio, but it could be done at no or low cost using Windows or Macintosh platforms and easily uploaded. Although it has been noted that creating audio has been a challenge for some teachers, benefits have been observed. In feedback obtained by Fulkerth (2009), students commented that hearing a teacher's voice was "nice". In contrast to teachers, students' imaginations were captured by the creation of podcasts and mp3 audio, but students were not willing to add the extra expense of purchasing microphones or headsets and spending time to find software to create the audio (Fulkerth, 2009).

Social Networking Tools

Social networking tools provide a link between the need to work collaboratively and the need to record thoughts and new information that is created. The need for the technology can be seen in the quote:

An essential part of learning can be described as cognitive conflicts, meaning

situations where earlier knowledge structures are not sufficient or are

contradictory to a new situation. In these situations, knowledge structures

demand updating, searching for new knowledge or an explanation in order to

assimilate or accommodate knowledge structures to respond to and work in a new

situation. (Vesisenaho et al., 2010, p. 274)

Wikis and weblogs are other tools that have been used in the blended learning

environment to store and represent information. Garrison and Vaughan (2008) have

defined a wiki as a collaborative online writing tool. Weblogs (blogs) are applicable to

some courses, but wikis have been found useful as a tool for management of knowledge

groups, or a class, when stored for discussion (Fulkerth, 2009). Vesisenaho et al. (2010)

promoted social software as a way for students to create, communicate, and actively

interact with their own material. In addition to the immediate benefits that wikis have

provided, wikis have been used to generate content that can be shared and created during

a semester and beyond seamlessly rather than ending with a paper that has been turned

into an instructor (Picciano, 2009).

Blended Learning Course

"At the heart of meaningful education experience are two inseparable elements of

inquiry – reflection and discourse" (Garrison & Vaughn, 2008, p. 31). The means of

accomplishing the task have been explored in several models and principles. In the

books, *Blended Learning: How to Integrate Online & Traditional Learning* by Kaye

Thorne and *Blended Learning in Higher Education: Framework, Guidelines and*