THE EFFECTS OF BLENDED LEARNING INSTRUCTIONAL STRATEGIES
AND THE IMPACT ON BIOLOGY END OF COURSE EXAM SCORES.

By

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Submitted to

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Submitted in Fulfillment of Graduation Requirements for

61-723 WRITING & INTERPRETING EDUCATIONAL LITERATURE AND STATISTICS
AND 61-724 FIELD STUDY

[December, 21, 2011]
ABSTRACT

In this study, a post-post pre experimental on the effectiveness of blended learning in comparison to traditional teaching styles and the impact on spring 2011 Missouri Biology End of Course Exam scores at ABC high school. There were 264 students that took the Biology EOC exam. 142 students were exposed to traditional teaching environment and 122 were exposed to a blended teaching environment using the Blackboard platform. Data collected was analyzed in one way ANOVA tests using ASP (Blackford, 2004). One way ANOVA was used during data analysis due to system errors with the ASP program. It was determined that blended learning is highly significant in comparison to traditional teaching methods on the spring 2011 Biology EOC. It is also noted that gender was found to be a significant factor on the outcome of the Biology EOC. It is recommended that future studies examine the impact gender plays on Biology EOC scores. It is also recommended that for proper set up of blended learning environments that district’s properly support teachers through staff development.
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CHAPTER ONE
INTRODUCTION TO THE STUDY

Background

ABC High School Biology End of Course (EOC) Exam scores are below state levels for students scoring proficient or advanced. Missouri state level score averages for combined proficient and advanced is 60.6% ("Missouri assessment program," 2011) for the Biology EOC Exam as reported on the DESE website. ABC High School average for proficient and advanced is 50.8% on the spring 2011 Biology EOC exam ("Missouri assessment program," 2011). In order to meet the goal of 100 percent Advanced by 2013 as mandated by No Child Left Behind (NCLB). In an effort to identify teaching best practices, this study will differentiate between traditional and blended learning classroom experiences. Currently, teachers are resistant to accept the use of blended learning as an instructional best practice. In a day and age of research based decisions, it is suggested that the effects of blended learning on student achievement on the Missouri Biology EOC.

Conceptual Underpinnings and Practices

Blended learning theory is a teaching style that works by actively engaging students in their education by using a variety of technology and face-to-face classroom best practices. Blended learning is a branch of Computer Assisted Instruction (CAI). CAI is a practice to use computers to foster the learning environment.

Statement of the Problem

The problem is that it has not been identified if in fact Computer Assisted Instruction (CAI) improves student EOC scores.

Purpose of Study
The purpose of this study is to identify the effectiveness of blended learning in comparison to traditional teaching styles. Especially in a day and age where districts are making data driven decisions to improve student achievement on the Biology EOC exam.

Research Question

RQ1: Can blended learning improve Biology EOC scores more than a traditional teaching style?

Null Hypothesis

H₀ = There is no significance that blended learning improves Biology EOC scores more than a traditional teaching style.

Limitations and Delimitations

This study is limited to post test data and no pretest. This weakness will not permit a comparison of before and post treatment results on Biology EOC score. The delimitations of this study are confined to current Biology teachers at ABC High School.

Anticipated Benefits of the Study

The benefits of this study are to identify best practices that are most effective at increasing ABC Biology EOC scores. While focusing on improving building levels EOC scores to above state average.

Definition of Terms

Blended learning teaching style as defined Bonk and Graham blended learning is defined as learning systems combining face-to-face instruction with technology mediated instruction (Bonk & So, 2010).

Computer Assisted Instruction (CAI) as defined by Encyclopedia Britannica is a program of instructional material presented by means of a computer or computer systems.
Missouri End of Course Exam (EOC) as defined by the Missouri Department of Elementary and Secondary Education, “are criterion-referenced tests that are delivered to middle and high school students when the Course-Level Expectations for a particular course have been covered. English II, Algebra I, Biology, and Government are required EOC Assessments for all students to satisfy the requirements of No Child Left Behind and the Missouri State Board of Education.”

**Summary**

In this study blended learning will be compared to traditional learning in a one way ANOVA using ABC Biology EOC scores from spring 2010 and spring 2011. In a day and age where test scores not only reflect the quality of education, it is important to continually evaluate best practices to meet the changing needs of learners in the 21st Century.
CHAPTER 2

REVIEW OF LITERATURE

Blended learning began according to Encyclopedia Britannica online, as early as the 1960’s, but began taking off in the 1970’s with the microcomputer (CAI). Computers give students instant feedback and gratification, which leads to higher student engagement through blended learning. Blended learning as defined by Penn State (2009) “a blended learning approach [as one that] combines face to face classroom methods with computer-mediate activities to from an integrated instructional approach.” This definition is consistent with Bonk & So (2010), Davidson & Elliott (2007), Balci & Soran (2009), Picciano (N.D.), and George-Palilonis & Filak (2009). George-Palilonis & Filak (2009) state that “blended learning has noted positive results.” As blended learning becomes more and more popular in the educational world literature suggests several key areas such as collaboration, assessments, podcasts, and virtual activities all which lead to an increase in student engagement George-Palilonis & Filak, (2009), Musoleno & White, (2010), Chang, Pearman & Farha, (2010), Sutton-Brady, et al, (2009), Sancho, (2006), Hochberg & Gabric, (2010).

There are several platforms that allow for blended learning to take place in today’s schools such as Blackboard and Moodle. The one used during this study was Blackboard. The Blackboard platform allows teachers to place assignments, lessons and tests online to expand learning outside the physical walls of the school. One web 2.0 tool is a Wiki. A web 2.0 tool is one that enables the learner to interact (Oliver, et al, 2010). As stated by Park (no date) a “Wiki is a technology which allows multiple editors access to a single document.” Wiki’s are a form of virtual collaboration that can take place in class or out via an internet connection. (Schaber, et al., 2010) Wiki’s can actively engage students in problem based learning as well according to
Robertson, I. (2008). The online collaboration and interaction of students in a Wiki actively engage students by allowing students to participate in group discussion. Schaber, et al (2010). Within Blackboard teachers may assess student participation and knowledge added to the project to ensure that all students are in fact actively engaged in the discussion or assignment.

Another way to monitor student progress is through the use of online assessments via Blackboard. Online assessments can give students and teachers alike instant feedback to student comprehension and knowledge. According to (Stetter & Hughes, 2011), comprehensive quizzes can be used as a baseline, during interventions and to maintenance phase of learning. By using the online test as pretests, formative assessments, and culminating summative assessments as a posttest. While Stetter & Hughes (2010) focused on learning disabilities (LD) and the use of CAI to improve comprehension of students with LD. Stetter & Hughes (2010) used story maps on the computer as a method of blended learning. The purpose of the story map was to allow LD students to visualize the story on the computer in an attempt to improve comprehension. Stetter & Hughes (2010) suggest that relying strictly on one type of CAI will not improve student comprehension. In order to increase student comprehension we can use other Web 2.0 tools such as podcasts as suggested by Sutton-Brady, et al (2009). Sutton-Brady, et al (2009) identify podcasts as a way to connect lecturers with their students. Students have the ability to download the lecture and then watch them at their convenience because they are then portable (Sutton-Brady, et al (2009).

Another way to effectively use blended learning in the classroom is through the use of computer simulations or virtual labs as suggested by Hochberg & Gabric (2010), and Sancho, et al (2006). Sancho, et al (2006) suggests that virtual labs be combined with real labs in order to insure that students learn proper lab technique. The key to all of the blended learning best
practices is to make sure that they actively engage students. In order to continue to raise scores educators must ensure that students are actively engaged as suggested by Lee, et al (2010). Teachers can use these tools to provide learning situations that can go beyond the walls of the building.

Dixson (2010) suggests that in order for online instruction to be successful “instructors need to be actively involved in the learning of students.” In order to achieve this, districts must support teachers with appropriate training (Ocak, 2010, Stetter & Hughes, 2011). Effective support a blended learning environment is important and in order to pull this off staff development must support teacher training as suggested by Ocak, (2010), Stetter & Hughes, (2011). Before a district undergoes a revamping staff development it is suggested by Robertson, (2008) that individuals should “self evaluate their technical skill level”. By performing a self evaluation as Robertson, (2008) suggests, would give districts direction into where staff needs assistance in developing a blended learning environment. Roblyer, etal., (2009) suggest that teachers should attend “training sessions aimed at expanding proficiency”. Effectively trained staff will be able to fully utilize blended learning to improve student engagement, while at the same time preparing students for 21st century, and EOC testing. A good starting point for introducing blended learning is by creating a “web enhanced environment” (Pyzdrowski & Pyzdrowski, no date). A building can continue to foster professional growth by utilizing collaboration time to share best practices and to “inspire their own ideas” (Oliver, et al, 2010). By effectively using blended learning student comprehension and engagement will lead to an increase in EOC test scores, thus helping the district meet AYP according to NCLB.
CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Problem and Purpose Overview

The problem of this study is identifying if blended learning can improve student Biology EOC Scores. The purpose of this study is to identify the best practice that is most effective at increasing Biology student EOC scores. In an effort to make data driven decisions to improve student achievement on the Biology EOC exam districts are identifying best practices that are most effective.

Research Design

The research design method used in this study is a post – post non-experimental.

Variables Used

The independent variable is teaching style. The two groups studied were the treatment group, which received a blended learning style education and the no treatment group received a traditional learning style education. The identified dependent variable is student EOC scores.

Research Question

The research question being examined is, can blended learning improve Biology EOC scores more than a traditional teaching style?

Null Hypothesis

The null hypothesis is there is no significance that blended learning improves Biology EOC scores more than a traditional teaching style. The p value less than or equal to .10 was determined to be significant and the null hypothesis would be rejected.

Study Group
The study groups used in this study were 2010-2011 Biology students from ABC High School taking the Missouri EOC exam the spring of 2011. There were 264 students that took the exam at ABC high school of these 142 students were exposed to a traditional teaching environment and 122 were exposed to a blended teaching environment.

**Data Collection and instrumentation utilized**

The data were collected in a post – treatment – post and a post – no treatment – post as stated by Messner (Class notes, 2011). The 2010-2011 student scores from the Missouri EOC were used. The data was then subjected to a one way ANOVA in a pre-experimental study using A Statistical Program (Blackford, 2004). The treatment was identified as blended learning and the no treatment group was exposed to a traditional teaching style.

**Data Analysis Strategies**

This study was a post – post pre-experimental in order to reject the null hypothesis a p value must be equal to or less than .10. The data were analyzed using the ASP (Blackford, 2004) in a one way ANOVA.

**Summary**

In an effort to answer the problem of can blended learning improve Biology EOC scores where used to identify if blended learning was more effective than traditional teaching methods. Biology student EOC scores from spring 2011 where analyzed using A Statistical Program (ASP) in a one way ANOVA.
CHAPTER FOUR
PRESENTATION AND ANALYSIS OF DATA

Review of the Research Design

RQ1: Can blended learning improve Biology EOC scores more than a traditional teaching style?

The research design method used in this study is a post – post non-experimental. Biology End of Course Exam data collected from ABC high school in the spring of 2011.

Findings

In Table 1, main effect for “instruction method” was identified ($F = 35.5, \text{Sig.} = 0.00$). The null hypothesis was rejected for “instruction method” main effect (see Table 1).

Table 1.

Summary of one way ANOVA results for “instruction method”

| DEP. VAR.: | RawScore |
|           | Factor: Instruction2method |

<table>
<thead>
<tr>
<th></th>
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<tr>
<td></td>
<td>SUM OF SQ’S D.F.</td>
<td>MEAN SQ.</td>
<td>F(1/262)</td>
<td>P-VALUE</td>
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<td>Instruction2method</td>
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<td>7784.22</td>
<td>262</td>
<td>29.7108</td>
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<tr>
<td>TOTAL</td>
<td>8839.76</td>
<td>263</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Table 2, main effect for “gender” was identified ($F = 2.89, \text{Sig.} = 0.09$). Alpha established at 0.10. The null hypothesis was rejected for “gender” main effect (see Table 2).

Table 2.

Summary of one way ANOVA results for “gender”.
In Table 3, no main effect for “ethnicity” was identified ($F = 1.53, \text{Sig.} = 0.17$). (see Table 3)

Table 3.

Summary of one way ANOVA results for “ethnicity”

\[ \begin{array}{l|ccc|c}
\text{SUM OF SQ'S} & \text{D.F.} & \text{MEAN SQ.} & F(1/262) & P-VALUE \\
\hline
\text{Gender} & 96.7293 & 1 & 96.7293 & 2.89866 & 0.0898391 \\
\text{ERROR} & 8743.03 & 262 & 33.3703 & \\
\hline
\text{TOTAL} & 8839.76 & 263 & & \\
\end{array} \]

In Table 4, main effect for “instruction method” was identified ($F = 35.5, \text{Sig.} = 0.00$), however no main effect was found for “gender” ($F = 2.62, \text{Sig.} = 0.11$). Also, no interaction effect for “Gender & Instruction method” was found ($F = 1.14, \text{Sign} = 0.29$) with Alpha established at 0.10. The null hypothesis was rejected only for “instruction method” main effect (see Table 4)

Table 4.

Summary Results of two way ANOVA Test of Significance for “gender & instruction method.”
Rejecting the null hypothesis

The null hypothesis is there is no significance that blended learning improves Biology EOC scores more than a traditional teaching style. The p value less than or equal to .10 was determined to be significant and the null hypothesis would be rejected. The p value for teaching style is determined to be highly significant. Blended learning instruction method is determined to be highly significant. The null hypothesis is rejected. To verify gender & instruction method had no main affect a two-way ANOVA was performed.

Summary

It can be concluded that the blended teaching style is highly significant and has an influence on Biology EOC scores. It was noted that gender of students at ABC high school was also impacted student performance on the Biology EOC. A combination of face-to-face instruction and CAI has an influence on Biology EOC scores. The blended teaching method effectively engages students and improves scores significantly.
CHAPTER FIVE
OVERVIEW, FINDINGS AND RECOMMENDATIONS

Restatement of the Purpose

The problem of this study is identifying if blended learning can improve student Biology EOC Scores. The purpose of this study is to identify the best practice that is most effective at increasing Biology student EOC scores. In an effort to make data driven decisions to improve student achievement on the Biology EOC exam districts are identifying best practices that are most effective.

Summary of Research Methods

The research was collected in a post – post non experimental design. It was determined that there is a significant difference in the teaching style and student performance on the Missouri EOC in Biology at ABC High School.

Discussion of Findings, Conclusions and Recommendations

In an effort to answer the research question, can blended learning improve Biology EOC scores more than a traditional teaching style? It can be concluded that the blended teaching style has an influence on Biology EOC scores. At ABC high school blended learning has a direct impact on Biology EOC scores by improving student engagement and comprehension. It is recommended for maximized student engagement blended learning is used to enhance face to face instruction and not replace it. It is highly recommended that districts support teachers efforts to implement a blended learning strategy in their classrooms. It is also recommended that gender be looked at in the future to identify gender bias on the Biology EOC in the state of Missouri.

Summary

The $H_0 = \text{There is no significance that blended learning improves Biology EOC scores more than a traditional teaching style.}$ This null hypothesis has been rejected. Blended learning
teaching strategy is highly effective at improving Biology EOC scores at ABC high school. It can be concluded that using technology to improve student engagement has a highly significant impact on the scores of students taking the Biology end of course exam in Missouri. While it was noted that gender affected EOC scores it was not highly significant. Blended learning does have a highly significant impact on the scores of students taking the Missouri Biology End of Course Exam.
<table>
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<th>% of County</th>
<th>% of State</th>
<th>% of Nation</th>
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</thead>
<tbody>
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<td>2010</td>
<td>2011</td>
<td>2012</td>
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<tr>
<td>Green</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>2013</td>
</tr>
<tr>
<td>Brown</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>2013</td>
</tr>
</tbody>
</table>

**APPENDIX A**

**Blended Learning**

**APPENDIX A**

**Blended Learning**
REFERENCES


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VITA