THE USE OF BLENDED LEARNING APPROACH TO IMPROVE THE STUDENTS' ACADEMIC PERFORMANCE IN METEOROLOGY AND OCEANOGRAPHY 1

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Abstract

This quasi-experimental study aimed to determine the effectiveness of blended learning approach to the academic performance of the first year Bachelor of Science in Marine Transportation (BSMT) students in Meteorology and Oceanography 1 at JBLFMU-Arevalo during the second semester of school year 2018-2019. The participants of this research were the two sections comparable with each other who were enrolled in the course Meteorology and Oceanography 1. There were 30 students composed of 15 in the experimental group and 15 in the control group. Validated and reliability-tested researcher-made questionnaire was utilized to gather the data needed for the study. The independent variables were the blended learning approach and the lecture-class discussion method while the dependent variable was the academic performance as scores in Meteorology and Oceanography 1. The statistical tools used were mean, standard deviation, Mann-Whitney test, and Wilcoxon-Signed ranks test set at .05 level of significance. The effect size was computed to determine the effectiveness of the intervention which is the blended learning approach to students' academic performance in Meteorology and Oceanography 1. Results showed that in the pretest, though the experimental group had a higher mean score than the control group, the Mann-Whitney test showed no significant difference in the mean scores of the two groups. When blended learning approach was introduced, findings showed that there were significant differences in the mean scores of pretest and posttest of experimental and control groups as well as in the posttests of both groups. Furthermore, a significant difference was observed between the mean gains of both groups. Lastly, the Cohen's d effect size revealed a 2.22 (>1.0) which has a very large effect size indicating that 98% of the control group (lecture-class discussion method) who are below

the average person in experimental group (blended-learning approach). This simply means that blended-learning approach is an effective way to improve students' performance in the course Meteorology and Oceanography 1. It is recommended that this approach may be utilized to complement other method of teaching and learning as well as for individual learning.

Introduction

According to Sethy (2008), everyone should adapt to the continuous change of the world. A pronounced number of studies have aimed at determining whether computer-mediated education in the form of e-learning, blended learning or hybrid learning is better than traditional face-to-face (F2F) teaching in relation to the academic performance of students in their course. However, Azizan (2010) stated that both pure e-learning and traditional learning hold some weaknesses and strengths, it is better to mix the strengths of both learning environments to develop a new method of delivery called blended learning.

The mixed learning setting to succeed in a harmonious learning equilibrium between face-to-face interaction and on-line access is crucial (Badawi, 2009).

This study is anchored under the learning theories for online education specifically the Theory of Connectivism that learning and knowledge exists within networks by George Siemens (2004). This is because this study determines the academic performance of students in Meteorology and Oceanography 1 with the use of the IDIG e-learning materials through Blackboard OLMS.

This study aimed to determine the effectiveness of blended learning approach to the academic performance of the first year BSMT students in Meteorology and Oceanography 1 during the second semester of school year 2018-2019.

Specifically, this study sought answers to the following questions:

1. What are the pretest score performance of the experimental and control groups?

2. What are the posttest score performance of the experimental and control groups?

3. Is there a significant difference in the pretest score performance between the experimental and control groups?

4. Is there a significant difference in posttest score performance between the experimental and control groups?

5. Is there a significant difference in the pretest and posttest performance of the experimental group?

6. Is there a significant difference in the pretest and posttest performance of the control group?

7. What are the mean gains of the experimental and control groups?

8. Is there a significant difference in the mean gains of the experimental and control groups?

9. How effective is the blended learning approach in terms of students' performance in Meteorology and Oceanography 1?

Methods

Research Design

The quasi-experimental method of research was employed in this study specifically the Non-equivalent Control Group design. A pretest-posttest randomized experiment was designed, but it lacks the key feature of random assignment (Trochim, 2020).

The Non-equivalent Control Group design was used because it utilized an instruction-related treatment or intervention (blended learning approach) in one student group known as experimental group but no such treatment (lecture-class discussion method) in another comparable group known as control group. Both groups were not randomly assigned but rather selected through match-group technique using the students' general weighted average of the previous semester.

The data collected from the pretest-posttest were intended to find answers to questions concerning the effectiveness of blended learning approach to the academic performance of first year BSMT students in Meteorology and Oceanography 1 during the second semester of school year 2018-2019.

Participants

The participants of this research were two sections relatively comparable first year Bachelor of Science in Marine Transportation sections of the JBLFMU-Arevalo in Iloilo City, who were enrolled in the course Meteorology and Oceanography 1 during the second semester of school year 2018-2019. They were selected through match-group design using their General Weighted Average (GWA) in the previous semester. A total of 30 students composed of 15 in the experimental group and 15 in the control group. A toss coin was used to determine the experimental and control groups. The head and the tail was assigned for experimental and control groups, respectively.

Instrument

A researcher-made pretest and posttest were used to gather data. It is composed of 60-items multiple choice test. A Table of Specification (TOS) was made to guide in constructing the instrument in Meteorology and Oceanography 1. The topics were taken from the prelim, midterm, and finals lessons. It underwent content validity from the three jurors and as well as reliability-testing through Kuder-Richardson 20 which is 0.74 using SPSS.

Data Collection

The study was conducted from November 2018 to February 2019 of the school year 2018-2019. The data needed for this study were gathered through the use of researcher-made pretest and posttest that were administered to both experimental and control groups.

During the first-class session, the researchers administered the pretest to the experimental and the control group. This first result of the pre and post-tests of the experimental and control groups was identified as the "pre-course" data.

The experimental and control groups were handled by C/M Eleuterio P. Fernandez, Instructor of the course. The blended learning group/experimental group of section Blackwall was taught such as group work, reporting, demonstration, plus online learning through Blackboad OLMS or mrooms. The topics were identified and each topic contains learning objectives, lesson proper/content, teaching and learning activities (e.g. video presentations and assignments), assessments, and references. The intervention lasted for three months and a half during the second semester of school year 2018-2019.

On the other hand, section Bowline in its non-blended learning group/control group was taught the course employing only the traditional lecture-class discussion method using the instructional/workbook for the course also lasted for three months and a half during the second semester of school year 2018-2019.

Data Analysis

The following statistical tools were used in the study:

Mean was used to determine the students' performance in the pretest and posttest. The mean scale, descriptive rating, and indicators for interpreting the pretest and posttest scores are shown in Table 1.

Table 1

Mean Scale, Descriptive Rating, and Indicators for Interpreting the Pretest and Posttest Scores

Mean Scale	Descriptive Rating	Indicators
48.04 – 60.0	Excellent	Students have mastered all the competencies
36.03 – 48.03	Very Good	Students have mastered most of the competencies
24.02 – 36.02	Good	Students have mastered at the average competencies
12.01 – 24.01	Fair	Students have mastered few competencies
1.0 – 12.0	Poor	Students have mastered very few competencies

Standard deviation was used to determine the level of the students' homogeneity in their Meteorology and Oceanography 1 performance.

Mann-Whitney test was used to determine the significant differences in the pretests and posttests between two groups in Meteorology and Oceanography 1 and for the significant difference in the mean gain of the pretest and posttest of the experimental and control groups was set at .05 level of significance.

Wilcoxon-Signed ranks test was used to determine the significant differences in the pretest and posttest of each group in Meteorology and Oceanography 1 set at .05 level of significance.

Cohen's *d* effect size was used to measure the effectiveness of blended learning approach to the academic performance of the first year BSMT students in Meteorology and Oceanography 1. This is done by using the means and standard deviations in the posttest among the experimental and the control groups.

Results and Discussion

Pretest Score Performance of the Experimental and Control Groups

Table 2 shows the pretest scores among the experimental and the control groups. Fifteen students composed the experimental group and another 15 for the control group. The experimental group's pretest means score is 29.07 while the controls group's mean score is 26.87. Both mean scores are described as "Good" which means that students have mastered at the average competencies.

It is noted that the experimental and control groups registered comparably the same mean scores in the pretest, indicating their almost identical cognitive levels before the experiment.

Table 2

Pretest Score Performance in Meteorology and Oceanography 1 of the Experimental and Control Groups

Compared Group	n	M	Descriptive Rating	SD
Experimental	15	29.07	Good	2.46
Control	15	26.87	Good	4.03

Posttest Score Performance of the Experimental and Control Groups

Table 3 shows the posttest scores among the experimental and the control group. Fifteen students composed the experimental group and 15 for the control group. The experimental group's posttest means score is 40.47 described as "Very Good" (students have mastered most of the competencies) while the controls group's mean score is 33.40 described as "Good" (students have mastered at the average competencies). This means that the experimental group manifested a higher mean score in the posttest than the control group, implying the experimental group's better performance in Meteorology and Oceanography 1 after the experiment.

Table 3

Posttest Score Performance in Meteorology and Oceanography 1 of the Experimental and Control Groups

Compared Group	N	M	Descriptive Rating	SD
Experimental	15	40.47	Very Good	3.04
Control	15	33.40	Good	3.66

Difference in the Pretest Score Performance in Meteorology and Oceanography 1 between the Experimental and Control Groups

Table 4 shows that there is no significant difference in the pretest score performance between the experimental and control groups, U=73, p=.100. This means that the result is good

since the baseline data prior to the use of blended learning suggest that the students have similar intellectual capabilities which will be very vital for trying out the experimental group in the teaching approach. The data suggest that the groups are very ideal for the experiment since they possess cognitive similarities prior to the experiment.

Table 4

Mann-Whitney Test Result for the Significant Difference in the Pretest Score Performance in Meteorology and Oceanography 1 between the Experimental and Control Groups

Compared Group	U	W	Z	Asymp. Sig. (2-tailed)
Experimental Control	73[ns]	193	-1.649	.100

Note. ns means not significant at .05 level of probability.

Difference in the Posttest Score Performance in Meteorology and Oceanography 1 between the Experimental and Control Groups

Table 5 shows that there is a significant difference in the posttest score performance between the experimental and control groups, U=14.50, p=.000. This means that the difference in scores in the posttest favor the experimental group which was taught using the blended learning approach. Hence, it is safe to say that blended learning is an effective intervention.

Table 5

Mann-Whitney Test Result for the Significant Difference in the Posttest Score Performance in Meteorology and Oceanography 1 between the Experimental and Control Groups

Compared Group	U	W	Z	Asymp. Sig. (2-tailed)
Experimental Control	14.50*	134.50	-4.084	.000

Note. Asterisk (*) means significant at .05 level of probability.

Difference in the Pretest and Posttest Score Performance in Meteorology and Oceanography 1 of the Experimental Group

Table 6 shows that there is a significant difference in the pretest and posttest score performance of the experimental group, Z=-3.413, p=.001. This means that the use of blended learning approach had increased the students' learning capability significantly.

Table 6

Wilcoxon-Signed Ranks Test Result for the Significant Difference in the Pretest and Posttest Score Performance in Meteorology and Oceanography 1 of the Experimental Group

Compared Test	Z	Asymp. Sig. (2-tailed)
Pretest Posttest	-3.413*	.001

Note. Asterisk (*) means significant at .05 level of probability.

Difference in the Pretest and Posttest Score Performance in Meteorology and Oceanography 1 of the Control Group

Table 7 shows that there is a significant difference in the pretest and posttest score performance of the control group, Z=-3.316, p=.001. This means that the control group's posttest performance is significantly better than their pretest performance. Hence, it is safe to say that the control group also learned from the traditional method which is lecture-class discussion.

Table 7

Wilcoxon-Signed Ranks Test Result for the Significant Difference in the Pretest and Posttest Score Performance in Meteorology and Oceanography 1 of the Control Group

Compared Test	Z	Asymp. Sig. (2-tailed)
Pretest Posttest	-3.316*	.001

Note. Asterisk (*) means significant at .05 level of probability.

Mean Gains of the Experimental and Control Groups

Table 8 shows the mean gains of the experimental and control groups. It shows that the mean gain in their scores in Meteorology and Oceanography 1 of the control group is lower than the experimental group.

This study supports the study of Hameed et al. (2008) wherein the efficacy of combined e-learning and traditional learning enhanced the students' performance in their course. They concluded that the blended learning approach provides the most flexible method of e-learning.

Table 8

Mean Gains of the Experimental and Control Groups

Compared Group	Pretest	Posttest	Mean Gain
Experimental	29.07	40.47	11.40
Control	26.87	33.40	6.53

Difference in the Mean Gains of the Experimental and Control Groups

Table 9 shows that there is a significant difference in the mean gains of the experimental and control groups, U=41, p=.003. This means that blended learning approach is better as compared to lecture-class discussion because students gain more understanding in Meteorology and Oceanography 1.

Table 9

Mann-Whitney Test for the Significant Difference in the Mean Gains of the Experimental and Control Groups

Compared Group	U	W	Z	Asymp. Sig. (2-tailed)
Experimental Control	41*	161	-2.983	.003

Note. Asterisk (*) means significant at .05 level of probability.

The Cohen's *d* effect size was 2.22 or greater than 1.0 which has a very large effect size (Cohen, 1988; Rosenthal, 1996) indicating that 98% of the control group (lecture-class discussion method) who are below the average person in experimental group (blended-learning approach) according to Coe (2002).

Conclusions

Blended learning is an effective intervention to improve the students' academic performance in Meteorology and Oceanography 1 over the traditional method which is the lecture-class discussion. This is evident in students' posttest performance, mean gain, and effect size. This simply means that students perform better in Meteorology and Oceanography 1 when exposed to blended learning approach.

Blended learning when compared to the virtual learning environment, blended learning offers a more successful learning experience since it contains some aspects of traditional classes.

Furthermore, examined students' view on blended learning environment and discovered that students enjoyed participating in a blended learning environment through which face-to-face classes supplemented with online classes. Moreover, the significance of communication and interaction for successful learning in online education was emphasized.

Recommendations

In assessing the findings and conclusions, the following recommendations were made:

1. The teaching instruction may not rely on the traditional method of giving instructions in relation to teach certain course. Other methods of teaching such as blended learning mode need to be introduced, where the presence of an instructor is supported by the use of modern technology, it can be accessible even at the convenient time and place of the learners or outside the four walls of the classroom.

2. Blended learning may be utilized to complement other methods of teaching and learning as well as for individual learning, particularly because students may struggle to explore the opportunities offered by blended learning and e-Learning.

3. Trainings and seminars may be conducted for instructors from time-to-time to bring up-to-date and get acquainted with latest technological innovations like blended learning. This will enable them to develop, modify and maintain the latest online learning technologies, such as blended learning and e-learning within the university system.

4. Maritime schools may embrace e-learning platforms as they may enhance students' academic performance.

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