EFFECTIVENESS OF BLENDED LEARNING FOR DEGREE STUDENTS

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ABSTRACT: Blended learning is emerging as an important teaching and learning model in schools and colleges including Universities because its elements are combined with online and face-to-face interactions. To examine the effectiveness of blended learning, as compared to the normal classroom mode, this research investigated the learning outcomes of students following the Botany classroom at the Undergraduate level of Salem City of Tamil Nadu State in India. A small database was analyzed including student variables (gender and their net-utilities), the different learning modes, and student performance in this study (N=145). Researches studies show that undergraduate students who participated in blended learning classes are effective. The independent variables are blended learning and the traditional method likewise; the dependent Variables are an Achievement test on Botany in the units of 'meristems and complex tissues' taken the course from the paper namely, Anatomy and Embryology of Angiosperms. The results show that students engaged in blended learning had better academic achievements in their Botany Classroom compared to students participating in the face-to-face learning mode. Students' factors (gender and locality) were taken as covariates to assess the opinions of blended learning also calculated with mean, standard deviation, F test and 't' tests. Findings reveal that blended learning access formats by themselves are of more benefit in achieving Botany unit's outcomes than the traditional model (F=5.76), particularly in gender-wise ('t'=3.63) and locality-wise ('t=2.98). And this research recommends, the proposed research line is to conduct an extensive study on the blended learning utility in any discipline.

KEYWORDS: Blended learning, Moodle, Botany subject, learning management.

I. INTRODUCTION

Many Science teachers have been searching for effective instruction to motivate students to learn biology so that the students achieve better academic performances. Technology has increasingly become important in the educational arena and it is seen as an important resource for instruction in Science teaching. Blended learning is primarily a learner-centric approach that offers learners autonomy and flexibility throughout their learning process. Blended learning which embraces various combinations of classroom presence and online study. The method combines 'brick-and-mortar' attendance with teachers in normal classroom practices with computer-managed content and delivery. Most teachers in many countries around the world are now able to access the digital world in their classrooms. Now-a-days, more number of students and teachers are connected by mobile devices with storage capacity, unprecedented processing power, and access to wisdom, the possibilities are unlimited. The use of these devices has led to an increase in mobile and ubiquitous learning, which has implications for blended learning. Blended learning environments include not only the presence of regular teachers and students but also the students' ownership and place, setting, path and control of the time at which learning takes place (Banditvilai, 2016).

II. REVIEW OF RELATED STUDIES

Most of the Review of studies fell into one or more of the following categories: unpublished papers on blended learning like blog posts with international reputations; relevant papers of governmental organizations, such as ERIC and the UNESCO, journals, and books. Some related reviews are following, according to Bates (2017), blended learning can consist of Classroom lecture with PowerPoint slides, extra home-works in online after a normal class, and a classroom where the lecture is recorded and available online, and the class time is used for discussion and questions about the video. Porter and Graham (2016) proposed a three-stage framework for the institutional adoption of blended learning: (i) awareness and exploration; (ii) adoption and early implementation and (iii) mature implementation and growth. They concluded blended learning was most effective in implementation with good planning of teachers.

Jeffries et al., (2016) blended instruction combines face-to-face classroom interaction with web learning and when used in student-centered ways, this instruction allows students to master and to explore content at their own pace, and become more self-directed and confident learners. Maccoun (2016) explored the study in Baghdad's fifth standard in schools, as the effect of using blended learning in students' achievement, that each group consisted of 30 students and to achieve blended learning in science is effective. Saritepeci and Cakir (2015) argued that blended learning methods could positively affect levels of student achievement that were higher than in normal classroom learning.

Al-Rimawi (2014) investigated in the Um-Qasir School for boys in Quwaismeh and his sample is Sixth standard in the English Language Class and to find out the effect of blended learning on the direct achievement and resulted in significant differences between the means of the direct achievement for the members of the experimental group. For Professional development and training settings, Blended learning is also used; because it is cost-effective, time-saving, efficient, and learner-friendly (Lothridge et al., 2013).

Al-Hasan (2013) experimented to identify the blended learning in biology class at the private secondary 41 students into two unequal groups. The research concluded that, there are statistically significant differences in favor of the students and also effectiveness occurs in the blended learning method of learning in the experimental group.

Shahin (2008) measured the Science Operations among Fifth standard Students and to find out the effectiveness of the blended learning on achievement at Al-Naser Experimental School in Tanta' and concluded favor towards blended learning. Freihat (2004) found out the effect of blended learning in teaching computer skills to the pre-medicine stage of 157 students at Arabian Gulf University in Bahrain. The results favored towards blending learning method of the teaching-learning process in future studies.

III. METHODOLOGY

The online content materials were presented to students within the learning management system (LMS) of Google Classroom environment. The primary purpose is to streamline the process of sharing files between teachers and students in free of charge manner. For this research, the investigators each had their content created in Moodle. Third-semester core course paper –IV (major) was selected and the units of 'meristems and complex tissues' taken the course from the paper namely, Anatomy and Embryology of Angiosperms. Within these contents, each Botany teacher conducted forum discussions, administered quizzes and assignments, and provided links to external online resources that the students had to study. The external online resources were typically websites with information and exercises related to the course outcomes. The Botany teachers communicated with the students online by replying to their forum postings and by sending them email messages through Moodle. Within Moodle, the Botany teachers quickly discovered the ability to share activities and materials and proceeded to share various worksheets and exercises with quizzes and assignments.

This study aimed at determining the effect of a 'blended learning' model toward students' achievement from Botany Students of Undergraduates in Salem District of Tamil Nadu State in India. This experimental research study used one group pre-test and post-test design. From the population of 145 students in Bachelor's degree in Botany Class of two Governments, One aided and Two self-financed arts and sciences colleges in November-December 2019 were selected by convenience sampling technique. The data were collected from each college 30 Third-year Botany students (in total 5 colleges and 145 total) by using pre and post-tests techniques through a developed and validated Opinions Tool (40 items) and a Botany achievement (30 statements). Both tools found out content validity and reliability 0.79 and 0.81 respectively. The control group was treated by conventional whereas the experimental group was treated through blended learning mode. The data were analyzed using mean, standard deviation, 't' test and F Test with a significance of 5%.

IV. DATA ANALYSIS

The post-test scores of the students who were exposed to the control group (normal classroom learning group) showed increased academic achievement. It shows 48.98% 'strongly agree', 28.57% 'agree', 20.41% 'disagree', and 2.04% 'strongly disagree' results. On the post-test of students exposed to a blended learning approach (experimental group), it shows that there is also an increase in their academic achievement. They obtained 64.85% strongly agree', 30.45% 'agree', and 3.68% 'disagree', and 1.02% 'strongly disagree' results. This means that the students who were exposed to blended learning show an improvement in their academic

achievement in Botany, since their performances leveled-up with the control group that was not exposed to a blended learning approach.

Table-1. 't'-test analysis of Blended Learning Opinion level (Gender-wise)

Gender	N	Mean	S.D	't' value	p-value
Male Students	71	88.04	20.14		
Female Students	74	98.87	15.37	3.6291*	0.0001

(* = Significant at 0.05 level)

Table-1 shows that there was a significant difference between the blended learning Opinion of Botany students in their gender-wise (male & female) with the value 't' = 3.63 and p =0.0001 ($p < 0.05$). Based on the meaning obtained, Female students in the Botany Classroom have a higher mean (98.87) compared with the mean of male students in the Botany Classroom (88.04). This shows that blended learning Opinion of Botany students in their gender-wise. The investigators concluded that there is a significant difference exists between the opinions of blended learning in Botany classrooms concerning their gender.

Table-2. t'-test analysis of Blended Learning Opinion level (Locality-wise)

Locality	N	Mean	S.D	't' value	p-value
Rural Area	72	88.28	20.42		0.0017
Urban Area	73	97.52	16.64	2.9846*	

(* = Significant at 0.05 level)

Table-2 shows that there was a significant difference between the blended learning Opinion of Botany students in their locality-wise (rural & urban) with the value 't' = 2.98 and p =0.0017 ($p < 0.05$). Based on the meaning obtained, urban students in the Botany Classroom have a higher mean (mean = 97.52) compared with the mean of rural students in the Botany Classroom (mean = 88.28). This shows that blended learning Opinion of Botany students in their gender-wise. The investigators concluded that there is a significant difference that exists between the opinions of blended learning in Botany classrooms concerning their locality.

Table-3. ANOVA results of Blended Learning utility level (Type of Institution wise)

Sources	Sum of Squares	df	Mean Squares	F value	p-value
Between	193.3748	2	96.6874		
Within	2389.3772	142	16.8266		
Total	2582.7520	144		5.7641 *	0.0039*

(* = Significant at 0.05 level)

From the table-3, explains the statistical test of the F value of 5.76. Using α of 0.05, we have F 0.05; df; 2,142 in the F distribution table= 3.04. Since the test statistic is much larger than the critical value, the investigators not accepted the null hypothesis of equal population means and conclude that there is a statistically significant difference among the population means. The p-value for F=5.76 is 0.0039, so the test is statistically significant at that level. Hence, it is concluded that the control and experimental groups differ. If the p-value (0.0039) is less than or equal to the significance level, the investigators reject the null hypothesis and conclude that not all of the population means are equal. This indicates that there is a significant relationship that exists between the achievement levels of blended learning in Botany, the control group compared to the experimental group concerning their Institution (utility in Government, aided and self-financed) wise.

Table-4. ANOVA results of Blended Learning utility level (Type of net-sources wise)

Sources	Sum of Squares	df	Mean Squares	F value	p-value
Between	193.4578	2	96.7289		
Within	2325.2926	142	16.3753		
Total	2518.7504	144		5.9070 *	0.0034*

(* = Significant at 0.05 level)

From the table-4, explains the statistical test of the F value of 5.91. Using α of 0.05, we have F 0.05; df; 2,142 in the F distribution table= 3.04. Since the test statistic is much larger than the critical value, the investigators

reject the null hypothesis of equal population means and conclude that there is a statistically significant difference among the population means. The p-value for F=5.91 is 0.0034, so the test statistic is significant at that level. If the p-value (0.0034) is less than or equal to the significance level, the investigators reject the null hypothesis and conclude that not all of the population means are equal. Hence, it is concluded that the control and experimental groups differ. This indicates that there is a significant relationship exists between the achievement level of blended learning in the Botany, the control group compared to the experimental group concerning their type of net-sources (utility in the institution, home, and cyber-cafe) wise.

The results showed that there is no significant difference between the two groups; this means that the academic achievement of the experimental group equates with the control group. This indicates an improvement in academic performance for the experimental group. These findings adhere to the study of Nachimuthu (2019) that those students exposed to a blended learning model of instruction performed better than those in conventional teaching methods. In conclusion, the results of this study are compared to the previous studies related to the benefits of blended learning over classroom instruction. The student's achievements are more learning occurred by the end of that one month of the blended learning program format. Findings concluded that the given blended learning method is improved the students' achievement.

The major limitation of this study is that the research findings are based on the practice in one or two institutions in each type of category, although they do cover a range of disciplines. A suggested future research area is to adopt the research developed in this project to research several universities to obtain a broader picture of the use of blended learning in the sector. Another proposed research area is to conduct an extensive study on the use of blended learning in any discipline.

V. CONCLUSION

A combination of Normal classroom interaction with online instruction, referred to as blended learning, has become popular with Biological science educators. The use of blended instruction is growing rapidly and it enhances student's satisfaction from the learning experience. (Lim & Morris, 2009). Likewise, lots of studies have shown that blended learning is highly effective and positively towards the teaching-learning process (Fandey, 2012; Popolzina, 2014). The blended learning approach, when introduced in Botany class particularly in from the paper namely, Anatomy and Embryology of Angiosperms would enable the learners to perform better performances. Teachers, therefore, need to explore more teaching variables and examine a learning environment that enhances academic achievement.

Blended learning model has many advantages such as: improving the effectiveness and efficiency of learning by exploring students' abilities through online media; and building communication with students through online media (Clyde & Delohery, 2005). The educational approach toward the blended learning environment requires the learners to be actively involved, hence Biological Science educators with blended learning environment should accommodate instructional strategy and materials and assess student's Biological Science learning skills. The implemented blended learning approach needs further investigation by looking at the goal structures and other combined learning strategies and assess students' academic learning outcomes. Under the students' Botany learning skills development, various teaching methods should be adopted. Course contents should be determined with the aim of improving the Botany learning skills of the students.

VI. REFERENCES

[1] Al-Hasan, Idris Kamatur (2013). The Effectiveness of Using the blended learning on the Academic Achievement in the Biology Course, Psychological and Educational Research Journal, (36) 59- 85.
[2] Al-Rimawi, Firas Tharwat (2014). The Effect of Using blended learning in Teaching English Language, Unpublished Master of Education Thesis, Faculty of Educational Sciences, Middle East University, Jordan.
[3] Banditvilai,C (2016). Enhancing students' language skills through blended learning, The Electronic Journal of e-Learning, 14(3), 220–229.
[4] Bates,T (2017). What is online learning? Seeking definition, April, 25, retrieved from https://www.tonybates.ca/ category/ teaching- and- learning/ blended-learning-teaching-and-learning.
[5] Clyde,W., & Delohery,A (2005). Using Technology in Teaching, London: Yale University Press
[6] Dangwal,K. and Lalima (2017). Blended learning: An Innovative Approach, Universal Journal of Education Research, 5 (1), 129-136.
[7] Freihat, Essam Ahmad (2004). Blended learning, Training and Technicality Journal, (62), 36-42.

[8] Jeffries,A., & Hyde,R (2010). Building the future students' blended learning experiences from current research findings, Electronic Journal of e-Learning, 8(2), 133-14.

[9] Lim,D.H. & Morris,M.L (2009) Learner and instructional factors influencing learning outcomes within blended learning, Educational Technology & Society, 12(4), 282–293.

[10] Lothridge,K., Fox,J., & Fynan,E (2013). Blended learning: Efficient, timely, and cost-effective, Journal for Forensic Sciences, 45(4), 407–416.

[11] Maccoun, Hussein Salem (2016). The Effect of using blended learning on the Achievement of student retention in the Biology course, Faculty of Education Journal, 22 (95), 209-240.

[12] Nachimuthu, K (2019). Effect of Multimedia Learning in Science, International Journal of Management and Business Research, SCOPUS Indexed, 9(2), 28-34.

[13] Popolzina,N.S (2014). Evaluation of blended learning model for solving problems, International Journal of experimental education, 7, 3638.

[14] Saritepeci,M., & Cakir,H (2015). The effect of blended learning environments on student motivation and student engagement, Education and Science, 40(177), 203– 216.

[15] Shahin, Suad Ahmed (2008). The Effect of blended learning on Achievement and the Development of Science Operations, Faculty of Education, Tanta University.