Educational Administration: Theory and Practice
2024, 30(3), 2556 – 2560
ISSN: 2148-2403
https://kuey.net/

Research Article

Impact Of The Blended Learning Environment On Students' Academic Achievement And Their Technological Attitude In Science Labs

Revathi, A[1*], Dr.K.Dhanalakshmi[2], Dr.K.Nachimuthu[3]

[1*]Research Scholar, Orcid 0000-0002-3042-757 X,
[2]Professors, Dept. Of Education, Periyar University, Salem, TN, Orcid 0000-0002-2186-8576,
[3]Orcid 0000-0003-4736-7750

Citation: Revathi, A et al. (2024), Impact Of The Blended Learning Environment On Students' Academic Achievement And Their Technological Attitude In Science Labs, Educational Administration: Theory and Practice, 30(3), 2556 - 2560
Doi: 10.53555/kuey.v30i3.6957

ARTICLE INFO

ABSTRACT

Specifically, it aimed to: determine the level of academic achievement of students as exposed to the blended learning approach and those exposed to the non-blended learning approach; ascertain the practical skills of students exhibited when exposed to the blended learning approach and those exposed to non-blended learning approach in terms of questioning, designing, communicating, recording, analyzing, and interpreting; compare the academic achievement of students toward science laboratories when exposed to blended learning approach and non-blended learning approach; and differentiate the practical skills exhibited by students toward science laboratories when exposed to blended learning approach and non-blended learning approach. Additionally, correlation analysis and descriptive statistics like suggestions and percentages were applied. The outcomes demonstrated that students who were acquainted with blended learning increased their academic performance from the pre-test to the post-test and achieved parity with students who were not. Students demonstrated the ability to interpret, communicate, design, record, analyze, and ask questions as practical skills. Additional findings revealed no discernible difference in the academic performance of students exposed to blended learning compared to those exposed to non-blended learning; both groups improved, hence the null hypothesis was not successfully rejected. The proposed null hypothesis is rejected because there is a notable difference in the practical skills displayed by students exposed to blended learning compared to those who were not.

Index Terms: Academic Achievement, Blended Learning, Practical Skills, Science Laboratories

INTRODUCTION

Science education has traditionally employed a dynamic pedagogical approach. It's one method for enhancing how educators instruct and learners acquire knowledge. But just as the world is getting more interconnected and globally competitive, so it has the approach to teaching science education. Today's students have extensive exposure to the Internet.

The largest and most diverse category of students called the Millennials, are the new wave of learners who prefer various kinds of active learning opportunities. Numerous universities and laboratory high schools in the Philippines provide a pure science curriculum that exposes students to an extensive spectrum of topics, science labs, and scientific research. However, it has been identified that students are silent during classroom discussions and lectures because they quickly divert their attention to other things when they become bored with their lessons.

Because of this, students' performance on the National Achievement Test (NAT) in science remains the most challenging subject in basic education, leading to a failure to understand fundamental concepts. A teaching

strategy for science teachers should be developed to achieve meaningful and retentive learning, as this will assist to address the low achievement in science and achieve the goals of science education.

It's interesting to note that numerous characteristics of the perfecting learning environment, like fewer lectures, the use of multimedia, and peer collaboration, are also elements of methods that research has proven to work. According to the K–12 Philippine Education Program, traditional methods of instruction should be replaced with electronic learning, where millennials—also referred to as 21st-century learners—are exposed to ICT skills and technologies. Pupils could now learn dynamically.
They can use the internet as a learning resource. They can learn with the world versus experiencing their concepts and knowledge exclusive to a four-wall classroom (Nachimuthu,2020). The blended learning approach is one of the most promising methods for integrating interactive lessons with the cutting-edge innovations and electronic devices of the Internet of Things. It is an innovative approach that incorporates the best elements of both normal classroom instruction and ICT-supported learning, including both online and offline learning.
With this new method of instruction, students could potentially be able to advance and strengthen their practical skills. In particular in science labs, students can better understand and develop their abilities by using practical skills to improve critical thinking and problem-solving abilities. These abilities include asking questions, taking notes, creating designs, speaking, evaluating, and interpreting.
Practical skills undoubtedly include the ability to operate a specific piece of apparatus or equipment and a wide range of other abilities for which it is impractical to evaluate a student's proficiency in the short amount of time allotted in school science laboratory spaces. In addition to Knowing those problems and reasons, it is particularly important to teach students in a way that they will find interesting and interesting because investigation indicates that students in this generation have attention spans that are brief and find traditional learning methods tedious, dull, and exhausting. Therefore, to understand its impact on students' academic performance and practical skills in science labs, the integration of a blended learning approach was investigated.

METHODOLOGY

Location of the Research
The study was conducted at the Arts and Science Colleges in Salem District of Tamil Nadu State with affiliation by Tamil Nadu Teacher Education University, Chennai.

Selection of the Respondents

Physics students enrolled in the second year of this academic year sampled as 120 students at Arts and Science Colleges in Salem District of Tamil Nadu State with affiliation by Tamil Nadu Teacher Education University, Chennai. Arts & Science College Laboratory served as the study's respondents. Two groups were involved in the research: a single group originated in the section and experienced exposure to a blended learning approach that engaged practical skills in science laboratories as an experimental group, and the other group turned out from the second section and was exposed to a non-blended learning approach the fact that was lacking in practical skills in science laboratories.

Data Collection

Both academic and non-academic evaluations have been utilized in this study. The pre-test was given to learners at the start of the experiment, and the post-test was given following the conversation about the unit's topic, which involved using a blended learning approach with practical skills in the laboratory. ‘Viscosity’ is the unit's topic used in this research.
After that, the students were given a questionnaire to determine what practical skills they had in science and how well they had performed in the lab using the blended learning strategy for physics. The collected data underwent coding, encoding, and evaluation to yield information relevant to addressing the research questions.

Data Analysis

Students' academic achievement was determined by analyzing the data gathered from the survey questionnaire responses using descriptive statistics like mean and percentages. To find the significant differences in academic achievement and practical skills between students through a blended learning approach and those utilizing a non-blended learning approach, test of significance like Mean and standard deviation calculations was utilized.

Results

The data gathered concerning junior students' academic performance and practical skills after exposure to blended learning and non-blended learning environments is interpreted and analyzed in this section.

Table-1. Analysis of Academic Achievement on Blended Learning in Physics

% Equivalent	Pre-Test				Post-Test			
	Control		Experimental		Control		Experimental	
	N	%	N	%	N	%	N	%
91-100	0	0	0	0	0	0	0	0
81-90	0	0	0	0	0	0	4	8.00
71-80	0	0	0	0	1	2.00	12	24.00
61-70	5	10.00	6	12.00	5	10.00	24	48.00
Below 60	55	90.00	54	88.00	54	88.00	20	20.00
	60	100	60	100	60	100	60	100

For their satisfactory level, from outstanding experience is termed as mostly strongly agree (91-100); very satisfactory is termed as strongly agree (81-90); their satisfactory level is indicated as agree (71-80); fairly satisfactory (61-70); and below 60 sores are termed as need expectation.

The post-test scores of the students who were exposed to non-blended learning showed normal academic achievement. It shows 2% in the satisfactory level, 10% in the fairly satisfactory level, and 88% in the need expectation level of results. The post-test of students exposed to the blended learning approach shows that there is also an increase in their academic achievement. They obtained 8% in the very satisfactory level, 24% in the satisfactory level, 48% in the fairly satisfactory level, and 20% in the need expectation level of results.

This means that the students who were exposed to blended learning showed an improvement in their academic achievement since their performance level had up with the second section who were not exposed to the blended learning approach. This is consistent with the findings of the study of Revathi et al., (2022) that whenever a student is exposed to a blended learning approach, they exhibit academic excellence. This may be due to students' cohesive analysis of the lessons when the blended learning strategy was introduced. The same research findings with that exposure to educational technology which relates to academic performance allowed the students to a high post-test result.

The current findings also accord with the study of Nachimuthu (2020), according to the result of his study blended learning was found to have positive effects on learners' study achievement and learners cooperate actively. It means that students acquire existing knowledge and actively create new knowledge for given task performance in the process of sharing knowledge with their peers. Blended learning improved students' likely study achievement through cognitive activities.

Moreover, according to the study of Ndelilie, (2004) the students who experienced the integration of technology in their instruction obtained better scores after the intervention was given compared to students who underwent the traditional way of instruction only. Thus, the blended learning approach is effective in teaching science and helps increase the academic performance of the students.

Hypothesis 1: According to this hypothesis, pupils who have good practical skills in technology and those who have less knowledge of practical skills toward technology do not significantly differ in their physics achievement.

Table-2. Analysis of Practical Skills on Blended Learning in Physics

Sources of Variation	N	M	S.D	df	t-cal	t-crit	P<.05
Physics students with Practical skills	60	62.80	2.46	118	8.26	1.99	*
Physics students without Practical skills	60	54.50	2.32				

* = significant at p < .05

Table 2 displays the hands-on abilities (practical skills) of students to the blended learning method. The abilities ranked by preference, with 'always' being the highest, include: interpreting (2.14); questioning (2.10); analyzing (1.93); recording (1.92); communicating (1.88); and designing (1.68), in that order. The skill of interpreting, with a preference score of 2.14, stands out as the most favored among the students in Traditional Learning. It appears that the students excel in gathering and drawing conclusions from data, as well as in problem-solving. The second most favored skill is questioning, with a score of 2.10, suggesting that the students are keen on the innovative approach to learning.

Direct administration of the instruments to the respondents in their regular classroom environment was done by the researcher. T-test statistics were used to examine the collected data at the 05 level of significance. According to this hypothesis, given a technological mindset, there is a more appreciable difference in physics achievement between students in their practical skills to do their practical in science labs. At a significance level of a.05., Table 2, the 't'- calculated (8.26) value exceeds the 't'- critical value (1.99). Thus, the third hypothesis is disproved. They are significantly different. This suggests that when it comes to their attitude toward technology, physics students with practical skills do better than their non-practical skills in their science labs.

Hypothesis 2: According to this hypothesis, pupils who have favorable attitudes toward technology and those who have negative attitudes toward technology do not significantly differ in their physics achievement.

Table 3: Analysis of the Effect of Technological Attitude on Physics Students' Achievement

Sources of Variation	N	M	S.D	df	t-cal	t-crit	P<.05
Positive technological attitude	60	16.82	4.46				
Negative technological attitude	60	26.82	6.76	118	9.98	1.99	*

* = significant at p < .05

Table 3 presents the results, demonstrating that at a significance level of a .05., the computed 't'- value (9.98) exceeds the crucial 't' -value (1.96). This suggests that the hypothesis is not true. This indicates that students' success in physics is highly influenced by their positive attitude toward technology, because of the significant differences among the technological attitudes.

Hypothesis 3: According to this hypothesis, there is no discernible difference in physics achievement between male and female students with a positive attitude toward technology.

Table 4: Analysis of the Effect of Technological Attitude on Physics Students' Achievement (Gender-wise).

Sources of Variation	N	M	S.D	df	t-cal	t-crit	P<.05
Males with positive technological attitudes	56	27.42	7.38				
Females with positive technological attitude	64	26.82	8.24	118	0.64	1.99	*

* = significant at p < .05

At the.05 alpha level of significance, Table 4 result demonstrated that the 't'- calculated (0.64) decreased the level of the crucial 't'- value (1.99). This suggests that the hypothesis is true, because of no significant differences as per the gender-wise calculations. The study concludes that, given a technical attitude, gender significantly influences physics students' achievement in the subject, because their positive attitudes toward practical skills influence all the activities in the science lab.

Conclusion

The findings indicate that:

1. Students' technology mindset has a major impact on their physics accomplishments.
2. Gender has a major impact on physics students' performance because of their attitude toward technology.
3. Considering their attitude toward practical skills technology, their achievement is highly influenced by the knowledge of practical skills acquired.
4. When it comes to the creation and application of the physics curriculum, students' technology attitudes ought to be considered a crucial element contributing to improved academic performance.

Discussion

The findings presented in Tables 1, 2, 3, and 4 validated the noteworthy impacts of students' gender, kind of school, and technology attitude on their physics achievement. This is because kids who have a favorable attitude toward technology have better psychomotor abilities than students who have a negative attitude toward technology. The outcome also stems from the fact that research has demonstrated that male pupils are more adept at manipulation than their female counterparts. Additionally, students attending technical schools are more likely to be exposed to scientific equipment from the start of their education than those attending grammar schools, who are more likely to be exposed to it during their last year of study when they take external tests. These findings are consistent with the research done by Luka et al, (2023), Revathi et al., (2022), and Ndelilie (2004).

References

1. Han, Feifei; Ellis, Robert A.; Guan, Enjing (2023). Patterns of Students' Collaborations by Variations in Their Learning Orientations in Blended Course Designs: How Is It Associated with Academic Achievement? *Journal of Computer Assisted Learning*, 39 (1), 286-299.
2. Ironsi, Chinaza Solomon (2023). Efficacy of Blended Interactive Educational Resources in Improving Writing Skills in a Hybrid Learning Environment, *Quality Assurance in Education: An International Perspective*, 31(1), 107-120.
3. Luka, Ineta (2023). Implementation of a Blended Learning Course for Adult Learners during the COVID-19 Pandemic, *Quality Assurance in Education: An International Perspective*, 31(1), 91-106.

4. Meng, Xiangju; Hu, Zhenfang (2023). The Relationship between Student Motivation and Academic Performance: The Mediating Role of Online Learning Behavior, *Quality Assurance in Education: An International Perspective*, 31(1), 167-180.
5. Nachimuthu, K. (2020). Effectiveness of Blended Learning for Degree students, *Journal of Critical Reviews,* 7(15), 1440-1444.
6. Nachimuthu, K and Revathi, A (2022). Effectiveness of Blended Learning among Undergraduate Students, *Psychology and Education,* 57(9), 5270-5273.
7. Ndelilie, C. E. (2004) A Thesis on the Effectiveness of Instructional Charts and Relia on Technical School Students Performance in Textile Technology
8. Revathi, A and Nachimuthu, K (2022). Effectiveness of Blended Learning among Undergraduate Physics Students, *Journal of Positive School Psychology*, 6(3), 10206-10210.
9. Schiering, Dustin; Sorge, Stefan; Keller, Melanie M.; Neumann, Knut (2023). A Proficiency Model for Pre-Service Physics Teachers' Pedagogical Content Knowledge (PCK)--What Constitutes High-Level PCK?, *Journal of Research in Science Teaching*, 60(1), 136-163.
10. Siong, Lai Chin; Tyug, Ong Yunn; Phang, Fatin Aliah; Pusppanathan, Jaysuman (2023). The Use of Concept Cartoons in Overcoming the Misconception in Electricity Concepts, *Participatory Educational Research*, 10(1), 310-329.