Effectiveness of blended learning in physics at the higher secondary level

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Abstract

The study aimed at the relative effectiveness of the blended learning literacy educational approach on students' academic achievement in Physics in the Salem quarter of Tamil Nadu State secondary schools. The study espoused the quasi-experimental pre and post-test control and experimental group design. An aggregate of 120 eleventh-standard students drawn out of two government schools was deliberately named as the samples. Two schools were used for each of the experimental and control groups. The students in the experimental groups were tutored using Blended Learning Instructional Approach while the students in the control group were tutored using a conventional system. Achievements Test on Physics (ATP) was developed, validated, and used to induce data for the study. The suppositions generated were tested using the 't'-test. The result of the study showed that students tutored with a blended learning literacy educational approach performed significantly better than those tutored using the conventional system. Gender does not affect the student's academic achievement when exposed to the same quantum of conditioning. Grounded on the findings of this study, it was recommended that training, forums, seminars, and workshops on the use of blended learning literacy educational approach and e-learning should be organized for Physics faculties. School teacher training programs should incorporate the blended learning literacy educational approach in the class for pre-service faculties while schools should be adequately equipped with complete systems and internet installations.

Keywords: Blended literacy, e-learning, educational approach, internet installations.

Introduction

Preface Physics is the branch of wisdom concerned with the parcels of matter and energy and the relationship between them. It's the study of matter and natural events which is grounded substantially on empirical compliances and qualitative measures. It also provides an introductory understanding and development of new instruments, chops, and ways for Agricultural, Earth, Biological, Chemical, Environmental, Physical and Medical subjects (Nachimuthu, 2020).

Hence, Physics establishes introductory knowledge demanded scientific advancement, which is the profitable machine of any nation. Still, the conception of Physics is more understood when the conventional system of tutoring used by the faculties is accompanied by other hands-on styles that enhance students' active literacy through tone discovery or inquiry. Good tutoring is the result of exposing students to certain experiences through acceptable guidance and furnishing applicable literacy conditioning so that the students acquire the stylish of literacy (Revathi et al., 2022).

The learners' station toward Physics is associated with academic achievement. Han et al., (2023) affirm that station whether positive or negative affect learning in wisdom. The study of Luka and Ineta (2023) reveals that students' station is one of the factors affecting students' performance in Physics. Schiering et al., (2023) posit that faculties should have positive stations and use intriguing tutoring systems in tutoring of wisdom to ameliorate students' performance and bring out lasting and endless positive stations towards wisdom. (Nachimuthu et al., 2022). They studied the pedagogical content knowledge (PCK) and reveals how teacher education can promote transitions into higher proficiency and support this knowledge. The studies carried out on the concept of Cartoons Worksheets are effective to overcome students' misconceptions about electrical concepts, specifically toward current circuits (Siomg et al., 2023). This study aims to probe the effectiveness of the blended learning literacy educational approach on the academic achievement of secondary academy students in Physics in the Salem District of Tamil Nadu.

Statement of the Problem

The experimenter's compliance from tutoring Physics and internal and external examinations grades of students in Physics have remained fairly low when compared with other subjects. The need to bumble from the traditional system of tutoring and borrow ultramodern innovative approaches is thereby essential. To this end, this study is out to examine the effectiveness of a blended learning literacy educational approach on the academic achievement of students in Physics in the Salem quarter of Tamil Nadu State secondary schools.

Hypotheses
The following exploration suppositions were formulated for this study:
1. There's no significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and pupils tutored using the conventional system in pre-tests.
2. There's no significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and pupils tutored using the conventional system in post-tests.
3. There's no significant difference in the achievement mean scores of manly and womanish students tutored with a blended learning literacy educational system in post-tests.

Research Design

This study employed quasi-experimental of pre and post-test non-randomized control and experimental group design which examined the effect of a blended learning literacy educational approach on students’ achievement in Physics.

Sample for the study

The sample for this study comported of 120 eleventh-standard students offering Physics who were aimlessly named from two higher secondary schools in the Salem quarter of Tamil Nadu State for the 2022-2023 academic session. 60 higher secondary school students in two schools offering Physics were aimlessly named from each academy.

Two schools were used as experimental groups while the remaining two schools were used as control groups. The named schools were considered to have good Physics faculties and have presented students for elderly secondary academy instrument examinations. The two schools to be used as experimental groups were intentionally named.

Tools for the study

The tools used for the study included Achievement Test on Physics (ATP), and the treatment package was Blended Learning Instructional Package for Physics (BLP). The instrument ATP comported of two sections A and B. Section A was drawn to evoke information on students' bio-data similar to the name of the institution, class, and gender of the students. Section B contains 40 particulars of multiple choice questions which concentrated on measuring students' performance in the named motifs. The achievement test was administered both to the control and experimental groups.

Face validity of the instruments was assured by experts in Physics Education, the Department of Guidance and Counseling, and Educational Technology. The BLP was validated by experts in Physics Education. Their commentary and suggestions were rigorously stuck and the corrected interpretation was used for data collection. The instrument BLP consists of Physics contents of 'Viscosity' linked with a website and which can be penetrated through the internet via a computer system. This package was used for the experimental group only and a post-test was constructed for both groups.

Methodology

Before the inception of the study, the students and Physics faculties of the named schools were duly trained on how to use a computer and the internet installations. The study was conducted for six weeks. Before the treatment stage, both control and experimental groups were given a pre-test, inform of Achievement Test on Physics.

At the treatment stage, students in the experimental group were tutored in ‘Viscosity’ using the Blended literacy Instructional Package (BLP) in the laboratory with the use of computer and internet installations. A computer was allocated for each student in those institutions. The students were allowed to perform literacy conditioning, ask questions and submit their assignments via the internet. This was carried out with the backing of trained and experienced Physics faculties. The students in the control group were tutored in the Physics contents using the conventional system. After treatment, both control and experimental groups were given post-test. The data collected were analyzed through ‘t’ tests.

Hypothesis 1

There's no significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and pupils tutored using the conventional system in pre-tests.

Table 1: Analysis of pre-test scores of blended learning in Physics

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>'t'-value</th>
<th>p-value</th>
<th>0.05 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Method</td>
<td>60</td>
<td>12.96</td>
<td>3.74</td>
<td>0.18</td>
<td>0.4287</td>
<td>No Sig.</td>
</tr>
<tr>
<td>Blended Learning Method</td>
<td>60</td>
<td>12.78</td>
<td>3.52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 1, the result showed that at p<0.05, 't'-calculated was 0.18 (p=0.43), and df was 118. It could be lesser than the calculated value at 0.05 level of significance. This implies that there was no significant differences in the achievement mean scores of students in pre-test before they were exposed to conventional teaching methods. From table 1, the result showed that the researchers accept the null hypothesis of no significance between the achievement mean scores of the students. Hence, there's no significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and pupils tutored using the conventional system in post-tests.
educational approach and conventional system concerning the analysis of pre-tests.

**Hypothesis 2**

There's no significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and pupils tutored using the conventional system in post-tests.

<table>
<thead>
<tr>
<th>Table 2: Analysis of post-test scores of blended learning in Physics</th>
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</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Conventional Method</td>
</tr>
<tr>
<td>Blended Learning Method</td>
</tr>
</tbody>
</table>

From table 2, the result showed that at p<0.05, ‘t’-calculated was 9.98 (p=0.0001). It could be greater than the ‘t’-value at 0.05 level of significance. The mean score of a blended learning method (26.82) is also higher than the mean scores of the conventional method (16.84) teaching. This implies that there were significant differences in the achievement mean scores of students in the post-test before they were exposed to experimental teaching methods. From table 2, the result showed that the researchers reject the null hypothesis of no significance between the achievement mean scores of the students. Hence, there's a significant difference in the achievement mean scores of students tutored with the blended learning literacy educational approach and conventional system concerning the analysis of post-tests.

**Hypothesis 3**

There's no significant difference in the achievement mean scores of manly and womanish students tutored with a blended learning literacy educational system in post-tests.

<table>
<thead>
<tr>
<th>Table 3: Analysis of post-test scores of blended learning in Physics (Gender-wise)</th>
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</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Male students</td>
</tr>
<tr>
<td>Female students</td>
</tr>
</tbody>
</table>

From table 3, the mean score and standard divagation of manly students exposed to a blended learning literacy educational system were 27.46 and 7.36, independently while the mean score and standard divagation of womanish students exposed to the same treatment were also at 26.82 and 8.28 respectively, independently at 0.05 position of significance, the ‘t’- value 0.64 (p=0.26) is lower than the table value at the concern degree of freedom. Since the researchers accept the null thesis. Thus, there's no significant difference in the achievement mean score of manly and womanish students tutored with a blended learning literacy educational system.

**Discussion**

The findings of this study revealed that students' achievements in Physics in both experimental and control groups in the pre-test were low and didn't differ statistically. This implies that there was no significant difference in the pre-test mean scores of the students in the experimental group using the blended learning literacy educational approach and the control group using the conventional system. This established the unity of the two groups involved in the study before the trial. In other words, it could be said that both the groups involved in the study were equal.

The findings of this study also showed that there were significant differences in the achievement mean scores of the two groups after the treatment. This implies that there was an enhancement in the performance of students performing from their exposure to the treatment. This corroborates the finding of Meng et al., (2023), who posited the role of online learning behavior in students' academic performance in Physics during the COVID-19 pandemic. The recrimination of this is that the use of the Blended Learning Instructional Approach is a tutoring strategy for enhancing students' achievement in Physics.

Hypothesis two sought to find the difference in the achievement mean scores of manly and womanish students tutored with the blended learning literacy educational approach. The study revealed that the achievement of students in Physics isn't determined by gender. That is, the effect of gender on students' achievement in Physics wasn't statistically significant. This corroborates the findings of Ironsi et al., 2023, who in their study contribute to educational literature resources used to improve some aspects of writing text.
Conclusion

From the findings of this study, it was concluded that there's a significant tutoring effect on students' achievement mean scores in the two groups. The use of the Blended Learning Instructional Approach was more effective for the tutoring and blended learning literacy of Physics than the conventional system since students who were exposed to the blended learning literacy educational approach performed better than those tutored with the conventional approach in the achievement test. Also, gender doesn't impact the performance of students when they were subordinated to the equal quantum of conditioning.

Recommendations

Grounded on the findings of this study, it was recommended that:

1. The mode of tutoring Physics at higher secondary academy positions should be modified to accommodate a functional pupil-centered and blended learning educational approach that will make Physics students good problem-solvers.
2. Since utmost faculties educate in the way they've been tutored, school teacher-training programs should incorporate a blended learning literacy educational approach, which will produce a new strain of faculties who'll be suitable to apply the blended learning literacy educational approach which is lacking in our schools.
3. Manly and womanish students should be encouraged to study wisdom subjects especially Physics as both of them are able of outstripping the subjects.
4. The higher secondary academy should be adequately equipped with computer systems and get connected to the internet to have access to online literacy.
5. Higher secondary academy faculties who are formerly in service should be given acceptable training through seminars, councils, conferences, and forums to enhance and acquire better strategies for tutoring Physics.

References