Blended vs. Traditional Learning: Academic Achievement in Formative Assessment at the University of Kabianga

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Abstract

Blended Learning (BL) combines traditional face-to -face classroom sessions with online learning sessions, offering students the advantages of both formats. This pedagogical approach has gained significant traction in higher education as it offers significant potential to enhance the educational experience in higher education globally. BL offers a promising solution to address the evolving needs of students and faculty in post COVID-19 era. University of Kabianga (UoK), like many higher education institutions, is facing increasing pressure to modernize its teaching and learning practices and is implementing Technology Enabled Learning (TEL) programme. Blended courses have been developed and lecturers and learners are slowly embracing BL under guidance and mentorship of Commonwealth of Learning (COL). Research on blended learning impact on academic performance has yielded mixed results, with some studies showing positive effects, others showing no significant difference, and some even suggesting negative impacts. This research study investigated the effectiveness of a BL approach in regard to students' academic achievement in higher education. This was achieved through examining whether there is a difference in academic performance in formative assessments, in courses taught through blended learning and those offered in the traditional mode of face to face, at University of Kabianga. Traditional driver blended learning model was used in this study. Complex Adaptive Blended Learning System (CABLS) theory was used to guide this study. The research designed employed in this study was Quasi-experimental research design. The type of Quasi-experimental designs used in this study was, 'use control groups but no pre-test'. The study sample was 2647 students, enrolled in 9 randomly selected courses, each with 2 groups of students. BL group had 1441students, while traditional group had 1206 students. Statistical Package for Social Sciences (SPSS) software was used to analyze the quantitative data. Data analysis yielded mixed results, with some courses showing significant difference in academic achievement between blended and traditional group, while others showed no significant difference. Overly, blended learning group had higher academic achievement than traditional group.

Introduction

Blended Learning (BL) has emerged as a prominent pedagogical approach in contemporary education, combining the traditional instruction with online learning experiences (Garrison & Vaughan, 2008). This innovative model leverages the strengths of both modalities, offering a more personalized and engaging learning environment for students (Qamar et al., 2024).

According to (Gupta, 2022), there are different types of BL models the five most common being; flipped, traditional driven, rotational, flex and enriched virtual model. This study adopted traditional driven model. 40% of the content was taught online (synchronously and asynchronously) while 60% was traditional. Formative assessment in the blended mode was online.

1.2 Purpose of the Study

The purpose of this study was to establish whether there is a difference in academic achievement of university students' taught through blended and traditionally mode.

1.4 Research Questions

The following research question were formulated for the purpose of this study:

1. How does academic achievement in blended and traditionally taught courses differ?

1.5 Research Hypothesis

H_o1. There is no statistically significant difference in academic achievement in blended and traditional learning mode.

2.0 Literature Review

Blended learning has emerged as a prominent pedagogical approach in contemporary education, combining the traditional face-to-face instruction with online learning experiences (Garrison & Vaughan, 2008).

2.1 Blended Learning Effectiveness

Blended learning is generally considered effective, as it can improve student engagement and performance (Gayani, 2023a) . By blended learning combining online and traditional activities, it leads to, increased student interactions with teachers and improved students' academic achievement, self-study abilities and learning attitudes in mathematics (Doung et al., 2022).

2.2 Academic Performance in the Blended Courses

Research on its impact on academic performance has yielded mixed results, with some studies showing positive effects, others showing no significant difference, and some even suggesting negative impacts (Cao, 2023). Several studies have revealed that applying blended learning to teaching improves student academic achievement (Alammary, 2019; Alsalhi et al., 2021; Balentyne and Varga, 2017; Gambari et al., 2017; Kundu et al., 2021; Lin et al., 2017; Poon, 2013; Psycharis et al., 2013; Zhang and Zhu, 2017). Other studies have found no significant difference in student performance between blended learning and traditional learning (Gayani, 2023b). Improved student interactions means students are more actively involved, and can learn independently and collaborate with others leading to improved academic achievement and better learning outcomes.

This analysis sought to establish how blended learning impacted academic score at UoK.

2.3 Factors Influencing Academic Performance:

Several factors can influence the effectiveness of blended learning and, consequently, student performance:

- **Course Design**: The quality of the course design, including the alignment of learning objectives, activities, and assessments, plays a crucial role. Well-designed blended courses that effectively integrate online and offline components tend to show better outcomes (Bernard et al., 2009).
- **Faculty Training:** Faculty training and development in blended learning pedagogy and technologies are essential. Effective instructors can create engaging learning experiences and provide appropriate support to students (Graham, 2006).
- **Student Characteristics:** Student characteristics, such as prior experience with technology, learning styles, and motivation, can influence their performance in blended learning environments.
- **Technological Infrastructure:** Reliable internet access, access to devices, and a user-friendly learning management system are critical for successful blended learning implementation (Means et al., 2009).
- **Assessment Methods:** The choice of assessment methods should align with the learning objectives and the nature of the blended learning activities. A variety of assessment methods, including online quizzes, assignments, discussions, and presentations, can provide a comprehensive evaluation of student learning.

2.4 Research Findings on BL and academic achievement

- **Positive Impact**: Several studies have shown positive effects of blended learning on student performance, particularly in terms of knowledge acquisition, skill development, and critical thinking (Garrison et al., 2000; Richardson & Swan, 2003**).**
- **No Significant Difference:** Other studies have found no significant difference in academic performance between students in blended learning courses and those in **traditional courses.**
- **Negative Impact:** In some cases, blended learning has been associated with lower student performance, particularly when the implementation is poorly planned or when students lack the necessary technological skills or support.

This study is an investigation of whether there is a difference in formative academic performance of students taught using traditional face-to–face method and BL in 9 courses at UoK.

2.5 Theoretical Framework

Complex Adaptive Blended Learning System (CABLS) theory was used to guide this study. This theory views blended learning as a dynamic ecosystem comprising six interrelated elements: the learner, the teacher, the technology, the content, the learning support, and the institution. Each element has its own characteristics and acts in relation to all the others in a

dynamic and integrative manner. The CABLS framework allows for a systemic comparison of blended and traditional learning by considering how each modality influences these key interacting components and their relationships (Wang et al., 2015).

3.0 Research Method

3.1 Methodology

Quasi-experimental research design was used in this study. Quasi-experimental designs are similar to true experiments but lack the key element of random assignment. The lack of random assignment is the major weakness of the quasi-experimental study design. Associations recognised in quasi-experiments meet one important requirement of causality since the intervention precedes the measurement of the outcome (Harris et al., 2006).

The type of Quasi-experimental designs used in this study is use control groups but no pre-test (Harris et al., 2006, Shadish, Cook, & Campbell, 2002, Cook, T. D., & Campbell, D. T. 1979)

In this case the independent variable is the type of learning (blended vs. traditional), while the dependent variable is academic achievement measured by formative test scores.

The traditional taught courses comprised only traditional teaching. The teaching consisted mainly of lectures with minimal interactions and small group activities.

On the other hand, blended learning course was designed to include a combination of online and traditional instruction. The online learning involved both synchronous and asynchronous learning. The asynchronous learning involved use of UoK Moodle Learning Management System (LMS). The course content on the LMS was well structured and involved a number of interactive learning activities (quizzes, non-interactive and interactive recorded lecturers, and links to journal articles, books blogs and other learning material.

In addition, there were synchronous online lectures via ZOOM, Google Meet and the local equivalent of Big Blue Button (KNET) platform. The online and traditional instruction were designed to complement each other and to provide a comprehensive learning experience.

3.2 Population and Sample size

The population of this study was 3000 learners enrolled in the 9 randomly selected course. Sample size was 2647 students of which, 1441 student went through BL and 1206 traditional learning. The 9 courses had 2 groups; students taught through blended learning and students taught through traditional method. The formative assessment scores of the 2 groups of students (BL and Traditional) were used to compare academic achievement of leaners in the two modes of learning. This is shown Table 1.

Table 1. Study Sample

Serial No.	Year of study	Course Code	No. in Blended Course	No in Traditional Courses
1.	2	ARE 216	6	5
2.	2	CIM 210	412	296
3.	3	CIM 312	133	110
4.	3	CIM 321	160	97

5.	3	BBM 311	8	17
6.	3	CIM 322	160	147
7.	3	CIM 323	206	64
8.	4	CIM 410	166	164
9.	4	EMP 411	190	306
Total			1441	1206

3.3 Research Instruments

Mark sheets were used to collect data.

3.4 Data Analysis

Statistical Package for Social Sciences (SPSS) software was used to analyze the data. Data analysis was conducted using descriptive and inferential statistics.

4.0 Results and discussion

4.1 Academic Performance in the Blended Courses

Mean scores of academic achievement in the two modes of learning were determined. Results are shown in Table 2.

Table 2: Mean scores

Learning Mode	N	Mean	Std. Deviation	df
Blended	1441	59.37	9.180	1440
Face to Face	1206	49.88	13.539	1205

- The blended learning group has a **higher mean score** (59.37 vs. 49.88).
- The **standard deviation** is smaller for blended learning (9.18 vs. 13.54), suggesting less variability in scores compared to traditional learning.
- The difference in means (**9.49 points**) is visually and numerically substantial.

Furthermore, results indicate that the range of mean scores for the blended courses was 39.46-66.29, while the range of mean scores for the traditional method was 34.14 - 65.13. This indicates that the blended learning group had a higher range of mean scores, with some students performing much better than others.

Additionally, results show that the median score for the blended learning group was 58. 55, while the median of the mean score for the traditional method was 51.68. This further illustrates that most students in the blended learning courses performed better than most in the traditional courses.

Statistical significance test between blended and traditional learning

This study investigated whether there is any significant difference between learners' performance in blended and traditional learning by use of independent sample t-test. Results were as shown in Table 3.

Table 3: Comparison of course performance in the traditional and blended learning groups

Mode	N	Mean	Std. Deviation	df	t value	p value
Blended	1441	59.37	9.180	1440	18.767	0.000
Face to Face	1206	49.88	13.539	1205		

The p-value for the t test for Equality of Means is 0.000, much lower than the p-value significance threshold of 0.05. This tells us that there is indeed a statistically significant difference in the mean of blended learning and traditional face to face learning at UoK. The blended group had a mean score of 59.37 with a standard deviation of 9.180 compared to the non-blended (face –to-face) groups' mean values of 49.88 with a standard deviation of 13.539 (t value=18.767, $p< 0.005$). Therefore, the null hypothesis is rejected.

Blended learning students scored significantly higher than face-to-face students, with a large and educationally meaningful effect. The difference is both statistically significant and practically important, given the effect size and confidence interval.

As a summary, the results of this study show that students in the blended learning courses performed significantly better than students in the traditional courses. The mean score for the blended learning courses was 59.37, while the mean score for the traditionally taught courses was 49.88. The difference in mean scores was statistically significant ($p < 0.05$) and the results were consistent with the standard deviation and median scores.

These results are consistent with those of JOOUST where the blended groups mean score on the achievement test was higher than the non-blended group's mean (Abeka & Dwada, 2021). The result at UOK were also consistent with those of Kibabii University where it was reported that there was a significant difference in course achievement in terms of mean score obtained. The experimental (blended) group's mean score on the achievement test was higher than the control (non-blended) group's. Result from Kibabii and JOOUST indicated that the learners in the blended mode of learning performed better than the learners in the non-blended mode (Prasad, 2022 & Mow, 2019).

Similar finding were reported by previous studies showing that BL is effective for improving academic performance (Cortizo et al., 2010, Xu et al., 2019, Yang et al., 2019). In addition, according to Gayani, (2023), blended learning is generally considered effective, as it can improve student engagement and performance (Gayani, 2023a). By blended learning combining online and traditional activities, it leads to, increased student interactions with teachers and improved students' academic achievement, self-study abilities and learning attitudes (Doung et al., 2022). Improved student interactions means students are more actively involved, and can learn independently and collaborate with others leading to improved academic achievement and better learning outcomes.

However, UoK results are inconsistent with those of Fiji National University and National University of Samoa which indicated that there was no statistically significant difference in courses taught through blended mode and those taught through face to face.

Table 4: Comparison of Mean Scores Attained between Blended and Traditional groups per Course

	Blended Course Assessment Score			Non Blended Course score				
	N	Mean	SD	N	Mean	SD	t value	p value
BBM 311	8	64.50	6.908	17	65.13	9.553	0.172	.868
CIM 210	412	60.44	8.656	296	57.49	8.590	3.957	.000
CIM 312	133	66.29	6.497	110	63.45	6.738	3.040	.003
CIM 321	160	52.44	5.811	97	50.29	6.248	2.664	.009
CIM 322	160	54.48	6.368	147	39.22	3.019	24.435	.000
CIM 323	206	64.02	7.623	64	60.27	9.089	2.731	.008
CIM 410	166	58.55	9.875	164	51.68	9.097	6.150	.000
EMP 411	190	39.46	7.302	306	34.14	9.717	5.978	.000
ARE 216	6	50.80	15.255	5	40.60	19.970	1.288	.267

UOK offered courses in blended mode, where learners accessed online resources for learning, and were also assessed online. From the analysis, some courses produced a higher mean when offered in blended mode while others showed low mean in academic achievement. When independent t test for equality of exam means of blended and traditional learning were calculated results indicate that in some of the courses namely; CIM 210, CIM 312, CIM 322, EMP 411and CIM 410 the p values are .000, .003, .000, .000 are much lower than the p-value significance threshold of 0.05. This is an indication that there is indeed a statistically significant difference in academic achievement of blended courses and face to face learning at UoK. As for the other courses namely BBM 311, CIM 321, CIM 323 and ARE 216 there is no statistically significant difference in the mean scores of students who learned through blended and traditional mode.

UoK results thus demonstrates mixed results where, in some courses students who used blended learning mode had higher exam mean scores than those who learned through face to face. In other courses student who learned through traditional got higher exam mean scores than though who learned through blended mode.

This mixed findings are consistent with those of Cao (2023) who stated that research on its impact on academic performance has yielded mixed results, with some studies showing

positive effects, others showing no significant difference, and some even suggesting negative impacts.

Similar results were found in Fiji National University, which showed mixed results, indicated a statistically significant difference in 40% of the courses under study while the remaining 60% didn't indicate a statistically significant difference (Prasad, 2022). Similarly mixed results were reported at National University of Samoa where they was statistically significant in three courses (30%) and no significant in seven courses (70%) under study Mow, (2019). Nakuru Training Institute Kenya, a TVET institution also produced mixed results in the units taught with blended and traditional mode (Wamunga & Kamonjo, 2023).

Conclusion

This study offers proof that blended learning is an effective approach to teaching in higher education. The results propose that blended learning can improve student performance compared to traditionally taught courses.

These results have important implications for the design and implementation of blended learning in higher education. The study established that students in the blended learning courses performed significantly better than students in the traditionally taught courses in the formative assessment. The mean score for the blended learning courses was 59.37, while the mean score for the traditionally taught courses was 49.88. The difference in mean scores was statistically significant. This is an indication that blended learning is a likely approach to improve student performance in higher education.

Generally, this study offers convincing proof that blended learning produced better academic achievement than traditional method in higher education and therefore can be used to improve student performance. BL approach is promising should be probed further to confirm this finding in order to inform decision of implementing or adopting BL in higher education.

However, the result in this study are based on a specific sample of year 2, 3, and 4 students in selected courses at UoK, and therefore may not be generalised in other populations and contexts. Generalisation is only limited to UoK.

Recommendation

Additional research is required to scrutinise the effectiveness of blended learning in diverse contexts and with diverse populations of students in higher education.

Moreover, forthcoming research should also emphasis on identifying the specific factors that contribute to the effectiveness of blended learning, such as the design of the course, the teaching methods used, and students' characteristics and factors among others.

Ethics statement

The studies involved student data and permission for use was given by UoK.

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