Effect of Mobile Applications on Students' Interest and Performance in Technical Colleges in Lagos State

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Abstract

This study investigated the effect of mobile applications on students' academic performance and interest in Furniture Design and Construction within technical colleges in Lagos State, Nigeria. Employing a quasi-experimental design, 85 first-year students from two randomly selected colleges were divided into an experimental group (43 students) taught using mobile apps and a control group (42 students) taught via conventional methods. Four research questions and hypotheses guided the study. Data were collected through validated instruments, including an Achievement Test, Interest Inventory, and Skills Performance Test, with pre-tests and post-tests administered over a four-week intervention. Results revealed that the experimental group outperformed the control group, with a mean academic gain of 25.20 versus 14.00 and an interest gain of 68.00 versus 5.75. Analysis of covariance (ANCOVA) confirmed significant differences in academic performance (F = 103.717, p < 0.05) and interest (F = 175.259, p < 0.05) favouring mobile apps, while ability level showed no significant effect on either outcome (p > 0.05). Recommendations include integrating mobile apps into technical education and optimal app design for sustained benefits.

Keywords: Mobile Applications, Technical Education, Student Performance, Learning Interest, Technical College

INTRODUCTION

Technology plays a vital role in enhancing human life, and its integration into education has enhanced student engagement and knowledge acquisition. Mobile applications (apps) has provided new opportunities for interactive and engaging learning experiences. Mobile apps serve as valuable tools that help students analyze lessons, stimulate curiosity, and systematically explore knowledge. Learning via mobile apps allows students to access educational content anywhere and at any time, thus promoting personalized learning experiences (Crompton, 2013).

The introduction of digital learning tools has transformed traditional education systems by making learning more engaging and participatory. Studies have shown that mobile applications provide students with multimodal learning experiences that cater for various learning styles (Traxler, 2010). For instance, students who struggle with conventional textbook learning can benefit from visually rich and interactive mobile apps that break down complex concepts into digestible content. Furthermore, mobile learning promotes active learning techniques, enhancing students' critical thinking and problem-solving skills (Kearney et al., 2012).

Graduates of Furniture Design and Construction from Nigeria's technical colleges are expected to demonstrate competency in various skills. As stated by the National Board for Technical Education [NBTE] (2004), graduates should be able to interpret constructional drawings, operate woodworking tools, and construct different types of furniture. However, concerns have been raised regarding

the quality of graduates, as many are unable to meet industry standards. This skill gap has been linked to the limitations of traditional instructional methods, which often fail to provide students with hands-on experiences and real-world applications of their knowledge (Audu, Abdulkadir & Abdul, 2013).

Poor performance in Furniture Design and Construction has been attributed to outdated teaching methods, inadequate instructional materials, and students' lack of engagement. Traditional instructional approaches often rely on passive learning methods, such as charts and diagrams, which fail to capture students' interest. Consequently, students struggle with low motivation and poor academic achievement. Studies indicate that student involvement plays a vital role in shaping educational results, and dynamic learning settings can greatly enhance students' ability to retain and comprehend challenging topics (Mayer, 2014).

In recent times, the integration of mobile apps in education has become increasingly significant, offering a way to boost student participation and academic success. Mobile technology holds the power to revolutionize conventional learning by encouraging lively and engaging environments (Gikas & Grant, 2013). In technical education, particularly in Furniture Design and Construction, mobile apps provide digital tools that support students in understanding design principles, woodworking techniques, and furniture construction. Apps such as Moblo, SketchUp, and AutoCAD allow students to visualize furniture designs, practice virtual construction, and refine their skills in a simulated environment before applying them in real-world settings (Akpan & Strachan, 2021).

Empirical studies suggest that mobile learning enhances collaboration, promotes self-regulated learning, and improves motivation (Kukulska-Hulme & Shield, 2008; Park, 2011). Additionally, the incorporation of gamification elements in mobile learning applications has been found to increase motivation and persistence among students (Hamari, Koivisto, & Sarsa, 2014). Given the increasing use of mobile devices among students, incorporating educational apps into learning can enhance their interest, improve retention, and boost academic performance. This aligns with constructivist learning theories, which emphasize active knowledge construction (Vygotsky, 1978).

Additionally, mobile applications provide immediate feedback, allowing students to self-correct and build confidence (Kim & Frick, 2011). Due to the potential benefits, this study, therefore, investigates how mobile applications impact students' interest and academic performance in Furniture Design and Construction in technical colleges in Lagos State.

RESEARCH QUESTIONS
1. How do mobile apps affect students' academic performance in Furniture Design and Construction in Lagos State's technical colleges?
2. How do mobile apps affect students' interest in studying Furniture Design and Construction?
3. What effect does ability level have on students' academic performance when taught with mobile apps?
4. What effect does ability level have on students' interest when taught with mobile apps?

HYPOTHESES
1. No significant difference exists in academic performance between students taught using mobile apps and those taught using conventional methods.
2. No significant difference exists in interest levels between students taught using mobile apps and those taught using conventional methods.
3. Ability level does not significantly affect the academic performance of students taught using mobile apps.
4. Ability level does not significantly affect students' interest when taught using mobile apps.

METHODOLOGY
A quasi-experimental design with pre-test, post-test, and a non-equivalent control group was adopted. Two technical colleges were randomly selected from the five available in Lagos State. The sample involved a total of 85 first-year students in Furniture Design and Construction, with 43 in the experimental group (Group A) and 42 in the control group (Group B).

Instruments and Data Collection

Data were gathered through an Achievement Test, an Interest Inventory, and a Skills Performance Test. The instruments were validated by three experts and piloted on 25 students outside the study area. Reliability coefficients were determined using Kuder-Richardson 20 for the Achievement Test (0.72), Kendall's Coefficient of Concordance for the Skills Performance Test (0.76), and Cronbach Alpha for the Interest Inventory (0.87).

Experimental Procedure

Pre-tests was administered to students in the two groups. Students in the experimental group received instruction using mobile applications, particularly Moblo 3D, for four weeks. Each student had access to a smartphone or tablet and actively engaged in lessons through the app. Meanwhile, the control group was taught using conventional methods. Post-tests were administered after the intervention.

Data Analysis

Mean scores were used to analyse research questions, and ANCOVA was employed to test hypotheses. If the mean gain score of the experimental group exceeded that of the control group, the treatment was deemed effective.

RESULTS

Research Question 1: How do mobile apps affect students' academic performance in Furniture Design and Construction in Lagos State's technical colleges?

Table 1. Effect of Mobile Apps on Students' Academic Performance in Furniture Design and Construction.

Group	N	Pre-test Score (X)	Post-test Score (X)	Mean Gain (X)
Control	43	40.50	54.50	14.00
Treatment	42	45.60	70.80	25.20

The table presents the effect of mobile apps on students' academic performance in Furniture Design and Construction in Lagos State's technical colleges. It compares two groups: a Control Group (students who did not use mobile apps) and a Treatment Group (students who used mobile apps). The Control Group had a pretest mean score of 40.50, which increased to 54.50 in the posttest, resulting in a mean gain of 14.00. The Treatment Group had a higher initial pretest mean score of 45.60, which significantly increased to 70.80 in the posttest, leading to a mean gain of 25.20. The results suggest that students who used mobile apps (Treatment Group) showed a greater improvement in their academic performance compared to those who did not (Control Group).

Research Question 2: How do mobile apps affect students' interest in studying Furniture Design and Construction?

Table 2. Effect of Mobile Apps on Students' Interest in Studying Furniture Design and Construction.

Group	N	Pre-test Score(X)	Post-test Score (X)	Mean Gain (X)
Control	43	40.50	46.25	5.75
Treatment	42	40.50	108.50	68.0

The table shows how mobile apps influence students' interest in studying Furniture Design and Construction by comparing a Control Group (students who did not use mobile apps) and a Treatment Group (students who used mobile apps). Both groups had the same pretest mean score of 40.50, indicating similar initial levels of interest. In the posttest, the Control Group showed a slight increase to 46.25, resulting in a mean gain of 5.75. However, the Treatment Group experienced a significant increase to 108.50, leading to a much higher mean gain of 68.00.These results suggest that students who used mobile apps developed a much stronger interest in Furniture Design and Construction compared to those who did not.

Research Question 3: What is the effect of ability level on students' academic performance in furniture design and construction?

Table 3. Effect of Ability Level on Students' Academic Performance in Furniture Design and Construction.

Group	Ability Level	N	Pre-test (X)	Post-test (X)	Mean Gain (X)	Difference
Control	High	23	57.40	60.70	3.30	2.20
	Low	20	43.60	48.30	4.70	
Experimental	High	22	52.10	81.40	29.30	
	Low	20	43.10	70.20	27.10	

The table presents the effect of ability level on students' academic performance in Furniture Design and Construction by comparing a Control Group (without mobile apps) and an Experimental Group (with mobile apps). In the Control Group, high-ability students had a slight mean gain of 3.30, while low-ability students gained 4.70, showing minimal improvement. However, in the Experimental Group, both ability levels showed significant progress, with high-ability students improving by 29.30 and low-ability students by 27.10. The difference in mean gain (2.20) suggests that while high-ability students slightly outperformed their low-ability peers, both groups benefited greatly from mobile apps.

Research Question 4: What is the effect of ability level on students' interest in studying furniture design and construction?

Table 4. Effect of Ability Level on Students' Interest in Studying Furniture Design and Construction.

Group	Ability Level	N	Pre-test (X)	Post-test (X)	Mean Gain (X)	Difference
Control	High	23	42.00	49.50	7.50	4.00
	Low	20	39.00	43.00	4.00	
Experimental	High	22	42.00	112.00	70.00	
	Low	20	39.00	105.00	66.00	

The table shows how students' ability levels (High and Low) affect their interest in studying Furniture Design and Construction, by comparing the Control Group and the Experimental Group. In the Control Group, high-ability students had a pretest mean score of 42.00, which increased to 49.50, resulting in a mean gain of 7.50, while low-ability students improved from 39.00 to 43.00, with a smaller mean gain of 4.00. In the Experimental Group, high-ability students' interest increased from 42.00 to 112.00, with a mean gain of 70.00, while low-ability students improved from 39.00 to 105.00, with a mean gain of 66.00. The difference in mean gain between high- and low-ability students was 4.00, favoring high-ability students.

Hypothesis 1: No significant difference exists in academic performance between students taught using mobile apps and those taught using conventional methods.

Table 5. Analysis of covariance of students' academic performance.

Source	SS	df	Mean Square	F	Sig.
Corrected Model	3277.884[a]	2	1638.942	54.769	.000
Intercept	4187.068	1	4187.068	139.920	.000
Skill Pre-test	620.984	1	620.984	20.751	.000
methodology	3103.718	1	3103.718	103.717	.000
Error	1107.216	37	29.925		
Total	161386.000	40			
Corrected Total	4385.100	39			

The analysis examines the effect of teaching methodology on students' academic performance, comparing mobile apps with conventional methods. The results show a significant effect of the teaching method (F = 103.717, Sig. = 0.000), indicating that students taught using mobile apps performed significantly better than those taught with conventional methods. Since the significance value for methodology is below 0.05, the null hypothesis is rejected. It is concluded that mobile apps significantly enhance students' academic performance compared to traditional teaching methods.

Hypothesis 2: No significant difference exists in interest levels between students taught using mobile apps and those taught using conventional methods.

Table 6. Analysis of covariance of students' interest in studying furniture design and construction.

Source	SS	df	Mean Square	F	Sig.
Corrected Model	38868.485[a]	2	19434.242	87.896	.000
Intercept	7176.916	1	7176.916	32.459	.000
Interest Pre-test	117.860	1	117.860	.533	.470
methodology	38750.625	1	38750.625	175.259	.000
Error	8180.890	37	221.105		
Total	286525.000	40			
Corrected Total	47049.375	39			

The ANCOVA examined whether a significant difference exists in students' interest between those taught using mobile apps and those taught with conventional methods. The teaching methodology had a significant effect on students' interest (F = 175.259, Sig. = 0.000), indicating that mobile apps greatly enhanced students' interest compared to traditional methods. Given that the significance value for methodology is below 0.05, the null hypothesis is thereby rejected. It is concluded that mobile apps significantly increase students' interest in studying Furniture Design and Construction compared to conventional teaching methods.

Hypothesis 3: Ability level does not significantly affect the academic performance of students taught using mobile apps.

Table 7. Analysis of covariance of students' academic performance as a function of ability level.

Source	SS	df	Mean Square	F	Sig.
Corrected Model	515.073[a]	2	257.536	2.462	.099
Intercept	3767.462	1	3767.462	36.019	.000
Skill Pre-test	52.673	1	52.673	.504	.482
ability	340.907	1	340.907	3.259	.079
Error	3870.027	37	104.595		
Total	161386.000	40			
Corrected Total	4385.100	39			

The ANCOVA results examine whether ability level significantly affects the academic performance of students taught using mobile apps. The ability level factor had an F-value of 3.259 and a significance level (Sig. = 0.079), which is greater than 0.05, indicating that ability level does not have a statistically significant effect on academic performance. Since the significance value for ability level is above 0.05, the null hypothesis is not rejected. It is concluded that ability level does not significantly affect the academic performance of students taught using mobile apps.

Hypothesis 4: Ability level has no significant effect on students' interest in furniture design and construction when taught with mobile apps

Table 8. Analysis of covariance of students' interest in studying furniture design and construction as a function of ability levels.

Source	SS	df	Mean Square	F	Sig.
Corrected Model	504.625[a]	2	252.313	.201	.819
Intercept	7548.975	1	7548.975	6.001	.019
Interest Pre-test	49.000	1	49.000	.039	.845
ability	386.765	1	386.765	.307	.583
Error	46544.750	37	1257.966		
Total	286525.000	40			
Corrected Total	47049.375	39			

The ANCOVA results examined whether ability level significantly affects students' interest in studying Furniture Design and Construction when taught using mobile apps. The ability level factor had an F-value of 0.307 and a significance level (Sig. = 0.583), which is greater than 0.05, indicating that ability level does not have a statistically significant effect on students' interest. Since the significance value for ability level is above 0.05, the null hypothesis is not rejected. It is concluded that ability level does not significantly affect the interest of students taught using mobile apps.

FINDINGS OF THE STUDY

1. The use of mobile apps improved students' academic performance in Furniture Design and Construction.
2. Mobile apps increased students' interest in studying Furniture Design and Construction.
3. Ability level had a minor effect on students' academic performance when taught using mobile apps.
4. Ability level had a minor effect on students' interest in Furniture Design and Construction when taught using mobile apps.
5. The ANCOVA results showed a significant difference in academic performance between students taught with mobile apps and those taught using conventional methods.
6. A significant difference was found in students' interest between those taught using mobile apps and those taught with conventional methods.
7. Ability level did not significantly affect students' academic performance when taught using mobile apps.
8. Ability level did not significantly impact students' interest in studying Furniture Design and Construction when taught using mobile apps.

DISCUSSION

The findings from Research Question 1 indicate that students using mobile apps exhibited a higher mean gain in academic performance compared to the Control Group. This is in line with Gikas and Grant (2013) who noted that mobile apps that are specifically designed for educational purposes, have the potential to transform traditional learning approaches and create interactive and dynamic learning environments. These result also align with empirical studies such as that by Sung, Chang, and Liu (2016), who conducted a meta-analysis on mobile learning and found that mobile devices significantly improve academic performance across various disciplines, attributing this to increased engagement and access to interactive resources.

For Research Question 2, the data reveal an increase in interest among students using mobile apps, with the Treatment Group achieving a mean gain of 68.00 compared to the Control Group's 5.75. This finding shows the motivational potential of mobile apps, likely due to their interactive and user-friendly features. This finding is corroborated by a study from Liao, Yuen-kuang, Chen, Cheng-Huan & Yang, Yong-Cih. (2020), which found that mobile learning tools significantly boost student interest and engagement by providing dynamic, visual, and self-paced learning experiences.

Research Question 3 examined the effect of ability level on academic performance. The Experimental Group showed greater gains for

both high-ability (29.30) and low-ability (27.10) students, with a minimal difference (2.20), indicating that mobile apps benefit students across ability levels. In contrast, the Control Group's gains were negligible (3.30 for high-ability, 4.70 for low-ability). This aligns with findings by Hwang and Wu (2014), who noted that mobile learning can level the playing field by providing tailored support, such as tutorials or simulations, which are particularly beneficial in practical subjects like Furniture Design. However, a study by Ahmad et al. (2020) opposes this, by suggesting that high-ability students may still outperform peers in technology-enhanced settings due to better self-regulation.

Similarly, Research Question 4 examined ability level's effect on interest. The Experimental Group showed large gains in interest for both high-ability (70.00) and low-ability (66.00) students, with a small difference (4.00), while the Control Group's gains were modest (7.50 and 4.00). This implies that mobile apps encourage interest uniformly across ability levels. This is supported by Liu et al. (2014), who found that mobile apps increase motivation universally by offering personalized feedback and interactive content.

The hypotheses tested via ANCOVA further solidify these findings. Hypothesis 1 was rejected, confirming that mobile apps significantly enhance academic performance over conventional methods. Hypothesis 2 was also rejected, affirming a significant increase in interest. Hypotheses 3 and 4 were not rejected, indicating that ability level does not significantly influence interest and academic performance when mobile apps are used.

CONCLUSION

This study shows that mobile apps significantly enhance both academic performance and interest in Furniture Design and Construction, regardless of students' ability levels. These results align with previous studies, although some point to contextual and implementation issues that that could moderate these effects. The practical implications suggest that integrating mobile apps into vocational education could yield substantial benefits, particularly in resource-constrained settings. Further research could explore long-term effects and the best ways to design apps to boost these results even further.

RECOMMENDATIONS

1. Educational institutions should consider integrating mobile apps in their teaching methods for technical subjects.
2. Workshops and seminars can be organized to familiarize teachers with the latest educational apps and how to incorporate them effectively in their teaching practices.
3. Schools should ensure that students have access to smartphones, tablets, or computers with internet connectivity.

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