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Effects of the Environments of Doodly-Produced Multimedia Instructions on the Academic Interest of Undergraduate Educational Technology Students

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Abstract

This study scrutinized the effects of Doodly-produced multimedia instructions on the academic interest of undergraduate Educational Technology (EdTech) students in Cross River State's public universities. Utilizing a 2x2 pre-test/post-test quasi-experimental factorial design, the research examined two instructional environments (classroom vs. online) while adopting gender as a mediating variable. The study population comprised 3,065 third-year education students from the University of Calabar and the University of Cross River State. Through purposive and simple random sampling, 196 students across two intact classes were selected (105 classroom-based; 91 online-based), consisting of 92 males and 104 females. Data were collected using the Educational Technology Interest Inventory (ETII), which after face and construct validation demonstrated high internal consistency with a Cronbach Alpha reliability index of 0.87. The three null hypotheses were tested using the Analysis of Covariance (ANCOVA) at a 0.05 significance level. The analytical output revealed that Doodly-produced multimedia significantly enhanced academic interest across both learning environments. Furthermore, no significant influence of gender was found, nor was there a statistically significant interaction effect between the instructional environment and gender. The study concludes that Doodly is an effective, gender-neutral tool for boosting EdTech student's interest in both physical and digital settings.

Keywords: Doodly Multimedia Instructions, Educational Technology Undergraduate Students, Academic Interest, Classroom Learning Environment, Online Learning Environment.

Introduction

The transformative potential of Educational Technology (EdTech) as a course of study is increasingly recognized as a cornerstone of modern-day teacher-training programs, yet its implementation often faces a paradox. While the course aims to solve educational problems through systematic technological application (AECT, 2018), undergraduate students' interest in the course is frequently in decline (Liu et al., 2022; Johnson et al., 2025). EdTech is more than the mere use of educational tools. It encompasses the study of learning psychology, curriculum development, and the scientific identification of practical solutions to instructional challenges (Lethan, 2021). Despite its necessity for trainee-teachers seeking to make a positive impact (Johnson et al., 2024), the traditional teaching methods by which instructions are delivered often fail to captivate students, resulting in a loss of motivation and academic interest (Pedro et al., 2018; Liu et al., 2022).

This challenge is particularly acute within public universities in Nigeria, and Cross River State specifically. As a general course required for third-year education students across all education faculties, EdTech instruction is hindered by high student-to-lecturer ratios, overcrowded classrooms, and a dearth of qualified instructors and resources (Asiyai, 2017; Odia & Omofonmwan, 2017).

While online learning offers a potential alternative to these physical constraints (Top, n.d.; Pedro et al., 2018), its effectiveness in the Nigerian context is often stymied by poor internet connectivity and inadequate equipment

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(Johnson et al., 2021). Consequently, the search for practical, replicable, and innovative pedagogical approaches remains a priority for researchers.

One such promising solution is the Doodly, a user-friendly animation production software that utilizes a drag-and-drop interface to create professional multimedia sketches and explainer videos (Stranger, 2020; Woofresh, 2021). Because it eliminates the need for extensive design skills, it allows educators to produce high-quality instructional materials with minimal investment in time and digital resources (AP News, 2021). Emerging evidence suggests that the act of doodling and the use of animated multimedia can activate neurological pathways that enhance information processing, retention, and academic achievement (Liu et al., 2022; Johnson et al., 2024). Preliminary studies indicate that Doodly-produced multimedia may outperform traditional presentations in fostering student engagement (Grabinger et al., 2019; Johnson et al., 2025; Johnson et al., 2025b).

The impact of such tools could be better understood through the lens of students' academic interest. This is a multidimensional construct comprising affective, cognitive, and behavioral components (Ashley et al., 2019). Interest acts as a critical psychological state and intrinsic motivator, fueling the attention and emotional connection necessary for knowledge acquisition (Harackiewicz et al., 2016; Renninger, 2021). When students' interest is captured, educators can create environments that cater to individual needs, potentially mitigating the negative effects of unfavorable learning conditions like poor ventilation or lack of materials often found in physical classrooms (Shalaway, 2020; Johnson et al., 2021).

Furthermore, the efficacy of Doodly-produced multimedia may be moderated by the learning environment. Whether it be the physical classroom or the digital, mobile-accessible online space (O'Malley et al., 2015; Johnson & Udo, 2020). However, the role of gender could add a layer of complexity. While some researchers suggest that gender, as a socio-cultural construct distinct from biological sex (Yavuz, 2016; Zambon, 2020), influences learning preferences, such as a female preference for visual and collaborative approaches (Liu et al., 2022), others find no significant disparities (Liu et al., 2022; Johnson et al., 2025), a situation which calls for more scholarly exploration.

This study is anchored in Mayer's (2022) Cognitive Theory of Multimedia Learning (CTML) and Siemens' (2011) Connectivism. CTML posits that deeper learning occurs when instructional messages are designed to align with human cognitive architecture, specifically the dual-channel processing of visual and auditory stimuli (Mayer, 2022). Well-crafted Doodly animations minimize extraneous cognitive load, thereby potentially increasing learning interest (Ramaltchan 2019). Complementing this, Connectivism views learning as a social, networked process facilitated by technology (Siemens, 2011). Based on the utilization of Doodly-produced multimedia in both traditional classrooms and online platforms (such as WhatsApp), this research explores how technology-enabled connections can overcome the physical instructional limitations of the Nigerian educational ecosystem (Pedro et al., 2018; Johnson & Udo, 2020). Ultimately, this investigation seeks to determine which instructional environment, classroom or online, most effectively leverages Doodly software to revitalize student interest in Educational Technology.

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Despite the growing ubiquity of mobile devices and their appeal to young learners (Al-Zahrarie & Laxman, 2016), the specific impact of Doodly-produced multimedia on students' academic interest within the EdTech curriculum remains underexplored. There is a pressing need for empirical clarity on how these animated instructions interact with both the learning environment (classroom vs. online) and student gender. This research, therefore, seeks to investigate whether Doodly can serve as a catalyst for professional proficiency and enhanced learning interest among pre-service teachers, ultimately contributing to a more effective educational system (Lethan 2021; Johnson et al. 2025). The study will empower lecturers with the necessary information to succeed in the field of EdTech by fostering students' interest in EdTech across classroom and online learning environments; the students' gender notwithstanding. The results of this research will also add significantly to creating effective instructional strategies using doodly-produced multimedia.

Consequently, the current study seeks to bridge the discussed scholarly gaps by investigating how different learning environments within Doodly-produced multimedia lessons affect the academic interest of Educational Technology undergraduates at public universities in Cross River State. Furthermore, it explores how gender may moderate the effectiveness of this intervention. To guide the empirical investigation, the following null hypotheses were formulated:

i. The mean interest scores in Educational Technology among undergraduate students will not differ significantly between those receiving classroom-based doodly-produced multimedia instructions and those receiving online-based doodly-produced multimedia instructions.

ii. Doodly-produced multimedia instructions will not significantly differ in the mean interest scores in Educational Technology among male and female undergraduate students.

iii. There is no statistically significant interaction effect between the environments of Doodly-produced multimedia instruction (classroom versus online) and gender on the mean interest scores of undergraduate students in Educational Technology.

Intervention Procedure Using Doodly-Produced Instructional Multimedia

This research used the ADDIE instructional design model, which stands for Analysis, Design, Development, Implementation, and Evaluation, as its framework for the intervention (Centre for Educational Technology, Florida State University 1975).

The Analysis phase targeted a detailed comprehension of the actual learners, exact contents of EdTech, learning context, and instructional needs of the participating lecturers. A preliminary study using the Topics Difficulty Inventory pinpointed four major areas under EdTech that required more concentrated attention (Forms of Educational Technology, Components of Educational Technology, Information and Communication Technology, and Principles of Effective Improvisation). Since Doodly is an innovative design tool, for its effective implementation, the lead researcher provided training for other researchers as well as the course lecturers on the instructional design principles and practical utilization thereof, using the storyboard for the production.

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The Design phase focused on the instructional goals to be achieved, storyboard for each doodly-produced multimedia resource, as well as plans for implementation and evaluation. The storyboards acted as blueprints for the content elements specific to each unit of multimedia being produced, including visual representation, audio narration, and assessment methods.

The Development phase involved turning the storyboards into finished audio-visual materials using the basic version of Doodly software. This included the conversion of written content into dynamic audio narration and the placement of pertinent visual components right on the Doodly timeline. Expert evaluations and comments were integrated throughout this phase to polish each multimedia resource and make sure it adhered to the predetermined quality standards.

The Implementation phase began with a pilot testing phase that aimed to determine the feasibility and effectiveness of the produced materials. Then, the doodly-produced instructional multimedia was delivered to the two groups: classroom group was given face-to-face instructions with a multimedia projector, while the online group accessed the packages on mobile devices through WhatsApp. The choice of WhatsApp was hinged on the ubiquity and ease of use of the App by the students, compared to other instant messaging platforms.

The evaluation phase involved the comparison of the data from the pre-test and the post-test to ascertain the effect of the doodly-produced instructional multimedia on undergraduate students' academic interest in EdTech. The findings from this measured the success of the instructional method used and provides helpful information for subsequent implementations.

Research Method

Ethical Considerations

Primarily, the researchers obtained an approval from the research and ethics committee of the University of Calabar, to execute the study. They further obtained a formal letter from the head of Educational Technology Department, University of Calabar, to participating departmental heads. This was in addition to the informed consent forms which the various heads of the departments had to fill and sign alongside the participating students. The purpose of the research was clearly explained to the participants, and they were further assured of strict confidentiality and anonymity.

Design and Procedure

The researchers adopted a quasi-experimental factorial framework, incorporating both pre-tests and post-tests to measure changes across the study groups, specifically a 2x2 design, which is appropriate for studying interventions in real-world contexts because it enhances the ecological validity and generalize ability of the results (Cook, 2019). The study's population consisted of all the three thousand and sixty-five (3065) third-year undergraduate students within the Education Faculties in the two public universities in Cross River State (University of Calabar – 2,474, University of Cross River State - 591). Through purposive sampling combined with simple random sampling, two intact classes with a total of

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196 third-year students were selected, comprising 92 males and 104 females (classroom group = 105 (females = 62, males = 43); online group = 91 (females = 42, males 49)). The two public universities in Cross River State were given random assignment using the “folded papers and blind picking” strategy, from which the University of Cross River State emerged as classroom group, while the University of Calabar became the online group. The target level was third-year students because EdTech as a course is mandatory at that level across the faculties of education. The doodly-produced multimedia instructional materials' integrated topics were Forms of Educational Technology, Components of Educational Technology, Information and Communication Technology, and Principles of Effective Improvisation. These topics were determined through a pilot study on the most difficult topics identified in the course content of the EdTech. Same packages were used for the two groups, but across the two different environments. The classroom group was treated to physical instruction with a multimedia projector, while the online group accessed the packages on mobile devices through WhatsApp. The choice of WhatsApp was hinged on the ubiquity and ease of use of the App by the students, compared to other instant messaging platforms. Data collection was facilitated by an instrument developed by the researchers known as the Educational Technology Interest Inventory (ETII), which was designed to evaluate general interest in Educational Technology. The ETII consisted of two sections: Section A captured demographic information pertinent to the study, while Section B had twenty items that employed a modified four-point Likert scale (Strongly Agree, Agree, Disagree and Strongly Disagree). The instrument was validated through the reviews by two EdTech, one Psychology, and two Educational Measurement experts. Reliability thereof was established using Cronbach's Alpha with a coefficient at 0.87. It was administered based on pre-post intervention; however, items’ order in post-test was rearranged. Data analysis followed data sorting, coding and scoring using Analysis of Covariance (ANCOVA) to test all null hypotheses at .05 level of significance. The use of ANCOVA was meant to control for pre-existing differences, reduce the error variance, examine the main effect of the intervention and investigate the interaction effect. The IBM Statistical Package for Social Sciences (SPSS), version 23, was used in running the data analysis.

Table 1: Results of Test of Normality Analysis.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Instructional Modes	*Statistic*	*Df*	*Sig.*	*Statistic*	*Df*	*Sig.*
Pre-test Edu Tech Interest	Classroom Instructional Env.	.083	105	.013	.963	105	.005
	Online Doodly Instructional Env.	.073	91	.040*	.987	91	.008

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Post-test Edu Tech Interest	Classroom Instructional Env.	.112	105	.002	.934	105	.000
	Online Doodly Instructional Env.	.088	91	.020	.972	91	.047

The above analysis using the Shapiro-Wilk test indicates that the data sets are normally distributed (Sig. < 0.05). This normality allows us to proceed with ANCOVA to test our hypotheses at a significance level of 0.05.

Results

The analytical results are presented as follows:

H1: The mean interest scores in Educational Technology among undergraduate students will not differ significantly between those receiving classroom-based doodly-produced multimedia instructions and those receiving online-based doodly-produced multimedia instructions.

Table 2: An ANCOVA Analysis Examining the Effects of Instructional Mode (Classroom vs. Online) on Students' Interest in Educational Technology Using Doodly-Produced Interventions

Source	*Type III Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared* (η^2_p)	*Dec.*
Corrected Model	919.723[a]	4	229.931	3.608	.007	.070	
Intercept	18855.430	1	18855.430	295.909	.000	.608	
Pretest EduT. Interest	526.305	1	526.305	8.260	.005	.041	
Group	164.118	1	164.118	2.576	.110	.013	NS
Gender	217.520	1	217.520	3.414	.066	.018	NS
Group * Gender	23.199	1	23.199	.364	.547	.002	NS
Error	12170.579	191	63.720				
Total	882913.000	196					
Corrected Total	13090.301	195					

Note: df = Degree of Freedom, F= F-ratio, Sig.= Significant/probability value, Dec.= Decision, NS = Not Significant, S = Significant

Table 2 contains results from an ANCOVA analysis on the effects of instructional mode (classroom versus online) on student interest in Educational Technology taught via the doodly-produced multimedia lessons. There were no differences in the mean interest scores of students receiving classroom versus online doodly-produced instruction ($F(1, 191) = 2.576$, $p = .110$, $\eta^2p = .013$). This non-significant finding is confirmed by the related p value, which

equals .110 and hence exceeds the alpha level set at .05. Moreover, the effect size has shown $\eta^2p = .013$, meaning there is a very insignificant difference between mean scores for interest in EdTech based on instructional environments; that accounts for only 1.3% of variance. Therefore, findings here indicate that Doodly-produced multimedia instructions delivered in a classroom as well as online can both effectively enhance student interest in EdTech.

H2: Doodly-produced multimedia instructions will not significantly differ in the mean interest scores in Educational Technology among male and female undergraduate students.

Table 2 also shows the results of ANCOVA on gender differences in the mean interest scores among undergraduate students in EdTech. The results indicated that there was no statistically significant difference in the mean interest scores between male and female students ($F (1, 191) = 3.414$, $p = .066$, $\eta^2p = .018$). The p-value (.066) is not significant as it falls beyond the accepted alpha level of .05, meaning that gender did not significantly affect students' interests in EdTech within the two environments of doodly-produced multimedia instructions examined.

H3: There is no statistically significant interaction effect between the environments of Doodly-produced multimedia instruction (classroom versus online) and gender on the mean interest scores of undergraduate students in Educational Technology.

Table 2 further shows the results of the ANCOVA analysis on the interaction effects of instructional environment (classroom versus online) and gender on the average interest scores of students in EdTech when using doodly-produced multimedia instructions. The study found that there was no statistically significant interaction effect between the two factors ($F (1, 191) = .364$, $p = .547$, $\eta^2p = .002$. In other words, the p-value ($p = .547$) is higher than the alpha level of 0.05; hence there is no statistically significant difference. Besides this, a small effect size $\eta^2p = .002$ provides further evidence that only 0.2% of mean interest score variance is attributed to the joint influence of instructional environments and gender. These results are again affirmed by Figure 1, which simply illustrates that there are no interaction effects significant enough to report. Here too, the curves representing an interaction between instructional environments and gender are just parallel lines-nonintersecting. The graph is as shown below.

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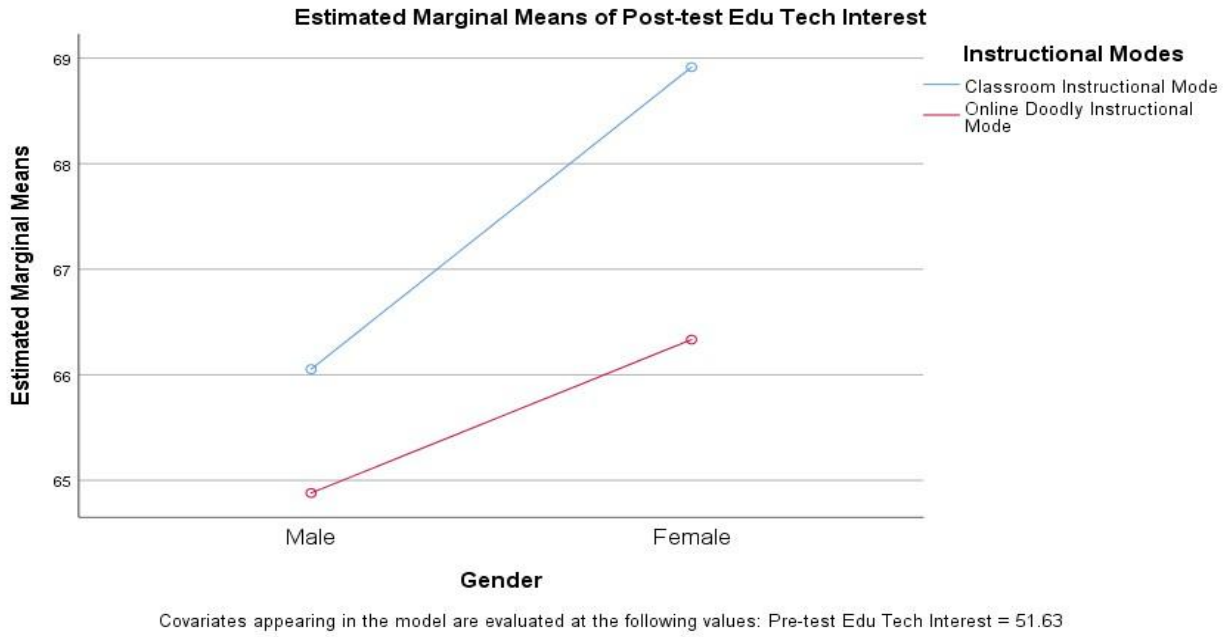

Figure 1: Profile plot for interaction effects of environments of Doodly-produced instructional multimedia and gender on the mean interest scores of students in Educational Technology.

The profile plot in Figure 1 indicates that there is no interaction effect between the instructional environments and gender on the mean interest scores of students in EdTech. This can be easily observed from the plot by looking at the parallel lines that represent instructional environments and gender groups. These lines do not cross each other, which means that their effect on students' interest remains unchanged to gender. Marginal means as well speak to this finding that independent of students' gender, classroom instructions have produced a mean interest score of 67.60 while online instruction has generated a mean score of 65.48.

Discussion

The first hypothesis which posited the mean interest scores in Educational Technology among undergraduate students will not differ significantly between those receiving classroom-based doodly-produced multimedia instructions and those receiving online-based doodly-produced multimedia instructions was upheld. It was evident in this study that classroom and online utilization of doodly-produced instructional multimedia worked significantly to boost the interest of undergraduate students in EdTech. The result showed that the university undergraduates taught EdTech in classroom and online, using doodly-produced instructional multimedia, had no significant difference in their mean interest scores. This outcome may be because doodly-produced instructional multimedia is a unique and unfamiliar audio-visual tool, embedded with dynamic captivating ability which makes it capable of compelling attention during instructional delivery, thereby leading to boosted interest in Educational Technology across the two learning environments. This result corroborates those of Salisu (2015) and Ibe, and Abamuche (2019), which provided that multimedia instructional materials, when effectively utilized, could

enhance the academic interest of students. Therefore, the introduction of learners to the beautiful combination of graphical images, audio, canvases, customized hands, characters and scenes, in the doodly-produced instructional multimedia, naturally captures and sustains their attention during instructional delivery, thereby leading to boosted academic interest of the undergraduate students, both in classroom and online learning environments.

The second hypothesis which stated that doodly-produced multimedia instructions will not significantly differ in the mean interest scores in Educational Technology among male and female undergraduate students was upheld. The results also proved that the mean interest scores across the two gender groups showed no significant difference, implying that doodly-produced instructional multimedia was able to evenly boost the interest of learners, irrespective of gender lines. This result is in corroboration with those of Godspower-Echie, and Khenko (2015), and Aydin, and Sung (2022) which showed that gender did not have any significant influence on the interest of students taught with a multimedia instructional package. This means that both male and female students had their interests boosted after being exposed to doodly-produced instructional multimedia.

The third hypothesis which posited that there is no statistically significant interaction effect between the environments of Doodly-produced multimedia instructions (classroom versus online) and gender on the mean interest scores of undergraduate students in EdTech was upheld. It was further proven in this study that the recorded boost in the interest of undergraduate students in EdTech was traceable to the instructional efficacy associated with doodly-produced instructional multimedia, and not due to dependence on gender. This result agrees with the outcomes of Liu et al. (2022), and Johnson et al. (2025b) who discovered that no interaction effects existed between gender and instructional media on the interest of students.

Conclusions

This study yielded some key findings regarding the effects of doodly-produced instructional multimedia on the learning interest of undergraduate EdTech students across classroom and online learning environments. First of all, the results showed that doodly-produced multimedia materials were effective in increasing student interest in EdTech both in the traditional classroom and online environments. Secondly, no significant gender differences in student's interest were found when learning about EdTech through doodly-produced instructional multimedia in the classroom versus online. To sum it up, the study did not find any interaction effect that is statistically significant between the learning environments (classroom versus online) and gender on students' interest in EdTech.

Recommendation

In line with the findings of this study, the following recommendations were projected:

i. The tertiary institutions should encourage the utilisation of Doodly-produced instructional multimedia in teaching for better academic interest.
ii. The management of tertiary institutions should provide ample opportunities to develop expertise for the effective design and implementation of Doodly-created instructional packages for effective teaching and learning.

iii. The policymakers and management of schools should make deliberate investment in the necessary human and material resources to facilitate the effective design and implementation of Doodly in instructional activities.

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