Do Male and Female Students Benefit Equally From AR-Based Accounting Lessons?

Dr. B. O. Alabi., Prof. M.O.A Akinpelu., Abanum Collins Ifeanyichukwu

Department of Science and Technology Education, Faculty of Education, Lagos State University, Ojo

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ABSTRACT

This study investigated whether male and female students benefit equally from the use of Augmented Reality Strategy (ARS) in learning partnership and goodwill accounts in Financial Accounting. Guided by one core research question and its corresponding null hypothesis, the study adopted a quasi-experimental mixed-methods design, employing a 2x2 factorial matrix involving instructional method and gender. Two Senior Secondary Schools II students from Lagos State were selected using purposeful sampling, with data collected through pre-test and post-test administration of the Partnership and Goodwill Account Achievement Test (PGAAT) and a qualitative interview guide. Quantitative analysis using ANCOVA revealed a statistically significant difference in achievement scores between male and female students taught using ARS, with gender accounting for approximately 11.7% of the variance (Partial Eta Squared = .117), indicating a moderate effect size. The null hypothesis was rejected, showing that female students performed slightly better than male students after exposure to AR-based instruction. Qualitative insights further supported these findings, revealing that both genders found AR engaging and helpful, although some differences in confidence levels and engagement patterns were noted. The results suggest that while ARS enhances learning outcomes for all students, subtle gender-related differences exist in how students interact with and benefit from the technology. This underscores the importance of implementing gender-sensitive support mechanisms to ensure equitable access and participation in AR-integrated classrooms. The study concludes that ARS is an effective and inclusive instructional strategy, but educators must remain attentive to gender dynamics to fully realize its potential in promoting equitable and meaningful learning experiences in Nigerian secondary school accounting education.

Keywords: Augmented Reality Strategy (ARS), Gender, Achievement, Financial Accounting, Technology-Enhanced Learning, Mixed-Methods, Nigerian Secondary Schools

BACKGROUND OF THE STUDY

The integration of Augmented Reality Strategy (ARS) into educational practice represents a significant shift from traditional gender-biased instructional methods toward more inclusive and equitable learning environments (Enwere & Enwere, 2019). Historically, disparities in access to digital tools and confidence levels have influenced how male and female students interact with technology-based instruction (Alani et al, 2022). However, recent developments in immersive learning technologies suggest that these gaps may be narrowing, especially among tech-savvy secondary school students in Nigeria.

Financial Accounting, being a core subject with high cognitive demand, requires equal engagement and motivation from all learners regardless of gender (Kaiser et al., 2022). ARS, through its visually engaging and interactive features, may reduce gender-related differences in participation and performance by offering a uniform platform that caters to diverse learning preferences (Adedokun-Shittu et al., 2020). Ziden et al. (2022) argue that AR-based instruction promotes active learning and reduces dependency on teacher-led explanations, potentially empowering female students who might otherwise feel marginalized in technology-integrated classrooms.

This background underscores the importance of examining whether ARS provides equal benefits to male and female students in terms of academic achievement and classroom engagement. As educators seek to implement gender-sensitive pedagogies, this study contributes evidence on the inclusivity of ARS in Financial Accounting instruction in Nigerian secondary schools.

Statement of the Problem

Gender disparities in access to and engagement with digital learning tools have been documented in various educational settings, including Nigerian secondary schools (Danladi & Uba, 2016). While Augmented Reality Strategy (ARS) has shown promise in improving learning outcomes, it is unclear whether male and female students benefit equally from its use in Financial Accounting instruction. Traditional lecture-based methods have historically favored one gender over the other due to differences in confidence levels and exposure to technology (Judith & Bethel, 2020). As Nigeria moves toward more inclusive and learner-centered pedagogies, it becomes essential to investigate whether ARS mitigates or reinforces existing gender-related gaps in achievement and classroom participation. Without such evidence, educators risk implementing technologies that inadvertently perpetuate inequality rather than reducing it.

Research Question

Would there be any difference in the mean achievement scores of male and female students taught partnership and goodwill account using ARS?

Research Hypothesis

Ho: There would be no statistically significant difference in the mean achievement scores of male and female students taught partnership and goodwill account using ARS.

METHODOLOGY

A 2x2 factorial matrix was employed to assess gender differences in achievement among students taught using ARS. The quasi-experimental phase included pre- and post-tests using the Partnership and Goodwill Account Achievement Test (PGAAT), while the qualitative phase utilized the Students' Perception of ARS Interview Guide. Participants were Senior Secondary School II students from Ajeromi Ifelodun Senior High School and Gaskiya Senior College, Lagos State, grouped into experimental and control groups. Data analysis involved ANCOVA to test for significant differences in achievement scores by gender. The design ensured that both male and female participants received equal instructional time and resources, allowing for equitable comparison.

RESULTS

Research Question Two

Would there be any difference in the mean achievement scores of male and female students taught partnership and goodwill account using ARS?

Table 1: Descriptive Statistics of Posttest Achievement Scores of Male and Female Students in Experimental Group

Gender	Mean	Std. Deviation	N
Male	22.6000	8.40899	10
Female	27.7097	6.52786	31
Total	26.4634	7.26670	41

Table 1 shows that female students had a higher mean achievement score (M = 27.71, SD = 6.53) compared to their male counterparts (M = 22.60, SD = 8.41). This suggests a noticeable difference in performance favouring female students in the group taught with ARS.

Research Hypothesis

There would be no statistically significant difference in the mean achievement scores of male and female students taught partnership and goodwill account using ARS.

Table 2: Analysis of Covariance on the Achievement Scores of Male and Female Students with Pretest Achievement Scores as Covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1137.803[a]	2	568.902	22.186	.000	.539
Intercept	414.066	1	414.066	16.148	.000	.298
Pretest Achievement	940.395	1	940.395	36.674	.000	.491
Gender	129.386	1	129.386	5.046	.031	.117
Error	974.392	38	25.642			
Total	30825.000	41				
Corrected Total	2112.195	40				
a. R Squared = .539 (Adjusted R Squared = .514)						

Table 2 shows the results of the ANCOVA used to examine whether there was a statistically significant difference in the achievement scores of male and female students taught using the Augmented Reality Strategy (ARS), while controlling for their pretest achievement scores. The main effect of gender was found to be statistically significant, with F(1, 38) = 5.046, p = .031, and a Partial Eta Squared of .117. This indicates a moderate effect size, suggesting that approximately 11.7% of the variance in students' posttest achievement scores can be attributed to their gender after adjusting for prior achievement. Since the p-value is less than .05, the null hypothesis (Ho_2) is rejected. This means there is a statistically significant difference in the achievement scores of male and female students taught using ARS, even when pretest scores are controlled. The result implies that gender had a moderate but statistically significant influence on students' academic achievement in partnership and goodwill account when taught using the Augmented Reality Strategy (ARS). Although ARS was effective across both genders, the difference in mean achievement scores suggests that one gender may have benefited slightly more from the strategy.

Summary

Gender and Achievement (Ho): A statistically significant difference was found in the achievement scores of male and female students taught using ARS. Gender accounted for about 11.7% of the variance, suggesting a moderate effect size. **Implication**: Gender influenced achievement to a moderate extent, with one gender possibly benefiting slightly more from ARS.

DISCUSSION

Gender and Achievement: A statistically significant difference was found in the achievement scores of male and female students taught using ARS. Gender accounted for about 11.7% of the variance, suggesting a

moderate effect size. **Implication**: Gender influenced achievement to a moderate extent, with one gender possibly benefiting slightly more from ARS.

The findings from the analysis of covariance (ANCOVA) indicate that there is a statistically significant difference in achievement scores between male and female students taught using the Augmented Reality Strategy (ARS). Gender accounted for approximately 11.7% of the variance in achievement, suggesting a moderate effect size. This implies that gender played a noticeable but not overwhelming role in determining student performance when ARS was employed as an instructional method. These results are consistent with previous studies conducted in Nigerian educational settings, which have shown that gender can influence academic performance, especially when new or technology-enhanced teaching methods are introduced (Nwosu & Umoren, 2023). The observed moderate effect suggests that while both genders benefited from ARS, one gender may have derived greater advantage possibly due to differences in engagement, learning preferences, or prior exposure to digital tools. This aligns with the findings of Okoye and Okeke (2021), who noted slight performance differences between male and female students exposed to technology-based instruction in business education. They attributed such differences to varying levels of confidence and interest in using digital platforms among male and female learners. Similarly, Yusuf et al. (2023) found that male students often demonstrate higher initial engagement with emerging technologies, possibly due to societal influences or early exposure to tech-related activities. However, it is important to note that other scholars, such as Adedokun and Adu (2022), argue that with adequate training and equal access, gender disparities in technology-assisted learning environments tend to diminish over time. This suggests that the moderate effect observed in this study may reflect current imbalances in digital exposure rather than inherent gender-based cognitive differences.

Moreover, these findings resonate with broader discussions in African educational research, where gender disparities in STEM and business-related subjects remain a topic of concern (Okeke & Okoro, 2022). In Nigeria, efforts to promote gender equity in education have made progress, but challenges persist, particularly in terms of access to digital resources and teacher support for female learners in technology-integrated classrooms. In light of these findings, it is evident that while ARS has the potential to enhance learning outcomes for all students, educators must be mindful of existing gender dynamics and ensure equitable access and support to prevent reinforcing existing inequalities.

The study by Abanum (2025) explores whether Augmented Reality Strategy (ARS) can bridge the gap for students with varying levels of technology proficiency in Nigerian secondary schools, particularly in financial accounting education. Socioeconomic disparities often result in unequal digital exposure, which can hinder the effectiveness of technology-enhanced instruction. ARS, with its intuitive interface and accessibility, was tested as an inclusive instructional tool for teaching complex accounting topics like partnership accounts and goodwill accounts. Using a quasi-experimental design, students were categorized into high, average, and low technology proficiency levels and taught using either ARS or a conventional lecture method. Results showed no statistically significant difference in achievement scores among students with different proficiency levels when taught using ARS, indicating its equitable impact on learning outcomes. Students with low and average proficiency even outperformed those with high proficiency, suggesting ARS's ability to reduce intimidation and engage diverse learners effectively. The study concludes that ARS is an inclusive and effective pedagogical approach, particularly in resource-constrained environments. It recommends providing foundational digital literacy training to further enhance AR-based learning outcomes. This research highlights the potential of ARS to support equitable learning opportunities in classrooms with diverse learner profiles.

From the researcher's perspective, the moderate influence of gender on achievement in ARS-based instruction highlights the need for inclusive and adaptive teaching strategies. While the data suggest that one gender may benefit slightly more under current conditions, this should not be interpreted as a limitation of ARS itself, but rather as an indication of the contextual factors that shape its effectiveness. The integration of augmented reality into accounting instruction represents a promising innovation, but like any educational tool, its benefits are mediated by how equitably and effectively it is implemented. As argued by Akintayo and Adeyemi (2023), the full potential of EdTech innovations in Nigerian education can only be realized when accompanied by deliberate efforts to bridge gender gaps in digital literacy and classroom participation. Therefore, the researcher recommends that future implementations of ARS and similar technologies in Nigerian schools should include

targeted interventions to ensure that female students receive adequate encouragement, mentorship, and hands-on experience with digital tools. Teacher training programs should also emphasize gender-sensitive pedagogy to maximize the benefits of technology-enhanced instruction for all learners.

CONCLUSION

ARS emerges not only as an effective instructional tool but also as a democratizing force in education, capable of delivering high-quality, engaging, and inclusive learning experiences to diverse student populations. It represents a valuable step toward modernizing teaching practices and aligning Nigerian education with 21st-century pedagogical standards.

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