



Effects of E-Portfolio and I-BIT Strategies on Male and Female Pupils' Literacy Achievement in English Language in Benue State, Nigeria

¹Chinwe Muodumogu, ²Emmanuel Edoja Achor, ³Clement Orver Igyu & ⁴Bemgba Asue

¹Department of Arts and Social Sciences Education, Rev. Fr. Moses Orshio Adasu University, Makurdi

^{2&3} Department of Science and Mathematics Education, Rev. Fr. Moses Orshio Adasu University, Makurdi

⁴Department of English and other Languages, University of Mkar, Mkar

Corresponding Author: cmuodumogu@gmail.com

Abstract

This study investigated the effects of e-Portfolio and digital inquiry-based Information Technology (I-BIT) strategies on male and female pupils' literacy achievement in English Language in public primary schools in Benue State, Nigeria. The study adopted a quasi-experimental pre-test, post-test control group design. The population comprised 630 primary six pupils aged 10–12 years and English language teachers in public primary schools in the North-West Education Zone, Benue State, Nigeria. A sample of 291 male and female pupils from 10 schools participated in the study (5 for each group). The study used two instruments to collect data: the Reading Achievement Test (RAT) and the Writing Achievement Test (WAT). The study analysed data using means, percentage mean gain, and Analysis of Covariance (ANCOVA). Findings showed that male and female pupils taught using the e-Portfolio and IBIT strategies improved their reading and writing achievement, but there was no significant difference between the genders. The study therefore recommended training teachers to use these two digital literacy instructional strategies to improve pupils' reading and writing achievement.

Keywords: E-Portfolio, I-BIT, gender, reading achievement, writing achievement, English Language, primary school pupils

Introduction

Information and Communication Technology (ICT) has advanced rapidly, transforming educational practices globally and creating opportunities for innovative teaching and learning strategies. Technology-supported learning encourages learner participation, collaboration, creativity, and self-directed learning (UNESCO, 2008). This study conceptualises literacy instruction as the systematic teaching and development of reading and writing skills consistent with the National Policy on Education (Federal Republic of Nigeria, 2014). According to Muodumogu (2019), in the twenty-first century, literacy extends beyond the ability to read and write simple statements to include the capacity to access, interpret, and communicate information through digital technologies. Consequently, integrating technology into primary education has become necessary to improve pupils' reading and writing achievement and to prepare learners for participation in a digital society.

The e-portfolio teaching strategy may be viewed as an innovative approach to literacy instruction. An e-portfolio is a digital collection of learners' academic work, reflections, projects, and artefacts that demonstrate

learning progress and achievement over time and promote active, meaningful learning (Guo & Li, 2024; Masaeli & Chalak, 2016). One other important instructional novelty is the Inquiry-Based Information Technology (I-BIT) strategy, which involves engaging learners in questioning, investigation, brainstorming, problem-solving, and critical thinking activities that help them construct knowledge (Al-Khamaiseh, 2023; Ramasari, 2020; Mutmainnah & Muhammad, 2022; Wale & Bogaie, 2021), rather than passively receiving information from teachers

Gender, often defined as the classification of learners as male or female, continues to attract scholarly attention because male and female learners may differ in learning preferences, participation patterns, and achievement outcomes. Some studies show that female learners tend to perform better in reading-related activities, while males may perform better in some writing- or technology-related tasks (AlSereidi, 2021; Feng et al., 2023). Yet, other studies reported that technology-supported learning environments reduce gender disparities by providing equal learning

opportunities for both male and female learners (Karami et al., 2018). These mixed findings suggest the need for further investigation into how gender influences pupils' literacy achievement when exposed to innovative instructional strategies such as e-Portfolios and I-BIT, which have not been studied or reported in primary schools in Benue State.

Statement of the Problem

Despite the documented benefits of technology-supported literacy instruction, concerns about gender differences in literacy achievement persist. In Nigeria, particularly in Benue State, the use of e-Portfolios and I-BIT strategies in primary school literacy instruction remains relatively underexplored. Many schools lack adequate ICT facilities, and teachers often have limited training in integrating technology into classroom instruction. Studies by Achor and Ityobee (2020) and Nwankwo et al. (2019) revealed low utilisation of ICT resources and e-Portfolios in Nigerian schools despite the growing need for digital learning approaches. Consequently, many pupils continue to experience poor literacy achievement due to inadequate exposure to innovative instructional strategies.

The present study, therefore, became necessary to determine the effects of e-Portfolio and I-BIT strategies on male and female pupils' literacy achievement in English Language among Primary 6 pupils in Benue Education Zone B, Benue State. Specifically, the study sought to determine whether these digital instructional strategies would improve pupils' reading and writing achievement and whether gender would significantly influence learners' performance.

Methods

Results

The results are presented using tables, following the order of the research questions and hypotheses. In the research questions, the mean difference indicates differences between genders, while mean gain indicates achievement from pretest to posttest within each teaching strategy.

Research question one: Using the e-portfolio strategy, what is the difference in male and female Primary 6 pupils' reading achievement?

Table 1: Mean E-Portfolio Strategy for Female and Male Pupils' Reading Achievement

Gender		Pretest	Posttest	Mean Gain	% Gain
Male	Mean	15.81	31.66	15.85	100.25
	N	161	161		
	Std. Dev.	5.75	10.05		
Female	Mean	16.93	32.95	16.02	94.62
	N	130	130		
	Std. Dev.	5.51	10.13		
Mean difference				0.17	

Table 1 shows a mean gain of 16.13 (94.62%) for female pupils and 15.85 (100.25%) for male pupils. The

The quasi-experimental research design was adopted for the study with pre-test, post-test, and comparison-group procedures. The design was considered appropriate because the researchers used existing intact classes in the selected schools without disrupting normal classroom arrangements (Ada et al., 2024). The design also enabled the researchers to determine the effect of the two instructional strategies on pupils' literacy achievement before and after the intervention.

The population consisted of 630 Primary 6 pupils and English language teachers in public primary schools in Benue North-West (Zone B), where Makurdi and Gboko Local Government Areas, Benue State, Nigeria, were selected because their metropolitan status made them suitable for an ICT-related study. The sample comprised 291 male and female pupils from 10 schools, selected through purposive sampling: 6 schools in Makurdi and 4 in Gboko. The schools were then randomly assigned to the two strategies using the hat-and-draw method. The study used two instruments to collect data: the Reading Achievement Test (RAT) and the Writing Achievement Test (WAT).

Three experts in English Education and one expert in Measurement and Evaluation face-validated the instruments, and the researchers pilot-tested them with pupils outside the study sample to assess reliability and consistency. The Kuder-Richardson-20 reliability indices were 0.93 for WAT and 0.85 for RAT, indicating that the instruments reliably measured pupils' literacy achievement. Mean values and gains were used to answer the research questions and determine pupils' levels of improvement, while Analysis of Covariance (ANCOVA) was employed to test the hypotheses and determine whether significant differences existed in the literacy achievement of male and female pupils exposed to the instructional strategies.

difference favoured female pupils (0.17) within the e-portfolio strategy.

Hypothesis one: There will be no significant difference in male and female Primary 6 pupils' reading achievement using the e-portfolio strategy.

Table 2: E-Portfolio Strategy ANCOVA Results for Reading Achievement of the Female and Male

Dependent Variable: PostRAT

Source	Type III SS	Df	MS	F	Sig.	R ²
Corrected Model	12177.516 ^a	2	6088.758	101.049	0.000	0.412
Intercept	5674.854	1	5674.854	94.180	0.000	0.246
PreRAT	12057.965	1	12057.965	200.113	0.000	0.410
Gender	0.010	1	0.010	0.000	0.990	0.000
Error	17353.646	288	60.256			
Total	332012.000	291				
Corrected Total	29531.162	290				

Note: R² = 0.412 (Adjusted R Squared = 0.408), *PostRAT* – post-intervention reading test, *PreRAT*, pre-intervention reading test.

Table 2 presents the ANCOVA results for reading achievement means between male and female pupils using the e-portfolio Strategy. The results show $F_{(1, 288)} = 0.000$ and $P = 0.990 > 0.05$. This indicates that reading

achievement did not differ significantly between female and male pupils when using the e-portfolio strategy; hence, hypothesis one was retained.

Research question two: Using the e-portfolio strategy, what is the difference in male and female Primary 6 pupils' writing achievement?

Table 3: Mean E-Portfolio Strategy Writing Achievement for Female and Male Pupils

Gender		Pretest	Posttest	Mean Gain	% Gain
Male	Mean	1.77	5.03	3.26	184.18
	N	161	161		
	Std. Dev.	1.23	2.27		
Female	Mean	1.97	5.16	3.19	161.93
	N	130	130		
	Std. Dev.	1.36	2.26		
Mean difference				0.07	

Table 3 shows a mean gain in writing achievement of 3.26 and a percentage of 184.18 for male pupils, and a mean gain in reading achievement of 3.19

and a percentage of 161.93 for female pupils. The difference in mean writing achievement score favoured the female pupils (0.07) within the e-portfolio strategy.

Hypothesis two: There will be no significant difference in male and female Primary 6 pupils' writing achievement using the e-portfolio strategy.

Table 4: E-Portfolio Strategy ANCOVA for Writing Achievement of the Female and Male Pupils

Dependent Variable: PostWAT

Source	Type III SS	Df	MS	F	Sig.	R ²
Corrected Model	83.074 ^a	2	41.537	8.519	0.000	0.056
Intercept	1754.562	1	1754.562	359.851	0.000	0.555
PreWAT	81.821	1	81.821	16.781	0.000	0.055
Gender	0.188	1	0.188	0.039	0.844	0.000
Error	1404.232	288	4.876			
Total	9045.000	291				
Corrected Total	1487.306	290				

a. R² = 0.056 (Adjusted R Squared = 0.049). *PostWAT* – post-intervention writing test; *PreWAT*- pre-intervention writing test.

Table 4 presents the ANCOVA results for mean writing achievement among male and female pupils using the e-portfolio Strategy. The table shows $F_{(1, 288)} = 0.039$

and $P = 0.844 > 0.05$. This indicates that male and female pupils' writing achievement did not differ significantly when using the e-portfolio Strategy.

Research question three: Using the I-BIT strategy, what is the difference in reading achievement of male and female Primary 6 pupils?

Table 5: I-BIT Strategy Mean Reading Achievement of the Female and Male Pupils

<i>Gender</i>		<i>Pretest</i>	<i>Posttest</i>	<i>Mean Gain</i>	<i>% Gain</i>
Male	Mean	15.71	31.02	15.31	97.45
	N	148	148		
	Std. Dev.	5.96	10.68		
Female	Mean	16.47	33.22	16.75	101.70
	N	185	185		
	Std. Dev.	6.04	11.04		
Mean difference				1.44	

Table 5 shows a reading achievement mean gain of 15.31 (97.45%) for male pupils and 16.75 (101.70%) for female pupils. The mean difference in reading achievement (1.44) favoured female pupils within the I-BIT Strategy.

Hypothesis three: There will be no significant difference in male and female Primary 6 pupils' reading achievement using the I-BIT strategy.

Table 6: I-BIT Strategy ANCOVA of Mean Reading Achievement of the Female and Male Pupils

Dependent Variable: PostRAT

<i>Source</i>	<i>Type III SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>Sig.</i>	<i>R²</i>
Corrected Model	11507.347 ^a	2	5753.674	67.479	0.000	0.290
Intercept	11183.408	1	11183.408	131.158	0.000	0.284
PreRATi	11108.903	1	11108.903	130.284	0.000	0.283
Gender	178.143	1	178.143	2.089	0.149	0.006
Error	28137.950	330	85.267			
Total	385841.000	333				
Corrected Total	39645.297	332				

a. $R^2 = 0.290$ (Adjusted R Squared = 0.286). *PostRAT* – post-intervention reading test; *PreRAT*- pre-intervention reading test.

Table 6 presents the ANCOVA results for the mean reading achievement of female and male pupils using the I-BIT Strategy. The table shows $F_{(1, 330)} = 2.089$ and $P = 0.149 > 0.05$. This indicates that male and female pupils' reading achievement did not differ significantly when using the I-BIT Strategy.

Research question four: Using the I-BIT strategy, what is the difference in writing achievement of male and female Primary 6 pupils?

Table 7: Mean Writing Achievement of the Female and Male Pupils with the Use of I-BIT Strategies

<i>Gender</i>		<i>Pretest</i>	<i>Posttest</i>	<i>Mean Gain</i>	<i>% Gain</i>
Male	Mean	1.96	5.04	3.08	157.14
	N	148	148		
	Std. Dev.	0.98	1.48		
Female	Mean	2.05	5.03	2.98	145.37
	N	185	185		
	Std. Dev.	1.08	1.34		
Mean difference				0.1	

Table 7 shows a writing achievement mean gain of 3.08 (157.14%) for male pupils and 2.98 (145.37%) for female pupils. The difference in mean writing achievement (0.10) favoured the male pupils within the I-BIT Strategy.

Hypothesis four: There will be no significant difference in male and female Primary 6 pupils' writing achievement using the I-BIT strategy.

Table 8: I-BIT Strategy ANCOVA for Writing Achievement of the Female and Male Pupils

Dependent Variable: PostWAT

Source	Type III SS	Df	MS	F	Sig.	R ²
Corrected Model	109.721 ^a	2	54.860	33.111	0.000	0.167
Intercept	1083.383	1	1083.383	653.868	0.000	0.665
PreWAT	109.720	1	109.720	66.221	0.000	0.167
Gender	0.215	1	0.215	0.130	0.719	0.000
Error	546.772	330	1.657			
Total	9112.000	333				
Corrected Total	656.492	332				

a. R² = 0.167 (Adjusted R Squared = 0.162). *PostWAT* – post-intervention writing test; *PreWAT*- pre-intervention writing test.

Table 8 presents the ANCOVA results for mean writing achievement among female and male pupils using the I-BIT Strategy. The table shows $F_{(1,330)} = 0.130$; $P = 0.719 > 0.05$. This indicates that female and male pupils' writing achievement did not differ significantly when the I-BIT strategy was used.

Discussion of Findings

This study investigated the effect of two digital instructional strategies, the e-portfolio and I-BIT, on the literacy achievement of male and female students in English Language instruction among primary 6 pupils in Benue North-West Education Zone. The study found that using e-Portfolio and I-BIT strategies positively enhanced the literacy achievement of both male and female pupils in English Language. This finding disagrees with Lekyong and Muodumogu (2022), who found that female students who received computer-assisted instruction in reading comprehension achieved significantly better outcomes than male students. The result also opposes AlSereidi (2021), which reported that female learners demonstrated better reading practices and higher engagement in inferential and critical reading activities than male learners. The present study therefore suggests that technology-supported literacy instruction may give both male and female learners opportunities to maximise their reading strengths through interactive, inquiry-based learning experiences.

Furthermore, the findings corroborate Karami et al. (2018), who found that e-Portfolio instruction significantly improved learners' writing performance, but gender had no significant effect on achievement outcomes. Similarly, Feng et al. (2023) observed that collaborative technology-supported learning environments encourage active participation among learners irrespective of gender. The present study therefore strengthens the argument that well-designed ICT-supported instructional strategies can reduce gender disparities in learning by creating inclusive and engaging learning environments for all learners.

Finally, using I-BIT tools during instruction likely increases pupils' reading and writing achievement regardless of their gender. The study demonstrated that technology-supported instruction exposes learners to interactive materials, multimedia resources, and

collaborative learning opportunities, making the writing and reading activities more engaging and meaningful. This finding aligns with Bhattacharjee and Deb (2016), who reported that using ICT tools in classroom instruction enhances students' learning experiences and improves academic performance. It also supports Guo and Li (2024), who found that electronic-based instruction improves learners' literacy performance and self-efficacy.

Conclusion

The findings showed that although slight differences existed between female and male pupils in reading and writing achievement, gender was not a significant factor in pupils' overall literacy achievement under the e-Portfolio and I-BIT instructional strategies. The study thus concluded that the strategies positively enhanced the literacy achievement of male and female pupils in English Language.

Recommendations

The study recommended that primary school teachers be trained in the effective use of e-Portfolio and I-BIT strategies in literacy instruction in English Language.

Secondly, school owners and administrators should provide adequate ICT facilities to support technology-based literacy learning for primary schools.

Thirdly, teachers should encourage collaborative and inquiry-based literacy activities among both female and male primary school pupils.

Fourthly, governments at all levels and other relevant educational stakeholders are encouraged to support digital literacy initiatives in primary schools.

References

- Achor, E. E. & Ityobee, S. (2020). Assessment of availability of ICT facilities for Basic Science teaching and learning in Upper Basic Schools in Benue State. *Journal of Research in Curriculum and Teaching*, 12(1), 1–10.
- Ada, N.A., Aligba, S. O. & Igyu, C. O. (2024). *Research methods in education: A practical guide*. Makurdi: DNA Traces Empire Ltd.
- Al-Khamaiseh, H. S. (2023). The effect of inquiry-based learning strategy on EFL tenth-grade students'

- reading comprehension. *Journal of International Education and Practice*, 6(2), 46–57.
- AlSereidi, M. A. S. (2021). Gender differences in reading skills in English: A case study of 11th grade public school students in United Arab Emirate. *Technium Social Sciences Journal*, 24, 131–142.
- Bhattacharjee, B. & Deb, K. (2016). Role of ICT in 21st century teacher education. *International Journal of Education and Information Studies*, 6(1), 1–6.
- Federal Republic of Nigeria. (2014). *National policy on education*. Abuja: NERDC Press.
- Feng, Q., Luo, H., Li, W., Chen, T., & Sogn, N. (2023). Effects of gender diversity on college students' collaborative learning: From individual gender to gender pairing. *Heliyon*, 9(6), 1–12.
- Guo, H., & Li, D. (2024). The effect of electronic portfolio-based writing instruction on the second language writing performance and writing self-efficacy of EFL learners: A mixed methods study. *SAGE Open*, 1–18.
- Karami, S., Sadighi, F., Bagheri, M. S., & Riasati, M. J. (2018). The potential impact of the application of electronic portfolio on Iranian English as Foreign Language (EFL) learners' writing performance seeking their gender role. *Cogent Social Sciences*, 4(1), 1–17.
- Lekyong, V. & Muodumogu, C. A. (2022). Effect of computer aided instruction on senior secondary students' achievement in reading comprehension in Jalingo, Taraba State, Nigeria. *International Journal of Advanced Multidisciplinary Research and Studies*, 2(5), 742–747.
- Masaeli, N., & Chalak, A. (2016). The effect of employing electronic portfolio on Iranian EFL learners' writing skill. *Journal of Language Teaching and Research*, 7(4), 746–751.
- Muodumogu, C. A. (2019). Paradigm shift in literacy instruction: Changing how we do what we do for improved literacy achievement. *Literacy and Reading in Nigeria*, 18(1), 1–9.
- Mutmainnah, M. & Muhammad, Y. (2022). The effect of using computer-assisted reading with inquiry-based learning on student reading comprehension. *English Education Journal (EEJ)*, 13(1), 122–139.
- Nwankwo, F. C., Okonkwo, M. U., Ezenwanne, C. R. & Anozie, P. U. (2019). Extent of utilization of e-portfolios for enhancing learning by business education students in Imo State. *Nigerian Journal of Business Education*, 6(1), 418–428.
- Ramasari, M. (2020). Teaching reading comprehension for the tenth-grade students by applying an approach of inquiry-based learning. *Jurnal Perspektif Pendidikan*, 14(1), 46–57.
- UNESCO. (2008). *ICT competency standards for teachers: Implementation guidelines*. Retrieved from <http://unesdoc.unesco.org/images/0015/00156209E.pdf>
- Wale, B. D., & Bogaie, Y. N. (2021). Using inquiry-based instruction to develop students' academic writing skills. *Asian-Pacific Journal of Second and Foreign Language Education*, 6(4), 1–6.