



## Effect of Gamified ICT Tools on Reading Fluency and Critical Thinking Skill among N.C.E. Students in Kaduna State

<sup>1</sup>AREO Kelechi Goodluck, <sup>2</sup>SOLOMON Moses, <sup>2</sup>CHUKWUMA Doris Ifeyinwa  
Department of General Studies Education (GSE),  
Federal College of Education, Zaria,  
Educational Psychology Department,  
Federal University of Education Zaria

### ABSTRACT

*This study examined the effect of gamified ICT tools on reading fluency and critical thinking skills among Nigerian Certificate in Education (N.C.E.) students in Kaduna State. The objectives were to determine how gamified ICT tools influence these competencies and address the limitations of traditional teaching methods. The study was guided by two hypotheses and employed a quasi-experimental pre-test-posttest control group design. The population comprised 10,345 N.C.E. students from the College of Education, Gidan Waya, and the Federal University of Education, Zaria, Kaduna State. A purposive target population of N.C.E. II students was selected, with a sample of 180 students obtained through stratified random sampling. The sample was divided into an experimental group (95 students) from the Federal University of Education, Zaria and a control group (90 students) from the College of Education, Gidan Waya. Two instruments were utilized namely, the Reading Fluency Assessment Tool (RFAT), with a Cronbach's alpha reliability of 0.80, and the Critical thinking skill Assessment Scale (CTAS), adapted from the Watson-Glaser Critical thinking skill Appraisal (Wang, 2015), with a reliability coefficient of 0.76 after pilot study. The experimental group was exposed to gamified ICT tools during English comprehension lessons for eight weeks, while the control group received traditional instruction. After the intervention, a posttest was administered to both groups, and data were analysed using Analysis of Covariance (ANCOVA). The results revealed a significant positive effect of gamified ICT tools on reading fluency and critical thinking skills, with p-values = 0.00 for both hypotheses being less than 0.05 alpha level of significance. Based on these findings, it is recommended that educational policymakers and curriculum developers incorporate gamified ICT tools into teacher education programs to enhance learning outcomes. Additionally, workshops and training programs should be organized to equip educators with the necessary skills to effectively implement gamified ICT tools in their teaching practices.*

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### INTRODUCTION

The growing integration of Information and Communication Technology (ICT) into education has transformed the learning landscape, providing innovative approaches to enhance students' engagement and performance. Gamification, the application of game-design elements in non-game contexts, has emerged as a promising strategy for improving learning outcomes. In recent years,

educators have increasingly adopted gamified ICT tools to address persistent challenges in literacy and critical thinking skills among students (Deterding et al., 2011).

Gamification is the process of applying game-design elements and principles, such as points, badges, leader boards, and challenges, to non-game contexts to enhance user engagement, motivation, and performance (Hamari et al., 2014). Gamified ICT tools have

Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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demonstrated potential to bridge these gaps by leveraging the motivational aspects of games to foster active participation and sustained effort in learning tasks. These tools incorporate elements such as points, badges, leader boards, and challenges, which can stimulate intrinsic and extrinsic motivation (Hamari et al., 2014). For instance, applications like Duolingo and Kahoot have shown effectiveness in enhancing language skills and promoting collaborative learning (Wang, 2015). By engaging students in interactive and rewarding learning experiences, gamified ICT tools can create an environment conducive to developing reading fluency and critical thinking skills.

Reading fluency and critical thinking skills are foundational skills that underpin academic success and lifelong learning. Reading fluency is the ability to read text accurately, quickly, and with proper expression, which facilitates comprehension and supports overall literacy development (National Reading Panel, 2000). Reading fluency is a critical aspect of literacy development. Studies have shown that gamified tools can significantly enhance reading fluency by providing engaging and repetitive practice in reading tasks. For example, Reinders & Wattana (2015) demonstrated that digital games incorporating reading exercises improved learners' reading speed and accuracy. Similarly, Finkelstein et al. (2013) found that gamified apps like "Reader Rabbit" fostered improved fluency among primary school students by creating interactive reading sessions.

Critical thinking skill is another domain where gamification has shown substantial promise. Critical thinking skill is the intellectually disciplined process of actively analysing, synthesizing, and evaluating information to make reasoned judgments and decisions. It enables students to analyse, evaluate, and synthesize information to make reasoned decisions (Facione, 2011). Gamified environments often require players to solve complex problems, make decisions, and analysed scenarios, thereby fostering critical thinking skills. A study by Liu et al. (2011) revealed that game-based learning environments enhanced students' abilities to evaluate and synthesize information effectively. Furthermore, Landers & Landers (2014) observed that gamified platforms encouraged

collaborative problem-solving and higher-order thinking in educational settings.

Empirical evidence further supports the effect of gamification on educational outcomes. For instance, Su & Cheng (2015) found that gamified learning significantly improved engagement and performance in language learning. Similarly, Kapp (2012) highlighted the potential of gamification to enhance critical thinking skill by incorporating problem-solving and decision-making activities into dynamic learning environments. Studies by Gonzalez et al. (2021) & Zainab et al. (2020) revealed that gamified ICT tools improved reading fluency, word recognition speed, comprehension, and critical thinking skills among students. Ayodele (2019) and Lin & Lin (2019) also demonstrated the benefits of gamified systems in enhancing literacy skills, retention, and analytical reasoning. Additionally, Ibrahim & Hassan (2020) reported significant gains in reading fluency using mobile gamified applications, while Balogun & Salami (2021) observed improvements in cognitive skills such as problem-solving and decision-making in teacher training colleges.

Despite the global advancements, the adoption of gamified ICT tools in Nigerian education, particularly in teacher training institutions, remains limited. Research indicated that many Nigerian Certificate in Education (N.C.E.) students struggle with low levels of reading fluency and critical thinking skill, which negatively affect their academic performance and future teaching capabilities (Oloyede, 2012). Given the pivotal role of N.C.E. graduates in shaping the literacy and cognitive skills of future generations, addressing these challenges is critical. Exploring the effect of gamified ICT tools on reading fluency and critical thinking skills among N.C.E. students in Nigeria can offer valuable insights into strategies for improving their academic success and professional efficacy.

### Statement of the Problem

Reading fluency and critical thinking skills are fundamental skills for academic achievement and lifelong learning. However, many Nigerian Certificate in Education (N.C.E.) students in Kaduna State face significant challenges in developing these competencies. Traditional teaching methods, which are often

Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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teacher-centered and monotonous, have proven inadequate in engaging students, enhancing critical analysis, or improving reading proficiency. As a result, these students may struggle to meet the demands of modern education and fulfill their roles as future educators.

The integration of Information and Communication Technology (ICT) into education offers innovative opportunities to address these challenges. Among these, gamified ICT tools designed to incorporate elements such as points, badges, and challenges have shown promise in fostering students' engagement, motivation, and skill development. Despite their potentials, the adoption of gamified ICT tools in Nigerian teacher education programs remains minimal. Furthermore, empirical evidence on their impact on improving reading fluency and critical thinking skill among N.C.E. students is limited.

This lack of integration and research creates a critical gap in understanding how gamification can be leveraged to prepare N.C.E. students for the demands of 21st-century education. If these issues remain unaddressed, there is a risk of producing a teaching workforce ill-equipped to nurture essential skills in their students, thereby perpetuating a cycle of low educational outcomes.

This study seeks to bridge this gap by investigating the effectiveness of gamified ICT tools in enhancing reading fluency and critical thinking skills among N.C.E. students in Kaduna State. The findings will contribute to the growing body of knowledge on gamification in education and provide evidence-based recommendations for policymakers, curriculum designers, and educators to improve teaching and learning outcomes in Nigeria.

### Objectives of the Study

1. To determine the effect of gamified ICT tools on reading fluency among N.C.E Students in Kaduna State.
2. To assess the effect of gamified ICT tools on critical thinking skills among N.C.E Students in Kaduna State.

### Hypotheses

H0<sub>1</sub> There is no significant effect of gamified ICT tools on reading fluency

among N.C.E Students in Kaduna State

H0<sub>2</sub> There is no significant effect of gamified ICT tools on critical thinking skills among N.C.E Students in Kaduna State

### METHODOLOGY

This study employed a quasi-experimental research design, specifically the pre-test-posttest control group design. The population consisted of 10,345 Nigerian Certificate in Education (N.C.E.) students from the College of Education, Gidan Waya, and the Federal University of Education, Zaria, Kaduna State. The target population was N.C.E. II students, purposively selected due to their stability compared to N.C.E. I students, who are newly admitted and still adjusting, and N.C.E. III students, who are unavailable due to teaching practice commitments.

A sample size of 180 students was selected using stratified random sampling from the two institutions offering N.C.E. programs in Kaduna State. The sample was divided into two groups: the experimental group (90 students) from the Federal University of Education, Zaria, and the control group (90 students) from the College of Education, Gidan Waya. Three research instruments were used: Reading Fluency Assessment Tool (RFAT), a standardized reading fluency test with established reliability (Cronbach's alpha = 0.80) and Critical thinking skill Assessment Scale (CTAS) adopted from the Watson-Glaser Critical thinking skill Appraisal (Wang, 2015) with Cronbach's alpha = 0.76.

The RFAT and CTAS were administered as pre-tests to both the experimental and control groups. During the intervention, the experimental group used gamified ICT tools integrated into their English comprehension lessons for eight weeks, while the control group received traditional instruction over the same period. After the intervention, both groups were administered post-tests using the same instruments to measure changes in reading fluency and critical thinking skills. Data were analysed using Analysis of Covariance (ANCOVA) to assess the effects of gamified ICT tools on reading fluency and critical thinking skills, while controlling for pretest scores. This approach ensured that any observed

Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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differences between the experimental and control groups could be attributed to the intervention.

## RESULT

**Table 1:** ANCOVA test on effect of gamified ICT tools on reading fluency among N.C.E Students in Kaduna State.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12787.924 <sup>a</sup>	2	6393.962	203.525	.000
Intercept	21359.581	1	21359.581	679.893	.000
<b>Group</b>	<b>12149.723</b>	<b>1</b>	<b>12149.723</b>	<b>386.736</b>	<b>.000</b>
<b>RFAT_pretest</b>	<b>782.097</b>	<b>1</b>	<b>782.097</b>	<b>24.895</b>	<b>.000</b>
Error	5717.730	182	31.416		
Total	277875.000	185			
Corrected Total	18505.654	184			

a. R Squared = .691 (Adjusted R Squared = .688)

Table 1 showed that the  $p = .000$  which is less than the alpha level of 0.005 indicating a significant effect of gamified ICT tools on reading fluency among N.C.E Students in Kaduna State. Hypothesis one was therefore rejected. The finding revealed that the

experimental group who were exposed to gamified ICT tools demonstrated significantly higher reading fluency compared to the control group who were instructed with traditional approach.

**Table 2:** ANCOVA test on effect of gamified ICT tools on critical thinking skill skills among N.C.E Students in Kaduna State

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15424.526 <sup>a</sup>	2	7712.263	237.545	.000
Intercept	9871.510	1	9871.510	304.052	.000
<b>Group</b>	<b>14869.571</b>	<b>1</b>	<b>14869.571</b>	<b>457.997</b>	<b>.000</b>
<b>CTAS_pre-test</b>	<b>544.702</b>	<b>1</b>	<b>544.702</b>	<b>16.777</b>	<b>.000</b>
Error	5908.911	182	32.467		
Total	289767.000	185			
Corrected Total	21333.438	184			

a. R Squared = .723 (Adjusted R Squared = .720)

Table 2 also showed that the  $p = .000$  which is less than the alpha level of 0.005 indicating a significant effect of gamified ICT tools on critical thinking skills among N.C.E Students in Kaduna State. Hypothesis two was also rejected implying that experimental group exhibited superior critical thinking skills compared to the control group.

N.C.E Students in Kaduna State. Two objectives and two hypotheses guided the study. All the hypotheses were rejected; the results indicated significant positive effects of gamified ICT tools on reading fluency and critical thinking skills among N.C.E. students.

Hypothesis one was rejected because the  $p$  value of .000 is less than 0.05 alpha level of significant. The rejection of the hypothesis suggested that students exposed to gamified ICT tools demonstrated significantly higher reading fluency compared to those taught using conventional methods. This result may be

## DISCUSSION

The aim of the study was to investigate the effect of gamified ICT tools on reading fluency and critical thinking skills among

Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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attributed to the interactive and engaging features of gamified tools, which likely enhanced students' ability to decode, comprehend, and articulate text. This finding is inline with the study of Gonzalez et al. (2021) who investigated the effect of gamified ICT tools on reading fluency among middle school students in Spain and reported that gamification improved students' word recognition speed and comprehension, with significant engagement due to interactive game elements. Similarly, Ibrahim & Hassan (2020) reported that students using mobile gamified applications achieved higher reading fluency scores compared to those taught with traditional methods after conducting a study on improving reading fluency through Technology-Enhanced Learning which focus on the use of mobile gamified applications in enhancing reading fluency

Hypothesis two was also rejected because it showed p value of .000 was less than the alpha level of significant. The rejection of the second hypothesis indicated that students in the experimental group exhibited superior critical thinking skills compared to the control group. This outcome could be linked to the problem-solving and decision-making tasks embedded in gamified ICT tools, which foster analytical and reflective thinking. The findings aligned with the study by Zainab et al. (2020) who explored the effect of gamified ICT tools on critical thinking skills and reported that students exposed to gamified platforms performed better in problem-solving tasks and demonstrated improved analytical reasoning compared to those in traditional settings. Similarly, Balogun & Salami (2021) investigated how gamification influences cognitive skills among students in teacher training colleges and reported significant improvements in critical thinking skill, problem-solving, and decision-making when gamified ICT tools were implemented.

## CONCLUSION

The study concludes that gamified ICT tools significantly enhance reading fluency and critical thinking skills among N.C.E. students in Kaduna State. The findings underscore the transformative potential of gamification in education, particularly for fostering essential skills critical for academic success.

## RECOMMENDATIONS

Based on the findings, the following recommendations were made

1. Educational policymakers and curriculum developers should incorporate gamified ICT tools into teacher education programs to enhance student learning outcomes.
2. Workshops and training programs should be organized to equip educators with the skills required to effectively implement gamified ICT tools in their teaching practices.
3. Institutions should allocate resources to acquire and maintain gamified ICT tools, ensuring accessibility and consistent use in classrooms.

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Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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Corresponding author: AREO Kelechi Goodluck.

✉ [areogk78@gmail.com](mailto:areogk78@gmail.com)

Department of General Studies (GSE), Federal University of Education, Zaria, Kaduna State.

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