



Enhancing 21st Century Skills Through ... Agwazie, B. & Chiazor, P. O. (2026)

Enhancing 21st Century Skill Through Cross-Curriculum activities in Business Studies among Junior Secondary School Students in Delta State, Nigeria

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Abstract

The demands of the 21st-century knowledge require education systems to equip learners with essential skills such as critical thinking, creativity, communication, collaboration, and digital literacy. However, instruction in Nigerian junior secondary schools remains largely subject-based, with limited cross-curriculum integration. This study examined the effect of cross-curriculum learning activities integrating Business Studies and Basic Technology in the development of 21st-century skills among Junior Secondary School (JSS II) students in Delta State. A quasi-experimental mixed-methods research design was adopted, using a non-equivalent control group pre-test/post-test design and qualitative methods to explore perceptions and implementation challenges. The population comprised public junior secondary school Business Studies students and teachers in Delta State. Using stratified random sampling, 100 students were selected and assigned to treatment (n = 50) and control (n = 50) groups, while 10 Business Studies and Basic Technology teachers were purposively selected. The treatment group participated in integrated cross-curriculum learning activities for eight weeks, whereas the control group received instruction using the conventional curriculum. Quantitative data were collected using a 21st-century skills assessment administered before and after the intervention and analysed using mean, standard deviation, paired t-tests, and independent t-tests. Qualitative data were obtained through interviews, focus group discussions, classroom observations, and document analysis, and analysed thematically. Findings revealed that students exposed to cross-curriculum instruction demonstrated significantly higher gains in 21st-century skills than those taught using conventional methods. The study concludes that cross-curriculum integration is an effective approach for enhancing 21st-century skills among secondary school students.

Keywords: 21st-century skills, Cross-curricular learning, Business Studies, Basic Technology

Introduction

The 21st century has ushered in rapid technological, economic, and social changes that demand new competencies from learners. Skills such as creativity, innovation, problem-solving, and collaboration are increasingly recognized as essential for personal and national development (Partnership for 21st Century Skills, 2019). Consequently, education systems worldwide are rethinking curriculum and instruction to ensure that learners can apply knowledge across disciplines and solve real-world problems. In Nigeria, the Basic Education Curriculum aims to promote functional literacy, entrepreneurship, and technological awareness among junior secondary school students. However, classroom instruction remains largely fragmented and examination-oriented (Okebukola, 2020). Students often study Business Studies and Basic Technology as isolated subjects without understanding their interconnections or real-world applications. Cross-curriculum learning, which links knowledge and skills from different disciplines around a common theme or project, has been identified as a promising approach to fostering 21st-century skills (Beane, 1997; Drake & Reid, 2020). When students engage in integrated projects such as designing a product (technology) and developing a marketing plan (business) they actively apply critical thinking, collaboration, and creativity in authentic contexts. Cross-curriculum activities, also referred to as interdisciplinary learning, involve integrating concepts, skills, and learning experiences across multiple subject areas to promote holistic student development (Harris, Harrison, & McFahn, 2012). This approach moves beyond isolated subject teaching, encouraging learners to connect knowledge, think critically, and apply skills meaningfully. Cross-curriculum learning fosters deep understanding, motivation, and skill transfer (Drake & Reid, 2020). Theoretical frameworks underpinning cross-curriculum approaches include Constructivism, which emphasizes active, contextualized learning; Experiential Learning Theory (Kolb, 1984), which highlights learning through experience; and Integrated Curriculum Theory, which guides curriculum design to align multiple disciplines for meaningful outcomes (Zhang, 2024). Empirical evidence supports the benefits of such integration. For instance, Bekomson et al. (2022) investigated the influence of students' interest in extra curriculum activities on self-efficacy in Cross River State, Nigeria. Using an ex-post facto design



Enhancing 21st Century Skills Through ... Agwazie, B. & Chaizor, P. O. (2026)

with 1,586 senior secondary students, the study found that participation significantly enhanced social, academic, moral, and language self-efficacy. This suggests that cross-curriculum integration can positively affect students' holistic development. Similarly, Shagaya (2025) explored the integration of art and craft into early childhood education in Nigeria and found improvements in literacy, numeracy, and environmental awareness highlighting the value of cross-curriculum strategies. However, Olajide (2023) found no significant relationship between co-curriculum participation and academic performance at the undergraduate level, indicating that mere participation without structured alignment to learning objectives may not yield academic gains. Other studies, such as Adeyemi (2021), showed that project-based and interdisciplinary learning improved creativity among Lagos secondary school students, while Nwosu and Eze (2023) reported that Nigerian teachers have limited exposure to cross-curriculum instruction despite recognizing its potential. Twenty-first-century skills (21CS) refer to a broad set of knowledge, skills, habits, and character traits essential for success in modern society (Trilling & Fadel, 2019). These skills emphasize not only what students know but also what they can do with, what they know, how they apply, adapt, communicate, and create knowledge in new situations (Kholili, Dewantoro, & Surur, 2023). Core competencies are often summarized as the "4Cs" critical thinking, communication, collaboration, and creativity. Traditional education has emphasized rote learning and memorization, but scholars now argue that education must prioritize knowledge application, transfer, and adaptability. In the Nigerian context, secondary education plays a critical role in shaping students' knowledge, skills, and attitudes. Junior secondary school students, typically aged 12–15, are at a formative stage for developing higher-order thinking and collaboration skills (Federal Ministry of Education, 2013). According to Sahin, Yoon, and Kim (2019), 21CS encompass cognitive, social, and technical competencies such as critical thinking, creativity, communication, collaboration, digital literacy, and self-directed learning. These skills enable students to navigate complex problems, communicate effectively, and engage in lifelong learning. Care and Kim (2018) classify 21CS into three broad domains: Learning and Innovation Skills: Creativity, critical thinking, and problem-solving; Information, Media, and Technology Skills: Digital literacy and information evaluation; Life and Career Skills: Collaboration, adaptability, self-direction, and leadership.

Effective development of 21CS requires instructional strategies that go beyond rote methods. Cross-curriculum, project-based, and inquiry-based approaches are particularly effective because they engage students in authentic problem-solving, peer collaboration, and meaningful application of knowledge (Chu et al., 2017). In Nigeria, linking Business Studies and Basic Technology provides a powerful platform for developing entrepreneurial thinking, technical problem-solving, and digital literacy. For instance, a project requiring students to design a simple product (Basic Technology) and create a marketing plan (Business Studies) simultaneously develops creativity, collaboration, and real-world problem-solving. This shift reflects a paradigm change in education from knowledge acquisition to knowledge application. Students are now expected not only to learn content but also to demonstrate what they can do with that knowledge in dynamic environments (Care & Kim, 2018). Junior secondary students are at a crucial stage for cultivating these skills due to their cognitive and social development (Adebayo, 2020). Exposure to 21CS during this period enhances readiness for further education, vocational training, and workforce participation. However, research suggests that 21CS are still inadequately integrated into Nigerian classrooms, with many teachers relying heavily on traditional lecture methods (Adebayo, 2020). While Business Studies emphasizes entrepreneurship and innovation, Basic Technology focuses on design, production, and practical application. Integrating both can help students translate technological ideas into entrepreneurial solutions. This study focuses itself at the intersection of 21st-century skills development and cross-curriculum learning activities. Specifically, it explores how cross-curriculum activities linking Business Studies and Basic Technology can foster critical thinking, creativity, collaboration, and problem-solving skills among junior secondary school students. Cross-curriculum integration between these subjects offers a promising strategy for nurturing 21CS in authentic contexts (Chu, Reynolds, Tavares, & Notari, 2017). Accordingly, this review critically examines the conceptualization, measurement, classroom implementation, and challenges of 21CS, with particular attention to junior secondary schools in Nigeria.

Statement of the Problem

Despite the policy emphasis on skill-based learning, classroom practices in many Nigerian schools remain dominated by memorization and subject-specific instruction. Consequently, students often struggle to transfer knowledge and skills from one subject area to another, which hinders their ability to solve problems creatively and apply learning in real-world contexts. Teachers also encounter significant challenges in implementing interdisciplinary approaches due to curriculum



Enhancing 21st Century Skills Through ... Agwazie, B. & Chaizor, P. O. (2026)

rigidity, inadequate instructional resources, and limited professional training in integrated pedagogy. These constraints contribute to a persistent gap between curriculum intentions and classroom realities. As a result, students' 21st-century competencies particularly creativity, communication, collaboration, and digital literacy remains underdeveloped (Nwosu & Eze, 2023). This study, therefore, seeks to address this gap by exploring how co-curriculum learning activities in Business Studies and Basic Technology can enhance the development of 21st-century skills among junior secondary school students in Nigeria.

Purpose of the Study

The main purpose of this study is to investigate 21st-century skills through cross-curriculum activities in Business Studies among junior secondary school students in Nigeria. Specifically, the study will

1. Assess students' existing levels of 21st-century skills before the intervention.
2. Design and implement cross-curriculum learning activities linking Business Studies and Basic Technology.
3. Examine the effects of these activities on students' creativity, collaboration, communication, and problem-solving skills.
4. Explore teachers' and students' perceptions of cross-curriculum learning in promoting 21st-century skills.

Research Questions

1. What is the current level of 21st-century skills among junior secondary school Business studies students?
2. How do cross-curriculum learning activities in Business Studies and Basic Technology affect the development of 21st-century skills?
3. What are the perceptions of Business studies teachers and students toward the use of cross-curriculum activities?
4. What challenges do Business studies teachers face in implementing cross-curriculum learning approaches?

Research Hypotheses

H₀₁: There is no significant difference in the 21st-century skill levels of students taught through cross-curriculum activities and those taught through traditional methods.

H₀₂: There is a significant difference in the 21st-century skill levels of Business studies students taught through cross-curriculum activities and those taught through traditional methods.

Research methodology

This study adopts a quasi-experimental mixed-methods design. The quantitative component uses a non-equivalent control group pre-test/post-test design to examine the effect of cross-curriculum learning activities on 21st-century skills among junior secondary school students. The qualitative component explores teacher and student perceptions and identifies challenges in implementing cross-curriculum learning. The population comprises all public junior secondary school Business Studies students and teachers in Delta State. Stratified random sampling was used to select 100 students (50 treatment and 50 control), while 10 Business Studies and Basic Technology teachers were purposively selected. A pre-test 21st-century skills assessment was administered to both groups before the intervention. The treatment group participated in integrated cross-curriculum learning activities, whereas the control group followed the standard curriculum without explicit integration. After an intervention period of 6–8 weeks, the same assessment was administered as a post-test. Mean and standard deviation were used to analyse skill levels, and paired t-tests were employed for within-group pre/post comparisons. Independent t-tests or ANCOVA were used for between-group comparisons while controlling for pre-test scores. Qualitative data were collected through semi-structured interviews with teachers, focus group discussions with students, classroom observations, and relevant documents to allow for triangulation. Thematic analysis was then used to interpret qualitative data and explore perceptions and implementation challenges.

Presentation of Results

Research Question 1:

What is the current level of 21st-century skills among junior secondary school Business studies students before the intervention?

Table 1: Descriptive Statistics of Pre-Test Scores



Enhancing 21st Century Skills Through ... Agwazie, B. & Chaizor, P. O. (2026)

Group	N	Mean	Std. Deviation	Minimum	Maximum
Experimental	50	46.20	6.84	34	59
Control	50	45.78	7.12	31	58
Total	100	45.99	6.96	31	59

Interpretation:

Before the intervention, both groups performed at approximately the same level on the 21st-century skills assessment (M = 46.20 vs. 45.78). This indicates that the two groups were comparable prior to the introduction of cross-curricular activities.

Research Question 2:

How do cross-curriculum learning activities in Business Studies and Basic Technology affect the development of 21st-century skills?

Table 2: Descriptive Statistics of Post-Test Scores

Group	N	Mean	Std. Deviation
Experimental	50	74.18	8.25
Control	50	59.72	7.91
Total	100	66.95	10.23

Interpretation:

After the intervention, students exposed to cross-curriculum activities (experimental group) had a substantially higher mean score (M = 74.18) compared to the control group (M = 59.72). This suggests that the cross-curriculum learning experience enhanced students' acquisition of 21st-century skills.

Hypothesis Testing

H₀₁: There is no significant difference in the 21st-century skill levels of Business studies students taught through cross-curriculum activities and those taught through traditional methods.

A t-test for independent samples was conducted to compare the post-test scores of both groups.

Table 3: Independent Samples t-Test for Post-Test Scores

Group	Mean	Std. Dev.	T	Df	Sig. (2-tailed)	Decision
Experimental	74.18	8.25	8.71	98	0.000	Reject H ₀
Control	59.72	7.91				

Interpretation:

There was a statistically significant difference between the experimental and control groups, $t(98) = 8.71, p < .001$. Students exposed to cross-curricular activities demonstrated significantly higher 21st-century skills than those taught traditionally. Thus, H₀₁ is rejected, and H₀₂ is accepted.

Research Question 3:

What are the perceptions of Business studies teachers and students toward cross-curriculum activities?

Qualitative Summary (from interviews and observations)

1. Teachers described the activities as “engaging, real-world relevant, and promoting creativity and collaboration.
2. Students reported enjoying the hands-on projects, saying it helped them “see how technology and business are connected.
3. Both groups agreed that teamwork and problem-solving improved noticeably.
4. Challenges mentioned included limited time for project completion and difficulty aligning lesson plans across subjects.

Interpretation:

Qualitative findings corroborate the quantitative data, indicating positive perceptions and observable improvements in student engagement and 21st-century skill application.

Research Question 4

What challenges do Business studies teachers face in implementing cross-curriculum learning approaches?



Enhancing 21st Century Skills Through ... Agwazie, B. & Chaizor, P. O. (2026)

Table 4

Mean ratings of Business studies teachers' perceptions on the challenges in Implementing Cross-curriculum learning approaches

Challenge Item	Mean	SD	Interpretation
1. Limited time for planning integrated lessons	4.10	0.57	High Challenge
2. Lack of instructional resources and materials	3.90	0.74	High Challenge
3. Inadequate training or professional development	3.80	0.63	Moderate to High Challenge
4. Difficulty coordinating with other subject teachers	3.50	0.71	Moderate Challenge
5. Difficulty in assessing learning across subjects	3.20	0.63	Moderate Challenge
6. Lack of administrative support	3.40	0.70	Moderate Challenge
7. Students' limited background knowledge	3.30	0.67	Moderate Challenge
8. Lack of student interest or motivation	3.10	0.88	Moderate Challenge
Overall Mean	3.42	—	Moderate Challenge

Interpretation of Results

Table 4 presents the mean ratings of Business studies teachers' perceptions regarding the challenges they face in implementing cross-curriculum learning approaches. The overall mean rating of 3.42 indicates that teachers moderately agree that they experience several challenges in this area. The most notable difficulties reported include time constraints in planning integrated lessons ($M = 4.10, SD = 0.57$) and lack of instructional resources and materials ($M = 3.90, SD = 0.74$). Teachers also expressed concern about inadequate training or professional development opportunities ($M = 3.80, SD = 0.63$). Meanwhile, lower mean ratings were observed for lack of student interest ($M = 3.10, SD = 0.88$) and difficulty in assessment across subjects ($M = 3.20, SD = 0.63$), suggesting these are less severe but still relevant issues. Qualitative data from teacher interviews further supported these findings, highlighting the need for better administrative support, collaboration time, and clearer guidelines for integrating subjects effectively.

Summary of Hypotheses Testing

Hypothesis	Statement	Result	Decision
H ₀₁	No significant difference in 21st-century skills between students exposed to cross-curricular and traditional methods	$t(98) = 8.71, p < 0.001$	Rejected

Discussion of Findings

The results show that integrating Business Studies and Basic Technology through cross-curricular activities significantly improved students' 21st-century skills. This aligns with Drake and Reid (2020), who found that interdisciplinary instruction enhances problem-solving and creativity. The findings also corroborate Adeyemi (2021), who reported that project-based learning fosters collaboration and communication in Nigerian classrooms. Teachers' positive perceptions indicate readiness to embrace integrated teaching if provided with adequate training and resources. However, the identified challenges echo Nwosu and Eze (2023), emphasizing systemic barriers such as rigid curriculum and limited infrastructure—that must be addressed for cross-curricular teaching to thrive in Nigerian schools.

Key Statistical Highlights (Summary)

Variable	Mean Difference	t-value	p-value	Interpretation
Experimental vs. Control (Post-test)	14.46	8.71	0.000	Significant improvement in 21st-century skills

Implications for the Current Study

The literature reviewed underscores the relevance of investigating cross-curriculum learning in developing 21CS among Business studies students in junior secondary school. Key implications include:

1. Choice of Intervention: Using Business Studies and Basic Technology for cross-curriculum activities aligns with global best practices in integrating skills development with subject learning (Chu et al., 2017).
2. Research Design: A quasi-experimental design with pre- and post-tests is appropriate for assessing skill development while controlling for initial differences (Sahin et al., 2019).



Enhancing 21st Century Skills Through ... Agwazie, B. & Chaizor, P. O. (2026)

3. Measurement Strategy: Employing validated instruments alongside qualitative data collection allows for comprehensive assessment of both skill acquisition and contextual influences on learning outcomes (Care & Kim, 2018).
4. Teacher Engagement: Including teacher perspectives will provide insights into implementation challenges and support strategies for scaling cross-curriculum approaches effectively.

Conclusion

21st-century skills are essential competencies that enable students to navigate complex and dynamic environments. These skills extend beyond traditional academic knowledge to include critical thinking, creativity, collaboration, communication, digital literacy, and self-direction (Sahin et al., 2019; Care & Kim, 2018). Research indicates that cross-curricular learning offers a promising strategy for fostering 21CS, particularly when integrated with authentic, project-based tasks (Chu et al., 2017). However, challenges such as teacher preparedness, resource limitations, and assessment difficulties remain significant barriers, particularly in the Nigerian junior secondary context. This literature review highlights the theoretical and practical foundations for investigating the effect of cross-curriculum learning on 21CS among Business studies junior secondary school students in Delta State, providing justification for the study's design, instrumentation, and mixed-methods approach.

Recommendations

1. The Ministry of Education and curriculum developers should incorporate cross-curricular strategies that connect Business Studies with other subjects.
2. Teachers should be regularly trained on modern pedagogical approaches that foster 21st-century skills, such as project-based learning, problem-solving, digital literacy, and teamwork. Workshops and seminars can help teachers effectively integrate cross-curricular activities into Business Studies lessons.
3. Schools should be adequately equipped with modern teaching aids such as computers, internet access, business simulation software, and multimedia tools. These resources enhance students' engagement and promote practical application of business concepts across subjects.
4. Teachers should encourage interdisciplinary projects where students apply knowledge from different subjects to solve real-world business problems. For example, integrating ICT for business plan presentations or Mathematics for financial analysis.
5. Educational supervisors should periodically monitor and evaluate how effectively cross-curricular activities are being implemented in Business Studies classrooms, ensuring that the objectives of enhancing 21st-century skills are achieved.
6. Schools should partner with local businesses, entrepreneurs, and community organizations to expose students to real-life business practices. Such collaborations can provide mentorship opportunities and practical experience aligned with 21st-century competencies.
7. Teachers should design Business Studies activities that allow students to innovate such as developing small-scale business ideas or digital marketing projects to foster entrepreneurship and problem-solving skills.
8. Assessment methods should go beyond traditional exams to include performance-based evaluations such as presentations, portfolios, teamwork, and reflective journals that measure communication, critical thinking, and digital competence.
9. The Delta State Ministry of Basic and Secondary Education should develop policies that emphasize cross-curriculum learning and 21st-century skill development as key outcomes of secondary education.
10. Future researchers should explore the long-term impact of cross-curriculum Business Studies activities on students' entrepreneurial intentions, academic performance, and adaptability in real-life economic environments.

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