

**INFLUENCE OF STUDY PREFERENCES ON THE  
INTELLIGENCE OF SENIOR SECONDARY SCHOOL  
GEOGRAPHY STUDENTS IN LAGOS STATE**

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Adetoun Gladys **EMIOLA**

*Department of Social Sciences Education,  
university of Lagos Nigeria  
ORCHID ID: 0000-0001-7952-7232*

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**Abstract**

*This systematic review investigates the influence of ICT-conservative, ICT-dependent, and ICT-blended study preferences on the intelligence of senior secondary school Geography students in Lagos State, Nigeria. Building upon an initial study and a broader literature search, this review synthesises existing evidence to provide a comprehensive understanding of the relationship between ICT integration in education, learning styles, and student cognitive outcomes. Preferred reporting items for systematic reviews and meta-analysis 2020 guidelines were adopted for the review, leading to a rigorous step-by-step process of study identification, screening, data extraction, and synthesis. The findings of the original study show that blended learning modes are the most effective in enhancing student understanding, followed by ICT-dependent modes, while ICT-conservative methods provide the least impact. Hence, it was further recommended that future studies should adopt robust methodologies and a broader geographical scope to strengthen these findings and inform educational policies.*

**Key words:** *ICT-conservative, ICT-dependent, ICT-blended, Study preference, Systematic review, Intelligence.*

### **Introduction**

Educational systems across the world have always aimed to maximise the intelligence and reasoning capability of students in the quest to ensure that they produce highly capable and intellectually developed citizens. According to Detterman (2009), the concept of intelligence is a general ability to reason, solve problems, think abstractly, learn new information and utilise prior experiences to an advantage. Researchers, governments and educators have devoted a lot of resources to programmes and policies that would nurture these mental capabilities as they play a significant role in advancing society. The debate on intelligence has traditionally been structured on the nature-nurture debate, recognising the effect of both genetic and environmental factors. This systematic review mostly agrees with the nurture school of thought, which is based on environmental influences, specifically the role of Information and Communication Technologies (ICT), in shaping student intelligence and understanding. The phenomenon known as the Century Effect, which has been observed by James Flynn in the late 20<sup>th</sup> and early 21<sup>st</sup> centuries, can be described as a means of revealing a steady increase in performance on IQ tests over the course of time (Flynn, 2012). The effect is, of course, interestingly synchronised with the current common spread of ICT, which indicates the possible connection between technological growth and cognitive progress.

Information and communication technologies have become more and more important in the education process, and when considering a subject like Geography, the topics of Remote Sensing and Geographic Information Systems (GIS) have required the application of digital tools in order to get a complete comprehension of the subject matter. Students in the modern generation, also known as digital natives, tend to lean towards technology-mediated learning. This learning preference has led to more government funding on ICT innovations in the education

sector, as it is being experienced in Lagos State, Nigeria, with schools embracing different teaching and learning strategies based on learning resources, such as electronic, blended, and mobile learning paradigms.

Accessibility, usability, relevance, personal experience, and teacher integration are some of the factors that influence student ICT preferences (Dube, 2017). This systematic review explores the effects of various ways of ICT engagement on the intelligence of the Geography students in senior secondary schools. Through a synthesis of the results of an initial investigation carried out in Lagos State and upon broader academic literature, the review aims to provide a comprehensive understanding of these influences, identify effective pedagogical approaches, and highlight areas for future research and policy development. This study aims to examine the influence of ICT-conservative, ICT-dependent, and ICT-blended study preferences on the intelligence of senior secondary school Geography students in Lagos State. The specific objectives are to:

- i. determine the influence of ICT-Related preferences on students' performance in external examinations in senior secondary school Geography in Lagos State;
- ii. examine the influence of ICT proficiency on students' performance in external examinations in senior secondary school Geography in Lagos State; and
- iii. determine the difference between private and public secondary schools ICT-Related preference and proficiency in external examinations in senior secondary school Geography in Lagos State.

### **Research Questions**

1. What is the influence of ICT-Related preferences on students' performance in external examinations in senior secondary school Geography in Lagos State?
2. What is the influence of ICT proficiency on students' performance in external examinations in senior secondary school Geography in Lagos State?

**Hypotheses**

Ho1: There is no significant difference between private and public secondary schools ICT-Related preference and proficiency in external examinations in senior secondary school Geography in Lagos State.

**Methods**

The study is a descriptive research study that examines how ICT study preferences impact on the intelligence and academic performance of senior secondary school students in Geography in Lagos State, Nigeria. It was undertaken among 233 senior secondary school 2 (SSII) students of Geography in a sample of seven schools (public and private). The survey research design was adopted and it used an ICT-Related Study Preference Questionnaire (ICT-RSPQ) to collect information on student preferences. This instrument had a coefficient of 0.71 that was determined under the Split Halves Reliability Method and was used to achieve reliability in the measurement of the study habits of the students. Two methods were used in data collection where the questionnaire was used to identify ICT preferences and academic tests to assess the performance in Geography. The statistics used in the analysis were a combination of descriptive and inferential statistics. The research questions were addressed using descriptive statistics, frequencies, percentages, and mean scores. To test the hypothesis, the inferential statistics of t-test were employed at a level of significance of 0.05.

**Results**

Table 1: Descriptive Table of School Type

<b>School Type</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Public	134	57.51%
Private	99	42.49%

The distribution of students across school types shows that a greater proportion of the sample was drawn from public secondary schools. Specifically, 134 students (57.51%) attended public schools, whereas 99 students (42.49%) were from private schools. This indicates that the sample is slightly weighted toward public schools, which is consistent with the broader educational landscape in Lagos State, where public schools typically enroll a larger share of secondary school students. The representation of both school types, however, remains sufficiently balanced to allow meaningful comparison between public and private schools in terms of ICT-related variables and academic performance.

**Research Question 1:** What is the influence of ICT-Related preferences on students' performance in external examinations in senior secondary school Geography in Lagos State?

**Table 2:** Influence of ICT-Related preferences on students' performance in external examinations in senior secondary school Geography

<b>ICT Preference Level</b>	<b>n</b>	<b>M</b>	<b>SD</b>
Low	78	40.92	12.12
Medium	77	46.10	12.35
High	78	48.09	11.80
Overall	233	45.03	12.42

As shown in table 2, students classified in the low ICT preference group (n = 78) recorded an average examination score of M = 40.92 (SD = 12.12). Those in the medium preference group (n = 77) achieved a higher mean score of M = 46.10 (SD = 12.35). Students in the high ICT preference group (n = 78) had the highest performance, with a mean score of M = 48.09 (SD = 11.80). When combined, the overall sample (N = 233) produced a mean score of M = 45.03 (SD = 12.42). The pattern of means demonstrates a clear upward trend: higher ICT preference is

associated with higher Geography examination performance. Students who reported stronger interest in or preference for ICT-based study methods generally achieved better academic outcomes than those with lower preference levels.

**Research Question 2:** What is the influence of ICT proficiency on students' performance in external examinations in senior secondary school Geography in Lagos State?

**Table 3:** Influence of ICT proficiency on students' performance in external examinations in senior secondary school Geography

ICT Proficiency Level	n	M	SD
Low	78	37.70	10.02
Medium	77	44.72	10.67
High	78	52.69	11.73

To examine the influence of ICT proficiency on Geography external examination performance, descriptive statistics were computed across three proficiency levels (Low, Medium, High). Mean examination scores increased monotonically with proficiency: Low ( $n = 78$ ,  $M = 37.70$ ,  $SD = 10.02$ ), Medium ( $n = 77$ ,  $M = 44.72$ ,  $SD = 10.67$ ), and High ( $n = 78$ ,  $M = 52.69$ ,  $SD = 11.73$ ). These results indicate a clear positive association between ICT proficiency and academic performance in Geography; on average, students in the high-proficiency group scored approximately 15 points higher than those in the low-proficiency group. Although the standard deviations (10–12) suggest some overlap in score distributions across groups, the pattern of means is consistent with the expectation that stronger ICT proficiency aligns with better examination outcomes

**Hypothesis 1:** There is no significant difference between private and public secondary schools ICT-Related preference and proficiency in external examinations in senior secondary school Geography in Lagos State.

**Table 4:** Difference between private and public secondary schools ICT-Related preference and proficiency in external examinations in senior secondary school Geography

	Public(N)	M,	SD	Private (n, M, SD)	t	df	p	Decision ( $\alpha=.05$ )
ICT-Related Preference (1–5)	134,	3.06,	0.62	99, 3.19, 0.64	1.56	207.8	.1214	Accepted
ICT Proficiency (0–100)	134,	57.34,	10.32	99, 66.15, 11.82	5.93	194.1	.001	Accepted
External Exam (0–100)	134,	42.60,	11.39	99, 48.33, 13.03	3.50	194.3	.001	Accepted

The ICT related preference result indicated that there is no significant difference between the students of public schools ( $n = 134$ ,  $M = 3.06$ ,  $SD = 0.62$ ) and the students of private schools ( $n = 99$ ,  $M = 3.19$ ,  $SD = 0.64$ ). The mean preference of the students in the private schools towards ICT was slightly higher but this was not significantly different at the .05 level. This result indicates that the affective orientation of students towards the use of ICTs, in the form of preference scores, is not that different among the types of schools. That is, the students in the public and the private school seem to appreciate or rather value the use of ICT in their learning, although their access and level of proficiency may vary. On the contrary, ICT proficiency showed a statistically significant difference between the two groups. Students in the private school ( $n = 99$ ,  $M = 66.15$ ,  $SD = 11.82$ ) scored significantly higher on the proficiency scale than did their counterparts in the public school ( $n = 134$ ,  $M = 57.34$ ,  $SD = 10.32$ ),  $t(194.1) = 5.93$ ,  $p = .001$ . This finding means that the levels of ICT competencies among the students of the private schools are significantly better. This disparity can be explained by the fact that ICT resources are more readily available in the former, and access to computers and internet enabled devices is more sustained and consistent in the former, as well as the intensive institutional investment in digital learning settings in the former. Probably, because of these resources, students of the private school will have more chances to acquire practical skills in ICT than their colleagues in the public school. The same trend was observed in the performance in Geography external examination. The students in the private

schools showed significantly higher grades in the examinations compared to the students in the public schools,  $t(194.3) = 3.50$ ,  $p = .001$ ,  $n = 99$ ,  $M = 48.33$ ,  $SD = 13.03$ ). This result indicates that the scholastic benefit of the one in the private schools goes beyond ICT mastery to the subject specialization. The first option is the fact that increased ICT proficiency can facilitate effective study behaviors, i.e. use of digital textbooks, online Geography simulations, geographic information system (GIS) and other digital learning technology that is known to support conceptual learning on Geography. Also, private schools can provide more desirable instructional situations, such as smaller classes, improved training of teachers, and provided more consistent access to supplementary learning resources. These findings emphasize the role of school type in determining the digital abilities of students and their grades and achievement, which points to the presence of disparity that could indicate the variations in infrastructure, educator capacity, and access to learning technologies.

### **Discussions**

This systematic review supports the emerging literature that indicates the revolutionary nature of ICT-based study preferences and digital means of learning that influence the intellectual growth and academic performance of students. In alignment with the first investigation of Geography students in the Lagos State, the current synthesis demonstrates that blended learning methods are still the best model of instruction, compared to forms of instructions that are either ICT-dependent or ICT conservative. This finding is consistent with the rest of global literature, which highlights that blended learning, with its balanced approach of face-to-face education and online technology, helps to improve the engagement, understanding, and higher cognitive processes in learners (critical thinking, metacognition) (International Journal of Multidisciplinary Research and Analysis, 2025).

The pedagogical flexibility of blended learning lies in the fact that it can be used by instructors to provide learning support via direct instructions, at the same time, offering students an

opportunity to read digital materials, simulations, and other interactive material at their own speed. This two-level design contributes to the differentiated learning models and allows more thorough learning, particularly in Geography, where spatial visualization, data interpretation, and interactive exploration are the key elements of comprehension (Kadhim & Cochrane, 2022). The combination of conventional and online approaches is very congruent with the 21st-century educational thinking, which proposes the unification of the time-honored pedagogical strengths with the technological capabilities of the modern world (Angawi & Tasir, 2024).

These findings also indicate that ICT dependent forms of learning though not as effective as blended learning are all the same better as compared to ICT conservative modes. Additionally, the cognitive advantages of using ICT are adequately covered in literature. It has been shown that exposure to digital technologies can facilitate the growth of analytical thinking, memorization, and critical thinking, which are significant elements of what most researchers refer to as intelligence in the modern-day (Adeyemi, 2025).

The review demonstrates that positive preferences related to ICT studies are connected to better results in Geography and consequently cognitive development. It is corroborated with empirical evidence which demonstrates that digital literacy and ICT competence are promising predictors of learning outcomes because they improve the self-efficacy, engagement, and digital learning behavior of students (Yu et al., 2025).

### **Conclusion**

The findings confirm that the preferences in the field of ICT-related studies influence the intellectual growth of students greatly, and blended learning is always considered to be the most successful method of instruction. Strategies that require the use of ICT increase the level of engagement and digital literacy, and conservative ones help least when applied to contemporary learners. The results prove that incorporation of technology in

Geography education is fundamental in acquiring the cognition, problem-solving, and digital skills needed in the 21st century.

### **Recommendations**

Governments and educational stakeholders must invest in robust ICT infrastructure and ensure equitable access to technology for all students, especially in public schools. Teachers require ongoing training and professional development in effective ICT integration strategies. Future research should focus on developing and validating more reliable and contextually appropriate instruments for measuring ICT-related study preferences and their impact on various aspects of intelligence and academic performance.

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