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BASELINE ASSESSMENT OF PROGRAMMING PERCEPTION AND READINESS AMONG SECONDARY SCHOOL STUDENTS IN EDO STATE

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ABSTRACT

The study examined secondary school students' readiness for programming in education in Edo State, Nigeria, with emphasis on curriculum gaps and students' preparedness before full implementation of programming in the national curriculum. A descriptive survey design was adopted, and data were collected from 185 validly completed questionnaires distributed across public and private secondary schools. The instrument measured students' perceptions, factors influencing readiness, and expectations toward programming education. Descriptive statistics (mean and standard deviation) and inferential tests (*t*-tests) were used for data analysis. Findings revealed that students' perception of programming was neutral (Mean = 3.27), influenced by limited practical exposure and teacher engagement. Factors influencing readiness included personal confidence, teacher competence, and availability of ICT resources, with a moderate overall readiness level (Mean = 3.46). Students' expectations were high (Mean = 3.71), showing enthusiasm toward learning programming and engaging in coding-related activities. Significant differences were found in perceptions across gender ($p < 0.05$), but not across school type. However, expectations differed significantly between public and private school students ($p < 0.05$). The study concluded that Edo State student's demonstrated readiness for programming education but require improved teacher capacity, gender inclusion, and infrastructure to support effective curriculum delivery. Recommendations include enhanced teacher training, provision of ICT resources, and establishment of coding clubs to foster engagement and digital competence.

Keywords: Programming Education, Coding, Computational Thinking, Readiness, Perception

INTRODUCTION

The integration of programming into secondary school education has become a key priority in preparing students for participation in a technology driven world. Globally, educators and policymakers increasingly emphasize the importance of programming as a fundamental digital skill that promotes creativity, critical thinking, and problem solving (Grover & Pea, 2013; Lye & Koh, 2014). This movement is grounded in the concept of computational thinking (CT), popularized by Wing (2006, 2017), who described CT as a universal problem solving process involving decomposition, pattern recognition, abstraction, and algorithmic design. While computational thinking does not necessarily require programming, programming serves as its most practical expression enabling learners to translate abstract reasoning into executable solutions.

In Nigeria, computer education has been part of the secondary school curriculum for over two decades. Earlier versions of the curriculum introduced students to Basic Programming at the junior secondary level, and expanded into Algorithm, Flowchart, and Program Development under Computer Studies and Data Processing in the senior secondary curriculum. However, despite these curricular inclusions, the level of programming proficiency among Nigerian students remains low (Nwangwu, 2015). This shortfall has been linked to inadequate teacher preparation, insufficient ICT infrastructure, and a lack of emphasis on practical programming experiences (Ekong, 2020).

With the recent revision of the Nigerian curriculum (2025/2026 session) emphasizing digital skills and computational competence, it becomes imperative to assess whether students are ready in terms of perception, exposure, and motivation to learn programming effectively. Understanding students' readiness is crucial because attitudes toward programming and access to supportive resources strongly influence learning outcomes and career interests in computer science (Korkmaz et al., 2017; Emily et al., 2024).

This study therefore investigates students' readiness for programming education in selected urban secondary schools in Edo State, Nigeria. It focuses on how students perceive programming as a subject, their learning environment, and their expectations toward future programming education. The findings are expected to provide insights for policymakers, teachers, and curriculum developers to design more effective interventions that bridges the gap between curriculum design and classroom practice.

MATERIALS AND METHODS

Research Design

This study adopted a descriptive survey research design, which is suitable for gathering data on perception, influence, readiness and expectation levels among a defined population. The design enabled the researcher to obtain quantitative data from students on their perceptions of programming, influence readiness, and readiness expectations for programming education. The survey approach was appropriate because it facilitated the collection of opinions from a large number of respondents within a limited period.

Population of Study

The population of study comprised all senior secondary school students (SS1 – SS3) in urban secondary schools in Benin City, Edo State, Nigeria. The focus on urban schools was informed by accessibility and the expectation that these schools have relatively better exposure to ICT facilities compared to rural counterparts.

Sample and Sampling Technique

A total of six secondary schools (two private and four public) located in Benin City were selected for the study. The selection was guided by the availability of computer studies as a subject and willingness of the schools to participate.

A total of 200 copies of the questionnaire were distributed to students across these schools. Out of these, 185 were correctly completed and returned, representing a 92.5% response rate. Among the valid responses, 130 were from public schools and 55 were from private schools.

The selection of participants within each school employed stratified random sampling, ensuring proportional representation by school type and gender.

Research Instrument

Data were collected using a researcher-developed questionnaire title "Baseline Assessment of Programming Perception (BAPPQ)". The instrument was developed after reviewing relevant literature (Grover and Pea, 2013; Christiane et al., 2017; Odey et al., 2025) and was structured into four Sections:

i. Section A: Demographic information (gender, class, school type, and two other items).
ii. Section B: Students' perception of programming (6 items).
iii. Section C: Factors influencing readiness (6 items)
iv. Section D: Readiness and Expectation (5 items)

Each item in Sections B to D was measured on a five-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree.

Validity of the Instrument

The instrument was subjected to face and content validation by three experts, two in Computer Science Education and one in Measurement and Evaluation from the University of Benin. Their observations ensured that each item aligned with the study objectives, was clearly stated, and covered the constructs under investigation.

Reliability of the Instrument

The reliability of the Baseline Assessment of Programming Perception Questionnaire (BAPPQ) was established through an internal consistency test using Cronbach's Alpha, computed with Python (pandas and numpy libraries). Cronbach's Alpha coefficients were computed for each construct, as shown in Table 1.

Table 1: Internal Consistency Test Using Cronbach's Alpha

Scale	No. Of Items	Cronbach's Alpha	Interpretation
Perception of Programming	6	0.78	Acceptable
Factors Influencing Readiness	6	0.75	Acceptable
Readiness and Expectations	5	0.88	Good
Overall Reliability	17	0.80	Good Internal Consistency

The results indicate that the reliability coefficients of all subscales are above the acceptable threshold of 0.70 recommended by Nunnally (1978). Therefore, the instrument was considered reliable and internally consistent for measuring students' perceptions, factors influencing readiness, and readiness expectations toward programming education.

Method of Data Collection

Prior to data collection, approval was obtained from the school principals of the selected institutions. The researcher personally administered the questionnaires with the help of the teachers assigned. The purpose of the study was explained to the respondents, and confidentiality was assured. Completed questionnaires were retrieved immediately after completion to ensure high response rates and data accuracy.

Method of Data Analysis

Data were coded and analyzed using Python (Pandas, SciPy, and Matplotlib) and Microsoft Excel.

i. Descriptive statistics (mean and standard deviation) were used to answer the research questions.
ii. Inferential statistics using the Independent Samples t-test were employed to test the hypotheses at a 0.05 level of significance.

The mean responses were interpreted using the following decision rules:

Table 2: Decision Rules

Mean Range	Interpretation
4.50 - 5.00	Strongly Agree
3.50 - 4.49	Agree
2.50 - 3.49	Neither Agree Nor Disagree
1.50 - 2.49	Disagree
1.00 - 1.49	Strongly Disagree

Ethical Considerations

Ethical standards were upheld throughout the study. Participation was voluntary, and respondents were informed of the study's purpose. No personal identifiers were collected, and the information provided was treated as confidential and used solely for academic purposes.

RESULTS AND DISCUSSION

This part presents the analysis of data collected from secondary school students in Edo State on their perceptions, factors influencing readiness, and readiness expectations toward programming education. Out of the 200 questionnaires distributed, 185 were correctly completed and used for analysis, representing a 92.5% valid response rate. The data were analyzed using descriptive and inferential statistics including means, standard deviations and independent samples t-test to answer the research questions and test the hypotheses at the 0.05 level of significance.

Research Question 1

What are the students' perceptions of programming in secondary schools in Edo State?

Table 3 presents the mean and standard deviation of students' responses regarding their perceptions of programming.

Table 3: Students' Perceptions of Programming

Item	Mean	SD	Interpretation
Programming is an important skill for my future career	3.29	1.41	Neutral
I enjoy computer classes that include practical activities	3.36	1.44	Neither Agree nor Disagree
Programming seems too difficult for most students	3.54	1.23	Agree
I understand what programming means	3.71	1.31	Agree
Learning programming will make other subjects easier	3.26	1.32	Neither Agree nor Disagree
Teachers make programming lessons interesting	2.43	1.07	Disagree
Grand Mean	3.27		Neutral to Agree

Results show that students generally hold neutral perceptions toward programming (Mean = 3.27). While many students agree that programming is meaningful and understandable, they also view it as difficult and find teaching approaches less engaging, especially due to limited practical exposure.

Research Question 2

What is the factor influencing readiness toward programming?

Table 4: Factors Influencing Readiness

Item	Mean	SD	Interpretation
There are enough functioning computers in my school	2.33	1.10	Disagree
I have access to a computer outside school	3.29	1.58	Neutral
Our computer teacher can teach programming well	3.29	1.41	Neutral
Electricity or power supply supports computer practice in school	3.91	1.40	Agree
I am confident that I can learn programming successfully	4.04	1.34	Agree
My parents or guardians encourage me to learn computer skills	3.93	1.34	Agree
Grand Mean	3.46		Neutral to Agree

The findings show that students' readiness for programming is influenced by both internal and external factors. While personal confidence and parental support are strong motivations, the lack of computers and inadequate teacher preparation act as barriers to effective readiness.

Research Question 3

What are students' readiness and expectations for programming education in Edo State secondary school?

Table 5: Readiness and Expectation

Item	Mean	SD	Interpretation
I am eager to learn programming if it becomes compulsory in school	4.05	1.29	Agree
I will consider a career related to computer programming	3.24	1.48	Neutral
I would like my school to organize coding clubs or competitions	3.94	1.41	Agree
I expect to create real computer programs during my classes	3.63	1.44	Agree
I will attend extra lessons to improve my programming skills	3.68	1.49	Agree
Grand Mean	3.71		Agree

The findings indicate high readiness and positive expectations toward programming among students. Most respondents expressed enthusiasm to learn programming, participate in coding activities, and develop real world computing skills.

Hypotheses Testing

Hypothesis one (H_1): There is no significant difference in students' perceptions of programming across gender.

Table 6: Hypothesis Test 1

Group	Mean	t-value	p-value	Decision
Male	3.56	5.440	0.001	Reject H_1
Female	2.96			

The p-value ($0.001 < 0.05$) indicates a significant difference in students' perceptions of programming across gender. Male students demonstrated more positive perceptions of programming than females.

Hypothesis Two (H_2): There is no significant difference in students' perceptions of programming across school type (public vs. Private).

Table 7: Hypothesis Test 2

Group	Mean	t-value	p-value	Decision
Public	3.33	1.573	0.119	Fail to Reject H_2
Private	3.12			

There is no statistically significant difference in students' perceptions based on school type (p = 0119 > 0.05). Both public and private school students exhibited similar views toward programming education.

Hypothesis Three (H_3): There is no significant difference in students' expectations for programming education across school type.

Table 8: Hypothesis Test 3

Group	Mean	t-value	p-value	Decision
Public	3.89	2.973	0.004	Reject H_3
Private	3.28			

A significant difference was found between public and private schools (p = 0.004 < 0.05). Public school students showed higher expectations toward programming education compared to their private school counterparts.

Discussion

The findings revealed that students held neutral perceptions of programming (Mean = 3.27). While most students agreed that programming is an important skill and understood its meaning, they also viewed it as difficult and less engaging. This issue could be attributed to students' limited exposure to practical lessons or the use of ineffective teaching methods. In this study, the neutral perception suggests a need to improve teaching methods, provide hands-on experiences, and link programming lessons to real world applications.

The results also showed that students' readiness is shaped by both personal and environmental factors. While students expressed confidence in their ability to learn programming (Mean = 4.04) and acknowledged strong parental encouragement (Mean = 3.93), the availability of functional computers and competent teachers remained key limitations (Mean = 2.33 and 3.29, respectively). This finding corroborates the observations of Odey et al. (2025), who found that a lack of trained ICT personnel and functional computer laboratories directly hindered practical ICT usage. The relatively high confidence levels observed in this study indicate that students are personally ready and motivated, but institutional constraints may hinder effective implementation of programming education.

Students demonstrated high expectations for programming (Mean = 3.71), indicating enthusiasm toward learning programming, participating in coding clubs, and pursuing programming-related careers. This positive outlook aligns with the findings of Apple and YPulse (2023), who reported that students exhibited strong interest and high expectations regarding coding education. Such enthusiasm suggests that when properly introduced, programming can be an engaging component of secondary education, capable of nurturing problem-solving skills and career aspirations in technology-related fields. However, students' expectations are likely influenced by their exposure to digital devices and awareness of technology driven opportunities. Their anticipation of hands-on experiences suggests that need for active learning environments that bridge the gap between theory and practice.

The t-test analysis revealed a significant gender difference in students' perceptions of programming (p = 0.001 < 0.05), with males demonstrating more positive perceptions than females. This finding is consistent with earlier studies (e.g. Irunokhai et al., 2024; Gunasekara, 2021) that boys and girls have different perceptions of computer uses. It reported that male students exhibit a higher interest in programming compared to their female counterpart. This highlights the importance of gender sensitive interventions such as female mentorship programs and inclusive classroom practices to close the perception gap.

Although perceptions did not differ significantly between public and private schools (p = 0.119 > 0.05), expectations for programming education were significantly higher among public school students (p = 0.004 < 0.05). This may suggest that public school students, who often have fewer ICT resources, see programming as an opportunity for upward mobility and digital empowerment, while private school students may already have access to digital technologies outside school.

CONCLUSION

The findings revealed that students are moderately aware of and interested in programming, although many still perceive it as a challenging subject. Readiness for programming education appears to be influenced by factors such as personal confidence, teacher competence, and the adequacy of infrastructure. Despite existing challenges, students expressed high expectations for programming education, showing eagerness to learn and participate in hands-on coding activities. Gender differences were observed, with male students demonstrating more positive perceptions of programming than their female counterparts. Additionally, students from public schools exhibited higher expectations for programming education compared to those in private schools.

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