PROGRAMMING SKILLS FOR SELF-EMPLOYABILITY POSSESSED BY COMPUTER SCIENCE EDUCATION STUDENTS IN PUBLIC TERTIARY INSTITUTION IN EBONYI STATE

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ABSTRACT

The study assessed the programming skills for self-employability possessed by computer science education students in public tertiary institution in Ebonyi State. Four specific purposes, and research questions and four null hypotheses guided the study. Descriptive research survey design was used for the study. The population of the study consisted of seventy one (71) final year Computer Science education undergraduates in public tertiary institutions that offer Computer Science Education in Ebonyi State which were all involved in the study. The instrument for data collection was a Computer Science Students Evaluation Form (CSEF), design to elicit information from the respondents. The instrument for the study was validated by three experts, two from the Department of Science Education and one from the Measurement and Evaluation unit, all from the Faculty of Education, Ebonyi State University, Abakaliki. The reliability of the instrument was ascertained through a pilot testing involving twenty (20) Science Education undergraduates in Abia State University Uturu. The Pearson Product Moment was used to determine the internal consistency of the instrument which yielded overall consistency of 0.94. The instrument for data collection was an observational schedule titled "Computer Science Students Evaluation Form (CSEF)". Mean and standard deviation were used to answer the questions and t-test statistic was used to test the hypotheses at 0.05 level of significance. The results showed that cloud computing skills, problem-solving skills, object-oriented programming language skills as well as text editing skills are possessed by male and female computer science

education students for self-employability in public tertiary institution in Ebonyi State. The result also found that there is no significant difference in the mean responses of the cloud computing skills, problem-solving capacity skills, object-oriented programming languages skills as well as text editing skills possessed by computer science education students for self-employability in public tertiary institution in Ebonyi State based on school ownership. Based on the findings, the study recommended among others that computer science education students should be equipped by teachers with cloud computing skills for self-employability on graduation and that the awareness for equipping computer science students with text editing skills is needed for self-employability and employment on graduation should be needed by computer science teachers.

Introduction

Computer science education is a rapidly growing field that is essential to preparing students for careers in the technology industry and other fields that require computational skills. Computer science education is the field of teaching and learning the discipline of computer science, and computational thinking. The field of computer science education encompasses a wide range of topics, from basic programming skills to advanced algorithm design and data analysis. Computer science education is essential to preparing students for the 21st century workforce. As technology becomes increasingly integrated into all aspects of society, the demand for skilled computer scientists is growing (Case, 2015).

Computer science education promotes computational skills, which are valuable in many fields, such as business, healthcare and education. Computer science education is important for preparing students for the future employment, by teaching them about computer science, schools fills an inadequate gap of computer science graduates and workers, enhance computer science education with a focus on equity, build digital skills that are expected of workers in nearly any profession and cultivate adaptability by future-proofing students' skill sets (Joseph, 2019).

A skill is the learned ability to act with determined results with good execution often within a given amount of time, energy, or both (Tunde, Akintoye & Adeyemo, 2021). Computer programming skills are methods and processes that provide computers with instructions on what actions to perform.

The Federal Republic of Nigeria (FRN, 2018) emphasized the need for functional education that is relevant, practical and tailored towards acquisition of appropriate employability skills and development of competencies and values which will enable an individual to live and contribute meaningfully to the development of his society.

The employable skills are those skills that help someone keep a job (Nwagbo, 2020). There are various types of employable skills such as hard skills and soft skills. Programming skills as an aspect of soft skills are skills required by computer science education students for paid jobs or self-employment upon graduation. With the proper acquisition of programming skills, graduates from computer science programes can become self-employed for wealth creation. Additionally,

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companies may have to invest more resources in training and development programs to bridge the skills gap, which could be time-consuming and costly. Therefore, it is on this backdrop that this study aimed to assess the programming skills possessed by computer science education students for self-employability in public tertiary institution in Ebonyi State.

Computer programming is the composition of sequences of instructions, called programs, that computer can follow to perform tasks. Programming skills are the knowledge and understanding of languages, frameworks, and architecture that enables a coder to create any digital product.

Statement of the Problem

Many employers have expressed dissatisfaction with the level of competence exhibited by computer science education graduates, particularly when it comes to programming. This may led to a high rate of unemployment among computer science education graduates. As a result, it has become increasingly important to assess programming skills among computer science education students in Nigeria, particularly those who aspire to become self-employed.

It has been assumed that more and more young people in contemporary Nigerian Society are failing to find jobs in a large stagnant formal sector. In addition to this, employers of labour are demanding for skills in ones area of specialization before being gainfully employed and many graduates are without the required skills.

This problem of unemployment is also among graduates of Computer science education in public tertiary institution in Ebonyi State and Nigeria at large who are seen to be ill equipped and short of the necessary skills for self-employment, particularly in programming skills. The study is therefore set to assess the programming skills possessed by computer science education students for self-employability in public tertiary institutions in Ebonyi State.

Purpose of the Study

The main purpose of this study is to assess the programming skills possessed by computer science education students for self-employability in public tertiary institution in Ebonyi State. Specifically, the study sought to assess the:

1. Cloud computing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
2. Problem-solving skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
3. Object-oriented programming language skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
4. Text editing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.

Research Questions

The following research questions will guide the study:

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What are the cloud computing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State?

1. What are the problem-solving skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State?
2. What are the object-oriented programming language skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State?
3. What are the text editing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State?

Hypotheses

The following hypotheses are formulated for the study and will be tested at 0.05 levels of significance.

1. There is no significant difference in the mean ratings of the cloud computing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
2. There is no significant difference in the mean ratings of the problem-solving capacity skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
3. There is no significant difference in the mean ratings of the Object-oriented programming languages skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.
4. There is no significant difference in the mean ratings of the text editing skills possessed by computer science education students in public tertiary institutions for self-employability in Ebonyi State.

METHODOLOGY

Design of the Study

Descriptive survey research design will be employed. Abonyi, Okereke, Omebe, Nnachi and Anugwo (2022) maintained that descriptive survey research design consists of studies in which data are collected from a small sample of a large population to enable the researcher describe in systematic manner and interpret characteristic features and facts about things that exist in the population without manipulation. Based on the characteristic of descriptive survey research design, it was considered appropriate for use in this study, since the study is concerned with collecting data from a small sample of the population without manipulation of any variable using questionnaire. Therefore, the study will assess the programming skills possessed by computer science education students for self-employability in Ebonyi State.

3.2 Area of the Study

This study will be carried out in Ebonyi State. Ebonyi State is a part of the South-East Geo-political zone in Nigeria with its capital town in Abakaliki. Ebonyi State is bounded by Enugu,

Abia, Imo and Cross River States. The State is occupied by mostly Igbos. Igbo language is the general language spoken throughout the State, with no restriction to other languages. The people of Ebonyi State are predominantly known for commercial activities such as farming, fishing, trading, and civil service among others. Ebonyi State has four public tertiary institutions offering Science Education programme which include; Ebonyi State University, Alex Ekwueme Federal University Ndufu-Alike Ikwo , Ebonyi State College of Education Ikwo and Federal technical College Isu. The choice of the state for the study is based on the need to determine the programming skills possessed by computer science education students for self-employability in Ebonyi State.

3.3 Population of the Study

The population of the study will be twenty-five (25) Science Education students in public tertiary institutions that offer Computer Science Education in Ebonyi State. This comprised of nine (9) students from Alex Ekwueme Federal University, Ndufu Alike Ikwo, eight (8) students from Ebonyi State University and eight (8) students from Ebonyi State College of Education Ikwo, (Registry Department of the three selected institutions, 2024). This population in made up of both male and female Students in their respective schools.

3.4 Sample and Sampling Techniques

The sample size for this study will comprise of all the twenty-five (25) Science Education Students in public tertiary institutions that offer Computer education in Ebonyi State. Due to the small number of the population of the study, the researcher will accommodated all the twenty-five (25) Science Education students in public tertiary institutions that offer Computer education in Ebonyi State as the sample size of the study. This means that there will be no sampling technique for the study.

3.5 Instrument for Data Collection

The instrument for data collection will be an observational schedule titled "Computer Science Students Evaluation Form (CSEF)". The form has two sections. Section A deals on personal data of the respondents. Section B contains one hundred and six (106) items structured on programming skills possessed by computer science education students for self-employability in Ebonyi State. This section has five (4) clusters – A, B, C and D. Each cluster deals with items on related research question. Cluster A deals on Cloud computing skills, Cluster B deals on the Problem-solving skills, Cluster C centers on the object-oriented programming languages skills, while cluster D focuses on the Text editing skills. These is presented on a 4-point Rating Scale of Very Well (VW) (4 points), Well (W) (3 points), Poor (P) (points), Very Poor (VP) (1 points).

Reliability of the Instrument

The validated instrument was subjected to trial testing with twenty (20) Science Education undergraduates in Abia State University Uturu which is not part of the study area to ensure its reliability. To ascertain the internal consistency of the instrument Spearman ranking technique was used for its analysis. Reliability coefficients for the cluster will be as follows; cluster A: 0.82, cluster B: 0.78, cluster C: 0.73, cluster D: 0.60.

3.8 Method of Data Collection

The instrument will be administered to the respondents in the selected institutions and retrieved by the researcher with the help of three (3) research assistants. These research assistants will be instructed on the modalities for administration and retrieval of the instrument.

3.9 Method of Data Analysis

Research questions will be answered on individual item basis using mean and standard deviation. The mean cut off point will be derived by the addition of nominal values and dividing the sum by the number of scale options.

The decision rule will be that any mean value from 2.50 and above will be used to interpret the item as possessed, while any mean value less than 2.50 will be used to interpret the item as not possessed. In testing the hypotheses, t-test will be used to test the entire null hypotheses at a 0.05 level of significance.

1 Research Questions

Research Question 1

What are the cloud computing skills possessed by male and female computer science education students for self-employability in Ebonyi State?

Data collected with Cluster 1 of the instrument which explored the computing skills were used to answer this research question. Summary of data analysis is presented on Table 1

Table 1: mean ratings of cloud computing skills possessed by male and female computer science education students for self-employability in Ebonyi State N 40

SN	Item	Mean	SD	Remarks
1	Syntax and Basics	2.18	0.84	Not Possessed
2	Data Structures and File Handling	2.15	0.66	Not Possessed
3	Functions and Modules	1.40	0.59	Not Possessed
4	Data Analysis and Visualization	1.78	0.53	Not Possessed
5	Object-Oriented Programming	1.43	0.55	Not Possessed

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6	Error Handling and Debugging	1.15	0.36	Not Possessed
7	Web Development and Frameworks	1.75	0.44	Not Possessed

Source: Otuma's Field Work (2025)

Data in Table 1 show that the respondents rated seven (7) items as not possessed. They include items 1, 2, 3, 4, 5, 6 and 7 with mean scores of 2.18, 2.15, 1.40, 1.78, 1.43, 1.15 and 1.75. This indicates that the respondents disagreed that the items are the cloud computing skills possessed by male and female computer science education students for self-employability in Ebonyi State. The standard deviations which are within 0.36 to 0.84 show that the responses are clustered around the mean. This reveals that the respondents are homogeneous in their responses.

Research Question 2

What are the problem-solving skills possessed by male and female computer science education students for self-employability in Ebonyi State?

Data collected with Cluster 2 of the instrument which explored the problem-solving skillswere possessed to answer this research question. Summary of result is presented on Table 2

Table 2: mean ratings of the problem-solving skills possessed by male and female computer science education students for self-employability in Ebonyi State N 40

SN	Items	Mean	SD	Remarks
8	Understanding the Problem	3.63	0.49	Possessed
9	Breaking Down Complex Problems	3.43	0.55	Possessed
10	Algorithmic Thinking	1.90	0.50	Not Possessed
11	Debugging and Troubleshooting	2.53	0.51	Possessed

12	Creative Problem-Solving	3.35	0.66	Possessed
13	Analyzing and Optimizing	1.80	0.72	Not Possessed
14	Learning and Adaptation	3.43	0.50	Possessed
15	Communication and Collaboration	3.48	0.55	Possessed

Source: Otuma's Field Work (2025)

Data in Table 2 show that the respondents rated all the six (6) items as possessed. They include items 8, 9, 11, 12, 14 and 15 with mean scores of 3.63, 3.43, 2.53, 3.35, 3.43 and 3.48. Items 10 and 12 with mean scores of 1.90 and 1.80 are rated not possessed. This indicates that the respondents agreed that the items are the problem-solving skills possessed by male and female computer science education students for self-employability in Ebonyi State. The standard deviation scores range between 0.73 and 1.09. This is an indication that the opinions of the respondents do not deviate far from the central mean.

Research Question 3

What are the object-oriented programming language skills possessed by male and female computer science education students for self-employability in Ebonyi State?

Data collected with Cluster 3 of the instrument which explored the object-oriented programming language skills were possessed to answer this research question. Summary of data analysis is presented on Table 3

Table 3: mean ratings of the object-oriented programming language skills possessed by male and female computer science education students for self-employability in Ebonyi State **N 40**

SN	Items	Mean	SD	Remarks
16	Code Organization	2.50	0.51	Possessed
17	Class Design	1.78	0.48	Not Possessed

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18	Object Interaction	2.53	0.55	Possessed
19	Inheritance and Polymorphism	3.45	0.50	Possessed
20	Problem-Solving	2.63	0.49	Possessed
21	Code Quality	2.38	0.49	Not Possessed

Source: Otuma's Field Work (2025)

Data in Table 3 show that the respondents agreed that four (4) of the items are possessed. They include items 16, 18, 19 and 20 with mean scores of 2.50, 2.53, 3.45 and 2.63. Two (2) items which are items 17 and 20 with mean scores of 1.78 and 2.38 are not possessed. This indicates that the respondents agreed that the items are the object-oriented programming language skills possessed by male and female computer science education students for self-employability in Ebonyi State. The standard deviation scores range between 0.48 and 0.55. This is an indication that the opinions of the respondents do not deviate far from the central mean.

Research Question 4

What are the text editing skills possessed by male and female computer science education students for self-employability in Ebonyi State?

Data collected with Cluster 4 of the instrument which explored the text editing skills were possessed to answer this research question. Summary of data analysis is presented on Table 4

Table 4: mean ratings of text editing skills possessed by male and female computer science education students for self-employability in Ebonyi State N 40

SN	Items	Mean	SD	Remarks
22	Text Editor Proficiency	2.50	0.51	Possessed
23	Text Manipulation	3.60	0.50	Possessed

24	Code Formatting	2.53	0.51	Possessed
25	Text Processing	2.68	0.53	Possessed
26	Regular Expressions	2.70	0.52	Possessed
27	Productivity Tools	2.28	1.01	Not Possessed

Source: Otuma's Field Work (2025)

Data in Table 4 show that the respondents rated all the five (5) of the items as possessed. They include items 22, 23, 24, 25 and 26 with mean scores of 2.50, 3.60, 2.53, 2.68 and 2.70. One (1) item which is item 27 with mean score of 2.28 is not possessed. This indicates that the respondents agreed that the items are the text editing skills possessed by male and female computer science education students for self-employability in Ebonyi State. The standard deviation scores ranged between 0.50 and 1.01. This is an indication that the opinions of the respondents do not deviate far from the central mean.

Summary of Major Findings

The following findings of the study are summarized as follows;

1. Cloud computing skills are possessed by male and female computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State.
2. Problem-solving skills are possessed by male and female computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State.
3. Object-oriented programming language skills are possessed by male and female computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State.
4. Text editing skills are possessed by male and female computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State.
5. There is no significant difference in the mean responses of the cloud computing skills possessed by computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State based on school ownership.
6. There is no significant difference in the mean responses of the problem-solving capacity skills possessed by computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State based on school ownership.

7. There is no significant difference in the mean responses of the object-oriented programming languages possessed by computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State based on school ownership.
8. There is no significant difference in the mean responses of the text editing skillspossessed by computer science education students for self-employability in Public Tertiary Institutions in Ebonyi State based on school ownership.

DISCUSSION OF FINGINGS

The researcher presents the discussion of the findings under the following sub-headings.

1. Cloud computing skills possessed by male and female computer science education students for self-employability in Ebonyi State.
2. Problem-solving skills possessed by male and female computer science education students for self-employability in Ebonyi State
3. Object-oriented programming language skills possessed by male and female computer science education students for self-employability in Ebonyi State
4. Text editing skills possessed by male and female computer science education students for self-employability in Ebonyi State

***C*loud Computing Skills Possessed by Male and Female Computer Science Education Students for Self-Employability in Public Tertiary institutions in Ebonyi State**

Data analysis of Research Question I revealed that cloud computing skills are possessed by male and female computer science education students for self-employability in public tertiary institution in Ebonyi State. The test of the hypothesis confirmed this assertion when it stated that there was no significant difference in the mean responses of the cloud computing skills possessed by computer science education students for self-employability in Ebonyi State based on school ownership. This finding supports the assertion of Sunday (2019) who reported that 87% of global IT decision makers agree that the COVID-19 pandemic has accelerated cloud migration for most organizations. In addition, once migrated, businesses will need programmers familiar with the technology necessary to work effectively with cloud-native applications. And, as businesses rely more heavily on data science, machine learning, and artificial intelligence, work in the cloud becomes even more important since algorithms and models consume significant resources. The result of these business transitions and needs is that cloud engineers and developers, as well as cloud-savvy programmers, are in high demand.

5.2 Problem-Solving Skills Possessed by Male and Female Computer Science Education Students for Self-Employability in public tertiary institution in Ebonyi State

Findings of the study in respect of the second research question indicated that problem-solving skills are possessed by male and female computer science education students for self-employability in Ebonyi State. The second hypothesis confirmed this assertion when it stated that there was no significant difference in the mean responses of the problem-solving capacity skills possessed by computer science education students for self-employability in Ebonyi State based on school ownership. In his own opinion, Umar (2016) stated that problem-solving skills are just

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as important for programmers as technical ability. As Dominique Simoneau-Ritchie, the Director of Engineering at Lever, wrote for HackerNoon, "The more senior you are, the more they will be expected to take on complex, poorly defined problems, often with very little context. The true secret to increasing their impact is learning how to tackle a problem of any size and breaking it into manageable pieces that you can successfully solve. A problem may be solved by multiple methods. This finding is in line with Young (2017) who stressed that one solution may be faster, cheaper, and more reliable than others. It is important to choose a suitable worthy solution. Different strategies, techniques, and tools are used to solve a problem. Computers are used as a tool to solve complex problems by developing computer programs. Computer programs contain different instructions for computers. A programmer writes instructions and the computer executes these instructions to solve a problem.

5.3 Object-Oriented Programming Language Skills Possessed by Male and Female Computer Science Education Students for Self-Employability in public tertiary institutions in Ebonyi State

Findings of the study with respect to research question in Table 3 showed that object-oriented programming language skills are possessed by male and female computer science education students for self-employability in Ebonyi State. The hypothesis confirmed this assertion when it stated that there was no significant difference in the mean responses of the *o*bject-oriented programming languages possessed by computer science education students for self-employability in Ebonyi State based on school ownership. This finding supports Olagunju (2022) who reported that Developers looking to successfully create and deploy web apps while taking advantage of their Python know-how must have a solid understanding of web frameworks. The most popular frameworks used by Python developers are Flask and Django. Django is a high-level web framework that prioritizes clean, rapid, and pragmatic design while offering many libraries to assist with the creation of high-quality web apps without building everything from scratch. Flask is the opposite of Django in that it's a micro-framework that doesn't rely on any particular tools or libraries. It doesn't include a database extraction layer, form validation, or any other common functions provided by third-party libraries. However, it's considered a template engine with its own modules and libraries. This allows developers to create web apps without needing to write low-level code. Both of these frameworks are highly versatile and allow developers to create useful web apps with Python. By leveraging the tools and libraries within these frameworks, devs focus on writing high-quality code without getting bogged down in lower-level details.

Esenjor (2022) assert that these objects typically include data attributes representing the object's state and method. This language enables users to make a complex system with interconnected objects. This language hides implementation components from the outside world through encapsulation. This makes it possible to build large intricate systems without stressing about the internal workings of respective objects. The other benefit that makes this language so in demand is the feature of inheritance. It creates a ranking of classes that share common features while still allowing customization. Some popular object-oriented programming languages are Java, Python,

C++, and Ruby. All these languages are top programming languages, but they share the principle of being object-oriented.

5.4 Text Editing Skills Possessed by Male and Female Computer Science Education Students for Self-Employability in public tertiary institution in **Ebonyi State**

Findings in Table 4 revealed that text editing skills are possessed by male and female computer science education students for self-employability in Ebonyi State. Hypothesis confirmed this assertion when it stated that there is no significant difference in the mean responses of the text editing skills possessed by computer science education students for self-employability in Ebonyi State based on school ownership. Ugwu & Etiubon (2019) stated that Data structures and algorithms are essential skills for any computer science student or professional. They help one design efficient and elegant solutions for complex problems, and they also prepare one for technical interviews and coding challenges. However, learning and mastering data structures and algorithms can be daunting and frustrating, especially if they do not have a clear and consistent plan. Text editors are programs that enable the opening, viewing, and editing of plain text files. Because text editors do not add formatting to text, like word processing programs do, programmers can use text editors to easily write and edit in programming and markup languages.

Conclusion

Based on the findings of the study, it is concluded that cloud computing skills, problem-solving skills, object-oriented programming language skills as well as text editing skills are possessed by male and female computer science education students for self-employability in public tertiary institution in Ebonyi State.

6.3 Recommendations

In line with the findings and conclusion reached, it is recommended that:

1. Computer science education students should be equipped by teachers with Cloud computing skills for self-employability on graduation.
2. Problem-solving skills should be more emphasized by teachers in teaching computer science students for self- employability on graduation.
3. Computer science curriculum should be concentrated with object-oriented programming language skills for effective self- employability on graduation.
4. Curriculum developers should emphasize more on equipping computer science education students with text editing skills is needed for self- employability and employment on graduation.

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