ASSESSMENT OF SUFFICIENCY AND UTILIZATION OF RESOURCES FOR EFFECTIVE SKILLS ACQUISITION IN COMPUTER PROGRAMMING, AIMED AT PRODUCING SELF-RELIANT GRADUATES, IN YOBE STATE COLLEGES OF EDUCATION.

BY

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Abstract

This research addressed the importance of programming languages as powerful tools for software development and their impact on modern society. With the rapid advancements in programming languages and technologies, it is crucial to equip students with the necessary skills to master programming and leverage their knowledge for productive ventures. This study aimed to create awareness among students about the opportunities in programming, enabling them to initiate small-scale businesses or seek employment in the global programming markets. The research adopted descriptive survey to collect information using checklist with three different items (A and B), and a five-point Likert scale questionnaire. Sections A and B is to access sufficiency of lecturers, laboratories, lecture halls, and installed software while five-point Likert scale questionnaire consist of nineteen (19) lists of items of equipment for the required standard computer programming laboratory. The four-point Likert scale questionnaire, was used for data collection that answered research question five (5), which assessed the level of utilization of the available computer resources. Four Hundred and Fifty Six (456) respondents were random selected from a population of One Thousand One Hundred and Thirty Five (1107). By collecting data from students, lecturers and head of departments of computer science in Yobe State Colleges of Education, the study evaluated the availability of resources and their utilization in programming education. The findings of this research provided insights into the effectiveness of existing training programs and identified areas for improvement. By examining the relationship between resource availability, utilization, and students' mastery of programming languages, the study aimed to bridge the gap between theoretical learning and practical application, ultimately producing self-reliant graduates who are well-prepared to fit into modern-day local and global information and communication technology employment opportunities.

Introduction

The demand for people with programming expertise is growing significantly. According to the U.S. Bureau of Labor Statistics, employment of software developers is expected to expand substantially faster than the average for all occupations, by 22% between 2019 and 2029. This highlights the necessity for people who can successfully use programming languages to create software and apps (Shapiro, 2014). Programming languages have different market shares, which represent their popularity and adoption. The TIOBE Index, which measures the popularity of programming languages, provides data on their usage patterns. Languages such as Python, JavaScript, and Java are frequently ranked among the top languages, reflecting their extensive use and relevance in today's digital landscape (Rabai, Cohen, and Mili, 2015). Programming languages have a huge impact on businesses as demonstrated by Joshi, (2017). According to W3Techs, over 95% of websites will utilize JavaScript by 2021, underscoring the importance of the language in online development (Brown, 2019). Matlab, Python and R have all been used successfully in teaching college students fundamentals of mathematics & statistics. In today's data driven environment, the study of data through big data analytics is very powerful (Ozgur, et al, 2017).

Computer programming has become an important field of effort in recent decades as the information sector has grown rapidly. Despite its importance, there is rising concern that programming is difficult to master (Yusuf and Noor, 2023). With an increasing need for programming skills in the labor market, it is necessary to analyze the current programming education system in Yobe State Colleges of Education to identify areas for improvement in order to make learning more dynamic, engaging, and productive. The issue at hand concerns the availability of resources required to conduct successful computer programming education in Yobe State Colleges of Education. A lack of experienced computer programming lecturers, improperly equipped computer programming laboratories, unsuitable lecture spaces, and a scarcity of computers with appropriate programming software may impede students' ability to learn practical programming skills. Furthermore, it is important to consider how students use accessible resources in their learning activities. Low usage rates may suggest additional obstacles or constraints in the educational environment that prevent students from accessing and engaging with programming materials. This, in turn, may limit their employment opportunities and ability to participate effectively in the workplace. Addressing these difficulties will provide insights into the availability of resources for computer programming education, highlight areas for development, and guide potential interventions to improve the quality of computer programming education in Yobe State Colleges of Education.

The objective of this study is to assess the sufficiency and utilization of resources for effective skills acquisition in computer programming in Yobe State Colleges of Education, aimed at producing self-reliant graduates that can adequately fit into modern day’s local and global abundant information and communication technology employment opportunities. The declining standard of education in contemporary Nigeria

continues to deteriorate, with no meaningful action taken by concerned authorities, elites, individuals, and groups to address the issues at hand (Besong, 2022). Programming is one of the computer education courses offered in Nigeria's universities and colleges of education. Various studies have found that students do badly in programming courses (Nwangu, 2015). Computer programming has become an important field of effort in recent decades as the information sector has grown rapidly. Despite its importance, there is rising concern that programming is difficult to master (Yusuf and Noor, 2023).

Research Question

The study provided answers to this research question.

How sufficient are lecturers in the department of computer science in Colleges of Education in Yobe State?

How sufficient are supporting staff of computer science department (Technologies/ Operators/System Engineer/Cleaners and Security) in Yobe State Colleges of Education?

How sufficient are computer laboratories and computer centers in Yobe State Colleges of Education?

How sufficient are devices, equipment and installed software for learning computer programming in Yobe State Colleges of Education?

What is the level of utilization of the available resources in learning computer programming in Yobe State Colleges of Education?

Literature Review

One of the six objectives of Nigeria Certificate in Education Minimum Standards (2020) for NCE Computer Science is to train the students to write computer program and process data with maximum speed and accuracy. This shows that when all equipment, devices, staff and the utilization are sufficient, relevant to the requirements of the minimum standard, the students will receive the need skills to excel in programming. Accordingly to the NCCE minimum standard 2020, also stated that “due to the dynamic nature of the advancement of Information and Communication Technology (ICT), equipment and software should be updated regularly to meet with the current changes in Technology”. This therefore entails providing the needed state of the art equipment for both theory and practical in order for the students to learn modern technology skills. The NCCE minimum standard 2020 provided the following computer programming

courses for students to learn: Basic Programming, Database Management, C Programming, PASCAL Programming Language, and Advance level programming language (Java, C++, V Basic, VCOBOL etc) with CSC 112, CSC 213, CSC 216, CSC 211, CSC 321 and CSC 321 as course codes respectively. A thorough look at the curriculum, reveals that the teaching and learning processes in programming courses is geared towards learning the core languages without their associated technologies that will be used to solve societal problems. The courses are design to provide the students, knowledge of the programming languages as languages not as technologies. It categorically stated that all students should have at least two hours each weekly for all of the programming courses. The NCCE minimum standard also in other to also facilitate learning of current trends in technology encourage management of colleges of education to provide their teachers with mandatory refresher courses due to very rapid changes in the field of information technology and computer science. It states that “it is mandatory for all computer science staff to regularly undergo workshops/refresher courses/programs in the field and belong to relevant professional bodies”. This is meant to equip the teachers with up to date knowledge of the field to meaningfully contribute to the development of the department and the students at large. The programming languages in this era should be focused towards proving the students with a sound knowledge of programming languages and their frameworks that are used for solving human problems and that can translate to gaining self-employment after graduation by the students. The teachers if well-equipped can definitely train and mentor the students in the art of programming and enable them become self employed by providing services to the community, the nation and the world at large (NCCE, 2020).

Students studying computer science and related fields must acquire programming abilities. These abilities are necessary for individuals to live in this modern age. Computer programming is one of the fundamental courses completed by computer education students to help them fit in and compete in the IT sector. Students with advanced programming skills will undoubtedly be able to get lucrative work opportunities (Muraina, Olayemi, Adesanya, and Moses, 2021). Computer education graduates must be prepared to comprehend the ramifications of the current trend in programming languages (Ibezim and Chukwujekwu, 2017). Programming skill development, in the form of electives or core courses that include algorithms and algorithmic tools, error types, debugging, data structure, different computer programming languages (low and high level), and the like, prepares students to fit in professionally in the labor market after graduation (Muraina, Olayemi, Adesanya, and Moses, 2021). Programming languages enable developers to turn their ideas into usable and scalable digital solutions (Dean, Mens, Mazrae and Golzadeh, 2022).Computer programming is an essential skill in today's technology age. Computer programming is a course of study that covers fundamental programming ideas such as algorithms and algorithmic tools, error kinds, debugging, data structure, and several computer programming languages (low and high level), among other things. As an art form, computer programming entails creating useful, maintainable, and expandable source code (programs) that can be translated by a program translator to accomplish a meaningful task. Computer programming allows people to better comprehend computers (Ibezim and Chukwujekwu, 2017). The development of a suitable

competency set gives an individual an advantage over others, improves job performance/output, and increases one's chances of getting a job, being promoted, and staying employed (Ibezim and Chukwujekwu, 2017). Computer programming is one of the most in-demand and lucrative skills in today's IT industry. There are plenty of work opportunities for programmers. The current computer programmer shortage demonstrates that there are considerably more occupations requiring programming skills than there are people with those talents. This could be attributable to the mismatch between what is taught in school and actual programming practice, which de-skills a computer education graduate upon graduation (Muraina, Olayemi, Adesanya, and Moses, 2021). The talents possessed by each country's inhabitants are the primary determinants of wealth and well-being. However, improving skills is expensive, thus expenditures in skill development must be undertaken carefully. This necessitates accurate data on where skill development is most needed, how effectively individuals' gained skills match those required in the labor market, and the economic and social returns on skill investments. Putting in place a comprehensive system of information linked to skills development is not straightforward, especially in low-income nations with very little resources to devote to a solid statistical infrastructure of data collecting, processing, analysis, and dissemination (Tholen, 2017).

According to a European Commission report, the software industry generates over €910 billion in revenue and employs more than 11 million people in the European Union. This demonstrates the economic importance of programming languages in increasing productivity and employment development. Mobile applications have become an essential part of our life. According to Statista, the Google Play Store will have around 4.4 million apps accessible for download by 2021, while the Apple App Store will have 2.2 million apps. These apps are built with programming languages, emphasizing their importance in the mobile app market (Florea and Stray, 2019). According to Abdurahman et al. (2019), regardless of how effectively a curriculum is developed, created, and recorded, implementation is critical. He also defines curriculum implementation as the process of putting all that has been planned in a curriculum document into practice in the classroom through the combined efforts of teachers, students, school administrators, and parents, as well as interaction with physical facilities, instructional materials, and the psychological and social environment. At this point, it could be argued that putting the curriculum into practice necessitates the use of an implementation agent. The teacher has been designated as the agent in the curriculum implementation process. Curriculum implementation refers to how the teacher translates the planned or formally designed course of study into a syllabus, scheme of work, and lessons to be delivered to pupils (Abdurahim et al, 2019).The Federal Republic of Nigeria (FRN, 2004) said in its National Policy on Education, "the Philosophy of Nigeria Education," that educational and training facilities will be multiplied and made more accessible, allowing individuals to make considerably more efficient and flexible choices. Most of our institutions of education nowadays lack enough equipment and supplies for both teachers to perform practical activities and students to conduct investigative activities or practical work on their own in order to discover new things and improve their practical abilities. Sufficiency of Workshop and training facilities address a wide range of concerns, including programs, facilities,

workshops, environments, storage facilities, lighting, ventilation, and machines. Functional capabilities improve the quality of learning (Abdurahim et al, 2019).

Research Methodology

Descriptive research is a quantitative method that focuses on describing the characteristics of a phenomenon rather than asking why it occurs. Doing this provides a better understanding of the nature of the subject at hand and creates a good foundation for further research. Hence, the descriptive survey is considered appropriate for this study, since it sought the response of head of departments, lecturers and students on the assessment of the sufficiency and utilization of resources for effective skills acquisition in computer programming, for producing self-reliant graduates that can adequately fit into modern day's local and global abundant information and communication technology employment opportunities, in Yobe State Colleges of Education. The area of this study comprised all the three (3) Colleges of Education in the Yobe State namely, College of Education (Technical) in Potiskum, Umar Suleiman College of Education in Gashua and College of Education and Legal Studies in Nguru. The Instrument for Data collection is a questionnaire. The questionnaire consists of three sections. Section one is on areas of lecturers, supporting staff, computer centers and laboratories. Section two provided a checklist for the assessment of sufficiency of devices, equipment and installed software. The benchmark for the analysis of section one and two is the specifications by the NCCE, where lecturers, supporting staff, laboratories, computer centers, devices, equipment and installed software were assessed as sufficient or otherwise . Section three provided a checklist for the assessment of the utilization of devices, equipment and installed software in the computer laboratories. A five-point Likert scale questionnaire drawn from NCCE Minimum standard was used in the section to collect data. Mean score was used to assess the level of utilization of the equipment. The instrument was validated by three experts. The five-point Likert data collected were analyzed using statistical package for social sciences (SPSS). 2.5 was used as point of utilization. This implies that items that scored a mean response of 2.5 and above were regarded as utilized, while items that scored mean response below 2.5 were regarded as not utilized.

The target population of this study comprised all the three heads of departments of computer science in the colleges (3), which served as administrators of the departments, Eight (8) lectures form the total twenty two (22) lecturers from all the colleges, Four Hundred and Forty Four students (442) from the total 1107 students in the three colleges and three (3) Laboratory Attendance or Workshop Assistants, one each from all of the colleges. Laboratory Attendants or Workshop Assistants being the custodian of the equipment, tools and instrument in the computer laboratory in respective Colleges of Education, constitute a significant source of information for the research. This will make a total population of Four Hundred and Fifty Six (456) respondents randomly selected.

Results and Discussions

Research Question 1

How sufficient are lecturers in the department of computer sciences in Colleges of Education in Yobe State?

Table 1: Sufficiency level of computer lecturers in the departments of computer science of the Colleges of Education in Yobe State.

S/N

Colleges of Education

NCCE benchmark

(lecturer/student ratio)

students population

in the college

Expected lecturers in relation to benchmark

No. of lecturers available

Remarks

1.

COELS Nguru

1:25

100

4

8

S

2.

USCOEGA Gashua

1:25

250

10

12

S

3.

FCE(T) Potiskum

1:25

183

8

16

S

Key: Sufficient (S), Not Adequate (NS)

Sufficient (S) = The available resources are equal or more than that stipulated by NCCE.

Not Sufficient (NS) = The available resources are less than that stipulated by NCCE.

All the departments in the colleges have sufficient number of lecturers in relation to benchmark despite the fact that the minimum standard required a minimum of eight (8) lecturers irrespective of the number of the students. By whatever measure, all the

colleges can be said to have sufficient number of lecturers.

Research Question 2

How sufficient are supporting staff of computer science department (Technologies/ Operators/System Engineer/Cleaners and Security) in Yobe State Colleges of Education?

Table 2: Sufficiency level of supporting staff of computer science department (Technologies/Operators/System Engineer/Cleaners and Security) in Yobe State Colleges of Education?

S/N

Colleges of

Education

NCCE benchmark

Available

Remark

1.

COELS Nguru

7

7

S

2.

USCOEGA Gashua

7

9

S

3.

FCE(T) Potiskum

7

12

S

Key: Sufficient (S), Not Sufficient (SA)

All the colleges have the required number of supporting staff as stipulated by the minimum standard.

Research Question 3

How sufficient are computer laboratories and computer centers in Yobe State Colleges of Education?

Table. 3: Sufficiency of computer laboratories and computer centers in Yobe State Colleges of Education?

S/N

Colleges of Education

NCCE benchmark

Available

Remak

1.

COELS Nguru

2

2

S

2.

USCOEGA Gashua

2

2

S

8.

FCE(T) Potiskum

2

2

S

Key: Sufficient (S), Not Sufficient (NS)

All the colleges have the required number of computer laboratories and computer center as stipulated by the minimum standard.

Research Question 4

How sufficient are devices, equipment and installed software for learning computer programming in Yobe State Colleges of Education?

The sufficiency of devices, equipment and installed software for learning computer programming in Colleges of Education in Yobe State are presented in tables 4, 5, and 6 respectively. The results indicated the sufficiency of most of the equipment, devices and installed software in all of the colleges needed for proper implementation of the requirements stipulated by the minimum standard by NCCE, an efficient and effective computer program that is envision to produce graduates that can write computer program and process data with maximum speed and accuracy.

Table. 4: Sufficiency of devices, equipment and installed software for learning computer programming in Colleges of Education and Legal Studies Nguru?

Number of students attending practical in the laboratory = 40

S/N

Item

Minimum quantity required for 40 students

Students attending practical in the laboratory

Quantity available in the laboratory

Remark

1.

Desktop Computers

20

40

40

S

2.

Computer Projectors

1

40

2

S

3.

Laptops

1

40

1

S

4.

Cabinet for storage facilities

2

40

4

S

5.

Computer Centre(s)

1

40

2

S

6.

Software materials (CDs/Flash Disk/Hard Disks etc.)

NI

40

5

S

7.

Alternative power supply

2

40

2

S

8.

650 VA UPS for each computer system

0

40

40

NS

9.

1000-Watt stabilizers for each system

1

40

40

NS

10.

Whiteboard(s)

1

40

1

S

11.

Network Racks

1

40

1

S

12.

Local Area Network

1

40

1

S

13.

Internet Connection(s) to systems

1

40

1

S

14.

Scanners

1

40

1

S

15.

Printer (Laser printers and DeskJet Printers)

2

40

2

S

16.

Speakers Or Headphones

1

40

2

S

17.

Local and international journals

20

40

5

NS

18

Furniture

40

40

40

S

19.

Webcam

40

40

0

NS

20.

Wi-Fi Access Points

1

40

1

S

21.

UPS 1.22 KVA or Higher Configuration

1

40

0

NS

22.

Interactive Whiteboard

1

40

0

NS

23

Latest Licensed Window OS

40

40

40

24.

Visual Studio/ Gambas/ FreeBASIC/ Liberty BASIC/ PureBasic (CSC 112 IDE/Editor)

40

40

40

S

25.

Visual Studio/ Eclipse/ Xcode/ CLion/ Code::Blocks/ Dev-C++ (CSC 214 IDE/Editor)

40

40

40

S

26.

Visual Studio Code/ Sublime Text/ Atom/ Brackets/ Adobe Dreamweaver/ CodePen (CSC 211 IDE/Editor)

40

40

40

S

27.

Eclipse/ IntelliJ IDEA/ NetBeans/ Visual Studio Code/ BlueJ/ JDeveloper (CSC 321 Java IDE/Editor)

40

40

40

S

28.

Visual Studio/ Eclipse/ CLion/ Xcode/ Code::Blocks/ Qt Creator (CSC 321 C ++ IDE/ Editor)

40

40

40

S

29.

Visual Studio/ Visual Studio Code/ Gambas/ MonoDevelop/ SharpDevelop (CSC 321 VBASIC IDE/Editor)

40

40

40

S

30.

Visual Studio/ Eclipse/ Micro Focus Enterprise Developer/ Xcode (CSC 321 VCOBOL IDE/Editor)

40

40

40

S

Key: Sufficient (S), Not Sufficient (NS), Not Indicated (NI)

Table. 5: Sufficiency of devices, equipment and installed software for learning computer programming in Umar Suleiman College of Education Gashua?

Number of students attending practical in the laboratory = 40

S/N

Item

Minimum quantity required for 40 students

Students attending practical in the laboratory

Quantity available in the college

Remark

1.

Desktop Computers

20

40

400

S

2.

Computer Projectors

1

40

2

S

3.

Laptops

1

40

1

S

4.

Cabinet for storage facilities

2

40

4

S

5.

Computer Centre(s)

1

40

2

S

6.

Software materials (CDs/Flash Disk/Hard Disks etc.)

NI

40

5

S

7.

Alternative power supply

2

40

2

S

8.

650 VA UPS for each computer system

0

40

40

NS

9.

1000-Watt stabilizers for each system

1

40

40

NS

10.

Whiteboard(s)

1

40

1

S

11.

Network Racks

1

40

1

S

12.

Local Area Network

1

40

1

S

13.

Internet Connection(s) to systems

1

40

1

S

14.

Scanners

1

40

1

S

15.

Printer (Laser printers and DeskJet Printers)

2

40

2

S

16.

Speakers Or Headphones

1

40

2

S

17.

Local and international journals

20

40

5

NS

18

Furniture

40

40

40

S

19.

Microcontrollers and Development Boards

NI

40

40

NS

20.

Wi-Fi Access Points

1

40

1

S

21.

UPS 1.22 KVA or Higher Configuration

1

40

0

NS

22.

Interactive Whiteboard

1

40

0

NS

23

Latest Licensed Window OS

40

40

40

24.

Visual Studio/ Gambas/ FreeBASIC/ Liberty BASIC/ PureBasic (CSC 112 IDE/Editor)

40

40

40

S

25.

Visual Studio/ Eclipse/ Xcode/ CLion/ Code::Blocks/ Dev-C++ (CSC 214 IDE/Editor)

40

40

40

S

26.

Visual Studio Code/ Sublime Text/ Atom/ Brackets/ Adobe Dreamweaver/ CodePen (CSC 211 IDE/Editor)

40

40

40

S

27.

Eclipse/ IntelliJ IDEA/ NetBeans/ Visual Studio Code/ BlueJ/ JDeveloper (CSC 321 Java IDE/Editor)

40

40

40

S

28.

Visual Studio/ Eclipse/ CLion/ Xcode/ Code::Blocks/ Qt Creator (CSC 321 C ++ IDE/ Editor)

40

40

40

S

29.

Visual Studio/ Visual Studio Code/ Gambas/ MonoDevelop/ SharpDevelop (CSC 321 VBASIC IDE/Editor)

40

40

40

S

30.

Visual Studio/ Eclipse/ Micro Focus Enterprise Developer/ Xcode (CSC 321 VCOBOL IDE/Editor)

40

40

40

S

Key: Sufficient (S), Not Sufficient (NS), Not Indicated (NI)

Table. 6: Sufficiency of devices, equipment and installed software for learning computer programming in Federal College of Education Technical Potiskum?

Number of students attending practical in the laboratory = 35

S/N

Item

Minimum quantity required for 35 students

Students attending practical in the laboratory

Quantity available in the laboratory

Remark

1.

Desktop Computers

15

35

50

S

2.

Computer Projectors

1

35

2

S

3.

Laptops

1

35

2

S

4.

Cabinet for storage facilities

2

35

2

S

5.

Computer Centre(s)

1

35

3

S

6.

Software materials (CDs/Flash Disk/Hard Disks etc.)

NI

35

8

S

7.

Alternative power supply

2

35

2

S

9.

650 VA UPS for each computer system

50

35

40

NS

10.

1000-Watt stabilizers for each system

50

35

0

NS

11.

Whiteboard(s)

1

35

1

S

12.

Network Racks

1

35

1

S

13.

Local Area Network

1

35

1

S

14.

Internet Connection(s) to systems

1

35

1

S

15.

Scanners

1

35

1

S

16.

Printer (Laser printers and DeskJet Printers)

2

35

2

S

17.

Speakers Or Headphones

1

35

2

S

18.

Local and international journals

20

35

3

NS

19

Furniture

35

35

41

S

20.

Wi-Fi Access Points

1

35

1

S

21.

UPS 1.22 KVA or Higher Configuration

1

35

0

NS

22.

Interactive Whiteboard

1

35

0

NS

23.

Latest Licensed Window OS

35

35

46

S

24.

Visual Studio/ Gambas/ FreeBASIC/ Liberty BASIC/ PureBasic (CSC 112 IDE/Editor)

35

35

40

S

25.

Visual Studio/ Eclipse/ Xcode/ CLion/ Code::Blocks/ Dev-C++ (CSC 214 IDE/Editor)

35

35

43

S

26.

Visual Studio Code/ Sublime Text/ Atom/ Brackets/ Adobe Dreamweaver/ CodePen (CSC 211 IDE/Editor)

35

35

43

S

27.

Eclipse/ IntelliJ IDEA/ NetBeans/ Visual Studio Code/ BlueJ/ JDeveloper (CSC 321 Java IDE/Editor)

35

35

43

S

28.

Visual Studio/ Eclipse/ CLion/ Xcode/ Code::Blocks/ Qt Creator (CSC 321 C ++ IDE/ Editor)

35

35

43

S

29.

Visual Studio/ Visual Studio Code/ Gambas/ MonoDevelop/ SharpDevelop (CSC 321 VBASIC IDE/Editor)

35

35

43

S

30.

Visual Studio/ Eclipse/ Micro Focus Enterprise Developer/ Xcode (CSC 321 VCOBOL IDE/Editor)

35

35

43

S

Key: Sufficient (S), Not Sufficient (NS), Not Indicated (NI)

Research Question 5

What is the level of utilization of the available resources in learning computer programming in Yobe State Colleges of Education?

Table 8: The result of the analysis in answering the research question 5 is presented in Table 8. The Table revealed that projectors, computers (laptops and desktops), whiteboards, Data Communication and Networking Devices, and all other needed software requirements for running the programming languages are fully utilized by the colleges. The other items indicated as not utilized have little or no direct impact to the effectiveness of learning the programming languages with the exception of interactive whiteboard which is not available in all the three computer laboratories.

Table 8: Mean Responses of Computer Science Students on the Level of Utilization of Available Resources in Learning Computer Programming in Yobe State Colleges of Education.

S/N

Items

X

Remarks

1.

Projectors

3.01

Utilized

2.

Laptops

3.12

Utilized

3.

Desktops

3.34

Utilized

4.

Scanners

1.56

Not Utilized

5.

Cameras

1.60

Not Utilized

6.

Whiteboards

3.16

Utilized

7.

Interactive Whiteboards

1.81

Not Utilized

8.

Speakers

1.56

Not Utilized

9.

Microphone

1.56

Not Utilized

10.

Data Communication and Networking Devices

3.37

Utilized

12.

Collaboration Tools

1.47

Utilized

13.

USB Flash Drives

1.83

Not Utilized

14.

Visual Studio/ Gambas/ FreeBASIC/ Liberty BASIC/ PureBasic for CSC 112

3.39

Utilized

15.

Visual Studio/ Eclipse/ Xcode/ CLion/ Code::Blocks/ Dev-C++ for CSC 214

3.59

Utilized

16.

Visual Studio Code/ Sublime Text/ Atom/ Brackets/ Adobe Dreamweaver/ CodePen for CSC 211

3.15

Utilized

17.

Eclipse/ IntelliJ IDEA/ NetBeans/ Visual Studio Code/ BlueJ/ JDeveloper for CSC 321 Java

2.96

Utilized

18.

Visual Studio/ Eclipse/ CLion/ Xcode/ Code::Blocks/ Qt Creator for CSC 321 C ++

3.29

Utilized

19.

Visual Studio/ Visual Studio Code/ Gambas/ MonoDevelop/ SharpDevelop for CSC 321 VBASIC

3.59

Utilized

20.

Visual Studio/ Eclipse/ Micro Focus Enterprise Developer/ Xcode CSC 321 VCOBOL

3.22

Utilized

Conclusions and Recommendations

The results of the research indicated that there are enough lecturers, supporting staff, installed devices, equipment, and software in the three colleges. The level of utilization of the devices, equipment and software in all the three colleges are also impressive. The equipment for the teaching of programming languages specified by the NCCE minimum standard are sufficient as indicated by the outcome of the research. It is very clear that the management and government (both state and federal) are doing their best in providing the needed man power, device, equipment and installed software for the successful training of the NCE students. A thorough analysis of the minimum standard by the researcher showed that the emphasis of the NCCE minimum standard is mainly on the teaching of the programming languages as languages not as technologies meant to solve certain specific societal problems or needs. The learning is not geared towards development of software app (web or mobile). It is also not directed at handling or managing data for specific applications in term of backend technologies nor in the design of interfaces in term of frontend technologies. The only modern approach to societal problems in the NCCE minimum standard is the newly introduced HTML and CSS in the 2020 minimum standard. The minimum standard needs to incorporate frameworks of programming languages to enhance the ability of the students to solve societal problems and hence improve their chances of being self-employed or employed by both local and international employers of labour. The management and government (state and federal) should improve their level of training of staff and students through workshops and conferences to enhance their awareness of modern trend in relevant technologies. The trend in learning programming to solve problems is based on having the knowledge of the basics of the language and then learning how to use libraries and frameworks of the language. Designs are not implemented from scratch but rather directed towards using reusable codes in forms of libraries and frameworks. There is need for shift in the learning approach and implementation by the NCCE minimum standard to prepare the students to be job ready after graduation.

References

Abdulrahman, M., Gimba, R. W., Hassan, A. A., & Jiya, M. (2019). Assessment of Adequacy Facilities and Required Personnel for Implementation of NCE Mathematics

Curriculum among Colleges of Education North-Central, Nigeria.

Brown, E. (2019). Web development with node and express: leveraging the JavaScript stack. O'Reilly Media.

Besong, E. N. (2022). INTERROGATING THE CONTEMPORARY STANDARD OF EDUCATION IN 21ST CENTURY NIGERIA. Journal of African Studies and Sustainable Development.

Colato, J., & Ice, L. (2023). Industry and occupational employment projections overview and highlights, 2022–32. Monthly Labor Review.

Decan, A., Mens, T., Mazrae, P. R., & Golzadeh, M. (2022, October). On the use of GitHub actions in software development repositories. In 2022 IEEE International Conference on Software Maintenance and Evolution (ICSME) (pp. 235-245). IEEE.

Florea, R., & Stray, V. (2019). The skills that employers look for in software testers. Software Quality Journal, 27, 1449-1479.

Ibezim, N. E., & Chibuogwu, C. I. (2017). Computer Programming Competencies Required by Computer Education Graduates for Sustainable Employment. Rev. Eur. Stud., 9, 106.

Federal Republic of Nigeria (FRN) (2004) Nigerian Policy on Education. Author, Abuja.

Joshi, P. (2017). Artificial intelligence with python. Packt Publishing Ltd.

Nwangwu, E. C. (2015). Attitudes of Computer Education Students Towards the Teaching and Learning of Programming Courses in Nigerian Higher Education: The Way Forward: The Way Forward. The International Journal of Technologies in Learning, 22(4), 13.

National Commission for Colleges of Education (2020). Nigeria Certificate in Education Minimum Standards for Science. Abuja: NCCE.

Rabai, L. B. A., Cohen, B., & Mili, A. (2015). Programming language use in us academia and industry. Informatics in Education, 14(2), 143.

Shapiro, R. J. (2014). The US software industry as an engine for economic growth and employment. Georgetown McDonough School of Business Research Paper, (2541673).

Tholen, G. (2017). Graduate work: skills, credentials, careers, and labour markets. Oxford University Press.

Yusuf, A., & Noor, N. M. (2023). Research trends on learning computer programming with program animation: A systematic mapping study. Computer Applications in

Engineering Education, 31(6), 1552-1582

Ozgur, C., Colliau, T., Rogers, G., & Hughes, Z. (2017). MatLab vs. Python vs. R. Journal of data Science, 15(3), 355-371.

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