

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.

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Executive Summary

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 two different items (Appendix A and B), and four-point Likert scale questionnaire. Appendix A is to assess sufficiency of lecturers, laboratories, lecture halls, and installed software while Appendix B consist of twenty (20) 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, which assessed the level of utilization of the available computers. Four Hundred and Fifty Six (456) respondents were random selected from a population of One Thousand One Hundred and Thirty Five (1135). By collecting data from students, teachers, and administrators 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 some businesses. Python, for example, has grown in popularity in data science and machine learning because of its huge library ecosystem, ease of use, and readability. The internet has transformed how we obtain information and conduct business. Web development relies on programming languages such as HTML, CSS, and JavaScript to create visually appealing and interactive websites. According to W3Techs, over 95% of websites will utilize JavaScript by 2021, underscoring the importance of the language in online development (Brown, 2019). Programming languages are at the heart of important technical advances like artificial intelligence, machine learning, data analytics, and robotics. These domains rely on languages such as Python and R to provide sophisticated libraries, frameworks, and tools. Researchers and developers with programming skills can use these technologies to foster innovation in a variety of fields (Joshi, 2017).

The demand for programming talents is increasing exponentially. According to the World Economic Forum, programming and app development are among the most sought-after skills by employers across all industries. This emphasizes the importance of programming languages in fulfilling the changing demands of the employment economy. Programming languages make a substantial contribution to economic progress. 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).

The open-source community has played an important role in improving programming languages. Platforms like GitHub serve as repository for open-source projects, allowing for collaboration and information sharing. As of September 2021, GitHub reported hosting over 100 million repositories, suggesting a thriving programming language community. Strong developer communities help to increase the importance of programming languages. Active communities offer developers support, resources, and forums to engage, share ideas, and seek help. This encourages continual learning and innovation, making programming languages more accessible and responsive to evolving technological demands. Programming languages serve as critical tools for technological advancement. They enable the development of new software, applications, and digital solutions that propel advances in fields such as artificial intelligence, the internet of things (IoT), blockchain, and cloud computing. Programming languages enable developers to turn their ideas into usable and scalable digital solutions (Dean, Mens, Mazrae and Golzadeh, 2022).

Programming languages provide the foundation for developing software applications. They let developers to write code that directs computers to carry out specified tasks and solve complex challenges. From low-level languages like C and C++ to high-level languages like Python and Java, each programming language has distinct features and

capabilities for producing various sorts of software. Programming languages improve the efficiency and productivity of software development operations. They offer tools, libraries, and frameworks that simplify development activities, improve code reuse, and automate common functions. This allows developers to create code more efficiently, resulting in shorter development cycles and lower time-to-market for software products. Many programming languages facilitate cross-platform development, which enables software programs to run on a variety of operating systems and devices. Languages like Java and Python, for example, can be used to create apps that work seamlessly across multiple platforms, such as PCs, mobile devices, and the web. This adaptability broadens the scope and accessibility of software across multiple environments (Medvidovic and Taylor, 2000)

Programming languages are used in a variety of industries, with software solutions tailored to specific industrial requirements. For example, in finance, languages such as R and MATLAB are commonly used for data analysis and financial modeling. C# and C++ are popular programming languages for developing dynamic and immersive gaming experiences. Each sector uses programming languages to solve its specific issues and needs. Programming languages are critical in the automation and robotics sectors. Python and C++ are used to write software for robotic control systems, artificial intelligence techniques, and autonomous systems. These languages allow for accurate control and coordination of large robotic systems, hence facilitating automation processes in industries like manufacturing, healthcare, and logistics. Data science relies largely on computer languages to manipulate, analyze, and visualize data. Languages such as Python, R, and SQL offer powerful tools and libraries for dealing with massive datasets, implementing machine learning algorithms, and gaining useful insights from data. Programming languages enable data-driven decision-making in a variety of areas, including healthcare, marketing, finance, and e-commerce (Ozgur, Colliau, Rogers, and Hughes, 2017).

Statement of the Problem

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). 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.

Objectives of the Study

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. Specifically, the study is designed to:

Determine the sufficiency of computer lecturers in Yobe State Colleges of Education.

Determine the sufficiency of support staff of computer department (Technologies/ Operators/System Engineer/Cleaners and Security) in Yobe State Colleges of Education.

Determine the sufficiency of computer laboratories in Yobe State Colleges of Education.

Determine the sufficiency of lecture halls for learning computer programming in Yobe State Colleges of Education.

Determine the sufficiency of computers with installed programming software for learning computer programming in Yobe State Colleges of Education.

Determine the level of utilization of the available resources in learning computer programming in Yobe State Colleges of Education.

Research Questions

The study provided answers to the following research questions. •

How sufficient are computer lecturers in Yobe State Colleges of Education.

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

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

How sufficient are the lecture halls for learning computer programming in Yobe State Colleges of Education.

How sufficient are the computers with installed programming software for learning computer programming in Yobe State Colleges of Education?

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

Hypothesis

The null hypothesis was tested at 0.05 level of significance in this study.

H01: There is no significant difference between the mean responses of Male and Female Students on the utilization of the available computers in learning computer programming in Yobe State Colleges of Education.

Significance of the study

The findings of the study would be beneficial to the Federal Ministry of Education in general and Yobe State Ministry of Education in particular and Administrators of the Colleges. Lecturers and Students will also benefit from the findings of the study.

Yobe State Ministry of Education would benefit from the result of the study by getting information on the state of the resources for skills acquisition in the Colleges of Education. The result would enable the state Ministry of Education plan on how to procure and distribute resources to cater for skill acquisition of students in computer programming.

Administrators of Colleges of Education in the state like Provost, Deputy Provost and Head of Departments would benefit by using the result of the study to determine the sufficiency of resources for teaching and learning/skills acquisition in computer programming. It would enable the Administrators to make requisition to the state or federal ministry of education on resources needed for teaching computer programming in the Colleges.

The result would be of benefit to Lecturers when adequate resources are provided, the lecturers will employ the resources towards teaching the students computer programming. Lecturers will carry out demonstration lessons and other teaching techniques using the resources.

Students would benefit from the result of the study because when the lecturers get the adequate resources and use the same resources to demonstrate skills during lesson, and students will learn the skills that have been demonstrated by the teachers. The students can employ the resources to carryout practical exercises in the workshop. The practical exercises carried out by the students using adequate resources would enhance skills acquisition in computer programming across Yobe State, Colleges of Education.

Scope of the Study

The scope of this study would be to analyze the appropriateness of three types of resources for skill acquisition in Yobe State's Colleges of Education. These resources include teachers, infrastructure (laboratories and lecture halls, installed software), and equipment. Any other resources will not be considered as part of this research work.

LITERATUREREVIEW

Theoretical Framework

Bertalanffy's system theory, developed in 1915, serves as the theoretical foundation for this study. According to the theory, "all systems have different parts performing different functions, but in such a way that each part interacts and is interdependent with other parts and other systems." (Giachetti, 2016).

A system is defined as a frame of reference composed of often interacting or interrelated groupings of activities, each of which has an impact on the others. A system is built out of four components: the object, its pieces, elements, and variables. Second, a system is composed of attributes, which are the qualities or properties shared by both the system and its objects. Third, a system has internal interactions among its components, and fourth, a system exists within a context. Organizational theory is mainly based on the system notion because organizations are complex, dynamic, goal-oriented processes. This is because system theory in organizational studies is viewed as a humanistic extension of natural science (Giachetti, 2016).

The term organization is defined as a system of interconnected resources that enable the achievement of specific aims or goals. It was also emphasized that they are social and technological gadgets comprised of people and physical elements. An organization is a group of people in the workplace who conduct different but linked and coordinated

duties to achieve certain goals.

The system theory further gives much embracing meaning to the terms input and output, and that to make use of the input for attaining the desired output, the transformation process is essential and controlled (Giachetti, 2016). It further reveals that the system components operate within an environment and as such, the system is bound to affect the environment and vice-versa. A system that interacts with its environment, receives input and influence from the environment and in turn passes back outputs and influence the environment is an open system (Giachetti, 2016).

Colleges of Education offer courses to train teachers who form the back bone of the educational system and who are now encouraged to gain self-reliance skills due to lack of employment opportunities in the country. In order to meet up with the modern trend, there is need to fully provide sufficient equipment and materials for their training. For such goal to be achieved the needed resources to be used to attain such will serve as the input as outlined by system theory and such input need to be adequate, such input resources are the Teachers, Infrastructures and Equipment, Software and the process being the actual teaching and learning as well as all enabling activities that lead to skills acquisition. The output represent the skill acquired by the students i.e. what they are able to perform after graduation.

This study is therefore based on system theory, as it is set to assess the sufficiency and utilization of resources for effective skills acquisition in learning computer programming in the Colleges of Education in Yobe State. Thus, the theory relates the resources as the input which need to be adequate for process that is the actual teaching and learning that lead to skills acquisition as the output.

The Need for Computer Programming Skills for NCE Computer Science Students

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. The study sought to investigate the relationship between a student's competency level in programming skills acquisition and future job placement after graduation (Muraina, Olayemi, Adesanya, and Moses, 2021). Computer education graduates have received training in the profession's theories, methods, and philosophical paradigms. Computer education graduates are prepared to teach and lead in secondary schools, technical schools, colleges of education, universities, and training programs at Innovative Enterprise Institutes. They are also taught to work for themselves or in software development firms, industries, and other related occupations/ parastatals, hardware repair firms, and information technology (IT) firms. 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).

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). Competency describes the acts that lead to successful performance. It allows the instructor to demonstrate that the student understood what was meant in the learning objectives or learning experiences. Competency descriptions inform employees about the amount of knowledge and skill mastery required to perform job activities successfully, as well as the behavior norms that must be regularly displayed. Computer education graduates can also use competencies to design their job path. Knowing the competencies required for obtaining and maintaining jobs and certain promotions enables computer education graduates to seek out and pursue suitable extracurricular training and development opportunities. 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).

Concept of Assessment, Resources and Skill Acquisition

According to Merriam-Webster Dictionary (2005), the term assessment comes from the

root word assess, which means "to determine the importance, size, or value of something." Assessment in education is described as an action that determines the relevance, size, or use of a subject under study. Assessment is the process of documenting knowledge, skills, attitudes, and beliefs in a measurable format (Nwoye, 2012). Assessment is a procedure in which teachers aim to discover and diagnose student learning problems while also providing students with excellent feedback on how to improve their work (Education Bureau, EDB 2011). Assessment is included into the curriculum, learning and teaching, and feedback cycles to encourage learning. The curriculum outlines what students should acquire in terms of learning targets/objectives (such as knowledge, skills, values, and attitudes). According to (Education Bureau, EDB 2011), assessment is the practice of collecting evidence of student learning. It should be constructed so that it examines what students are supposed to learn (i.e., learning targets and content) as well as the learning processes that lead to it. This organization went on to provide numerous modalities of assessment that can be employed as needed to gain a thorough knowledge of student learning in a variety of areas. Feedback can then be given to students and teachers as a basis for judgments on what to do to improve learning and teaching. Assessment in schools (Education Bureau, 2011) can be formative or summative, depending on the reason for which it is intended. Formative assessments are continuous assessments, reviews, and observations in the classroom. Nwoye (2012) explains that teachers use formative assessment to improve instructional approaches and student feedback throughout the teaching and learning process. Summative assessments are used to assess the efficacy of instructional programs and services at the end of the academic year or at a set time. Summative evaluation is used to determine student competency at the end of an instructional phase. This is relevant to the current study, which evaluates the sufficiency and utilization of resources for effective skill acquisition in computer programming in Yobe State Colleges of Education.

Resources are vital and powerful elements in any company. Owoeye and Yara (2011) argued that educational resources are an important driver of academic achievement. Resources in education are the fundamental requirements that aid and support effective teaching and learning. Mmou and Olutila (2000) defined instructional resources as human and non-human materials such as school buildings, machines, laboratories and their equipment, learners' tools, teachers, and non-teaching staff provided for administration, teaching and learning, and research processes.

Onyesom (2013) divides educational resources into three categories: individuals, physical buildings, and instructional equipment and materials. Personnel (human resources) include teachers and other support workers such as workshop participants, instructors, and technicians. Physical facilities can be defined as the full set of physical infrastructures, including workshops, classrooms, furnishings, libraries, laboratories/studios, and staff offices. Oyeniyi (2010) defined educational facilities and equipment as physical resources that school administrators and personnel use, allot, and maintain for school administration, teaching, and learning.

Onyesom (2013) emphasizes the importance of resources in meeting educational

objectives and aims. The extent to which an educational institution achieves its goals is directly proportionate to the educational resources available and used. According to Adeogun and Osifila (2008), the availability, relevance, and sufficiency of educational resources help students attain academic success. Unattractive school facilities, crowded classrooms, and a lack of skilled and appropriate staff can all contribute to children's low academic performance. Teaching and learning cannot occur in the classroom if fundamental instructional resources are not available. Ayeduso (2000) defines a project's success as the resources available to finish it. Ayeduso further claimed that a skill development program, as a project, can be successfully implemented with proper educational resources. Similarly, Bongotons and Onyenwe (2010) argued that one of the key components of a successful course implementation is the availability of suitable instructional resources. The importance of school resources cannot be over emphasized, since they serve as the foundation for the public's assessment of an educational institution and its offers. Bulama (2001) defined sufficiency of instructional resources as the extent to which the qualitative and quantitative requirements of number, size, shape, quality, and application of resources are satisfied. According to him, sufficiency of quantity refers to the estimated amounts of spaces and equipment, whilst size and shape refer to space in square meters and the architectural form of structures as they relate to spatial purposes. Furthermore, he argued that sufficiency alone does not guarantee well-planned educational resources; they must also be appropriate in terms of environmental control, atmosphere, location, ease of maintenance, and long-term economic viability. Toby (1991) stated that without adequate instructional resources and the administration of all types of resources, the goal of Nigerian Vocational/Technical Education will remain a mirage.

Sufficiency of Equipment and Materials

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

Summary of Literature Review

The theoretical framework for the study is system theory. The hypothesis identified some organism-like features in an organization, with input, process, and output all working together to achieve the organization's goals. The system components of input, process, and output are all related to resources (teachers, infrastructures, and equipment), the teaching and learning process, and the skills that students acquire upon graduation.

The review also defined the concepts of assessment, resources, and skill acquisition in relation to the study by several authors and authorities who were all associated with the study. The assessment emphasizes the sufficiency of instructional resources for skill acquisition, which was recognized as a backbone of the success of learning computer programming in the three colleges.

Research Design

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. 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 administrators, 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.

Area of the Study

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. Yobe State

has a pluralistic population with rich and diverse historical and cultural heritage. The major ethnic groups in the state include the Kanuri/Manga, Fulani, Ngizim, Bolewa, Bade, Kare-Kare, Hausa, Ngamo, Babur/Maga and several other ethnic groups from different parts of the country. Most of the people are peasant farmers which the main reason why guinea corn, ground nuts, beans; maize, millet, wheat, and rice are produced in commercial quantities. A significant number of the inhabitants also engaged in trading, fishing, livestock and animal rearing. The state has the largest cattle market located at Potiskum town which makes it the supplier of livestock in the country. It is located within latitude 11 North and longitude 13.5 East with a total land area of 47,153 square kilometers. It shares common boundaries with Borno state to the east and southeast, Jigawa state to the northwest, Bauchi and Gombe states to the southwest. It also shares an international border with the Republic of Niger. This boundary stretches over 323km to the north of the State. The population of the State according to the National Head Count conducted in 2006 is about 2.6 million. The state was created on August 27, 1991 having been carved out of the old Borno State in the year 1991 with Damaturu as the state capital.

Population of the Study

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.

Sample and Sampling Techniques

The sampling technique for the research is all the three administrators, one laboratory attendant each from the colleges and 40% of students and lecturers selected using random sampling.

Instrument for Data Collection

The Instrument for Data collection for this study was a Checklist and a four-point Likert scale questionnaire drawn from NCCE Minimum standard. The checklist named "Checklist Instrument for Assessing Resources Sufficiency for Effective Skill Acquisition in Computer Programming in Yobe State, Colleges of Education". The researcher

constructed the checklist using the NCCE Minimum Standards for the study. The checklist consists of two (2) different items. Appendix "A" will be in areas of Teachers, Laboratory and Lecture Halls sufficiency respectively. While appendix "B" of the checklist consists of twenty (20) lists of items of equipment for the required standard computer programming laboratory. While the four-point Likert scale questionnaire, was used for data collection that answer research question five which was developed from NCCE Minimum Standard administered to the students of the colleges. It consists of another twenty (20) lists of equipment for practical utilization as Appendix "C".

Validation of the Instrument

The instrument was validated by three experts one from the Department of Computer Science, College of Education and Legal Studies, Nguru, another from Department of Computer Science, College of Education (Technical) Potiskum Yobe State and one from the Department of Electrical and Electronics, College of Education (Technical) Potiskum Yobe State. They assessed language usage and appropriateness of the instrument to collect the needed data from the respondents. All suggestions were carefully considered and used in the adoption of the instrument.

Reliability of the Instrument

The validated instrument was pilot-tested on diploma one students of Galtima Mai Kyari College of Health Sciences and Technology, Nguru, which is not part of the study. The data collected was tested through 'Cronbach Alpha' using statistical package for social sciences (SPSS).

Method of Data Collections

The data for this study was collected by the researcher with the help of research assistants using the courses specification manual obtained from NCCE. Checklists was used as instruments to collect relevant data to answer research questions 1, 2, 3 and 4 about the sufficiency of resources. The checklists are in two Appendices; A and B. Appendix "A"(Appendix I Checklist for assessing lecturers, laboratory and lecture hall sufficiency) was used to collect relevant data about Computer Science Lecturers, Laboratories and Lecture Halls sufficiency for National Certificate in Education (NCE). While Appendix "B"(Checklist for assessing equipment sufficiency) was used to collect relevant data pertaining to sufficiency of equipment consisting of twenty (20) items used in training of computer students programming in the NCCE minimum standard. A five-points Likert scale questionnaire will be used to collect relevant data on the utilization of available equipment for computer programming training as Appendix "C". In each case, a column for remark will be provided as against each item in the instruments for decision making.

Method of Data Analysis

Data collected for this Study was analyzed using Statistical Package for Social Sciences (SPSS). In order to answer research questions 1, 2, 3 and 4 percentage score will be used. The benchmark for the analysis is the specifications by the NCCE. Mean was used to answer research question five (5) and z-test was also used to test the hypothesis at 0.05 level of significance.

In making decision on the sufficiency and utilization of resources for Effective Skill Acquisition in Computer Science Departments of Colleges of Education in Yobe State, the resources was regarded as adequate where the resources are equal or more than that stipulated by NCCE while not adequate where the available resources are less than that stipulated by NCCE. For research question five decision rule was taken based on the cut- off point in identifying the level of utilization of the available equipment for skill acquisition in Departments of Computer Science, in the Colleges of Education in Yobe State, the cut-off point was derived from the Real Limit of Number in Table 2.

For decision purpose 2.50 was used as a level of acceptance. This implies that items that score a mean response of 2.50 and above was regarded as utilized, while items that score mean response below 2.50 was regarded as not utilized. For the null hypothesis, it was accepted seen the calculated value is less than the table value.

Table 2: Rating Point for Research Question Five

Responses

Symbol

Upper limit	Lower limit
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Always used

AU

5.00	4.50
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Sometime used

SU

4.49	3.50
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Sometime not used

SNU

2.49 1.50

Always not used

ANU

1.49 0.05

Results (Expected Output/Results)

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, may likely revealed insufficiency and less utilization of these resources for skills acquisition in computer programming in the three (3) colleges of education of Yobe State.

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.

Adeogun, A.A. & Osifila, G.I. (2008). Relationship between educational resources and students' – 6 FVÖ–2 W&`ormance in Lagos State, Nigeria. Retrieved on the 25th September 2011, –g&öÖ ‡GG çò÷www.unilorin.edu.ng/ejournals/ijem/

Ayeduso, J. O. (2010). Improving Vocational Education Facilities for Adequate Acquisition of Skills for the Achievement of Vision 2020 in Niger State. *Journal of Vocational and Technical Educators (JOVTED)*2. (2), Edition. p. 172- 180.

Bongotons, O.Y. & Onyenwe, B.O. (2010). Availability and adequacy of ICT resources in business teacher education programmes of Nigeria. *Business Education Journal*, 7(2), 200-215.

Bulama, K. H. (2001). An Evaluation of Educational Facilities in State Technical Colleges in "æ÷ th Eastern Nigeria. Unpublished Doctorate' thesis, University of Nigeria Nsukka

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

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

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

Dauda, Y. A., & Hassan, M. A. (2022). Availability And Utilization Of Resources For Skill Acquisition In Carpentry and Joinery Trade in Technical Colleges in North-East, Nigeria.

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.

Giachetti, R. (2016). *Design of enterprise systems: Theory, architecture, and methods*. CRC Press.

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

Medvidovic, N., & Taylor, R. N. (2000). A classification and comparison framework for software architecture description languages. *IEEE Transactions on software engineering*, 26(1), 70-93.

Nwoye, A. N. (2012). *Assessment of Resources and Level of Entrepreneurial Skills Acquired by Secondary Schools Physics Student's in Anambra State*. Unpublished Master's Thesis. Nnamdi Azikiwe University, Awka.

Mmou, R. & Olutola, A. (2000). *Supervision and utilization of facilities in vocational education*. London: Macmillan Press.

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).

Onyesom, M. (2013). *Assessment of Instructional Resources for Teaching Business Education at Nnamdi Azikiwe University Awka*. Unpublished Master's Thesis, Nnamdi Azikiwe University Akwa.

Owoeye, J.S. & Yara, P.O. (2011). School facilities and students' academic achievement of secondary school agricultural science in Ekiti state, Nigeria. *Asian Social Science*, 7(7), 1-6.

Oyeniya, O.L. (2010). Analysis of the educational facilities in southern universities in Nigeria. *Journal of Education and Development*, 8(2). Retrieved on the 3rd July, 2011 from <http://www.aljss.com>.

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

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.