

Perspectives About the State of Undergraduate Computing Education in Nigeria

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DOI:10.59668/1269.15637



In this preliminary research, qualitative research was conducted through interviews with employers of computing talent, recent computing graduates, and undergraduate computing professors. The findings indicate a concerning trend of decline in the quality of undergraduate computing programs in Nigeria, primarily due to graduates' dissatisfaction with the outcome of computing education. University professors and recent graduates have offered recommendations to enhance the quality of computing education in the country.

Introduction

Computing education, part of STEM, has witnessed a decline in quality in Nigerian universities, leading to a diminished reputation of higher education in the country, as many independent learning hubs have recorded more success in their computing education efforts (Chiemeké et al., 2009; Atiase et al., 2020).

This study examines the state and perceived value of computing education in Nigeria from stakeholders' perspectives. These stakeholders within the computing education community include the employers of computing talent; the computing graduates themselves, and their professors. These stakeholders shared their perspectives and experiences with regard to computing education in Nigeria, and data were gathered through online interviews with these different stakeholders.

This research employs the phenomenology qualitative research theory and as seen in the Stanford Encyclopedia of Philosophy, "Phenomenology is the study of structures of consciousness as experienced from the first-person point of view" (Smith, 2018). In this research, we investigate the experiences of people in the computing education context, and we seek to answer the following research questions:

1. What do computing graduates (early career professionals), professors, and recruiters think about the quality and effectiveness of undergraduate computing education in Nigeria?
2. Are there common perspectives among graduates, professors, and recruiters?
3. How do these perspectives influence the present and future of undergraduate computing education in Nigeria?

Literature review

Computing education in Nigeria began in 1963 with the establishment of a training center by the IBM World Trade Corporation at the University of Ibadan, leading to bachelor's degree programs in Computer Science in several Nigerian universities (Anyanwu, 1978). Computing education in Nigeria has grown in popularity, as Computer Science is currently one of the most sought-after programs by

prospective undergraduates. Presently, over 114 universities in Nigeria offer Computer Science programs (DrugSavant, 2023; Nigerian Scholars, 2019).

Historical research indicates that early computing programs designed their curricula in alignment with the national needs of their time, ensuring that graduates were equipped with skills that met the nation's requirements (Anyanwu, 1978). However, the current situation in most universities reveals static and outdated computing curricula that do not address the current needs of Nigeria. As a result, independent learning hubs have emerged as more successful in providing relevant computing education and contributing to national innovation and development (Atiase, 2020).

Existing research on undergraduate computing education in Nigeria has primarily focused on elementary and secondary education (Basson, 2021; Dlamini & Dewa, 2021; Tshukudu et al., 2023), cultural relationships and methods (Arawjo & Mogos, 2021; López-Quiñones et al., 2023), and technology's role in improving learning experiences (Agbo et al., 2021; Bukar et al., 2016; Olutola et al., 2021; Thomas et al., 2020; Uzorka & Olaniyan, 2023). Some research has explored the relationship between undergraduate education and graduate employability, emphasizing the importance of practical skills and real-world examples (Chukwuedo & Ementa, 2022). Few studies have specifically examined computing education a concentration on individual aspects of the curriculum. One research paper focused on Deep Learning (Artificial Intelligence) education (Yong, 2022), and another focused on Object-oriented programming education (Sunday, 2022).

Methodology

This preliminary research focuses on the perceived value of undergraduate computing education programs and curricula from the perspectives of technology recruiters, recent graduates, and university professors, which is a gap that has been identified in the literature. The objective is to gain insight into the current state of undergraduate computing education and its value as perceived by key stakeholders, with the aim of identifying areas for improvement.

Research design

Data sampling

This preliminary research included a total of 14 participants: 5 recruiters, 6 graduates, and 3 professors. The recruiters were responsible for recruiting computing professionals for prominent industries in Nigeria.

The computing professionals graduated from various universities across Nigeria between 2014 and 2019. Their academic backgrounds primarily comprised STEM-related fields, particularly in computing, technology, and engineering. These universities were in different regions of Nigeria, including the South-West, North Central, and South-East.

The university professors chosen for this study were specifically Computer Science educators instructing computing and technology courses at a university in the Southwestern region of Nigeria.

Purposive sampling was employed to select these participants due to their expertise in computing education, either as educators, professionals, or talent recruiters.

Data collection instrument and procedure

Interviews were used as the data collection method. Recruiters answered 12 questions, professionals answered 16, and professors answered 7.

Recruiters' interviews focused on the quality of undergraduates' skills. Professionals were asked how well their university education prepared them for employment, and professors were queried about the effectiveness of the computing curriculum in equipping students with the necessary skills.

Participants were primarily found on LinkedIn and contacted through messaging platforms such as LinkedIn, WhatsApp, and Facebook. The interviews were conducted via Zoom, and responses were recorded in text format.

Data analysis

Thematic analysis was used to identify the most prominent themes within the responses.

Results and discussion

Hiring fresh graduates: Recruiters' perspectives

Recruiters were asked about their hiring practices. 75% of them confirmed hiring recent graduates, typically placing them into graduate trainee roles.

When discussing the desired skills in recruits, recruiters noted that both technical and non-technical skills are important. Notably, a recruiter from a Fortune 500 company highlighted that a university degree is not the primary consideration for entry-level recruits; instead, they value hands-on skills relevant to the role.

These findings suggest that employers in the computing and technology sector expect a certain level of expertise in fresh graduates but are also open to providing training, recognizing that some graduates acquire the necessary skills through non-traditional means.

Universities' approach to computing education: Graduates' perspective

When asked if their university education adequately prepared them for the industry, 65% of early career professionals responded negatively. Some who felt prepared credited assignments and projects, while others relied on independent learning. Those who felt unprepared cited outdated curriculum, lack of hands-on experience, inclusion of irrelevant courses, insufficient guidance on real-world knowledge application, and a generally uninspiring learning experience.

Notably, 100% of early career professionals pursued additional training post-graduation, with half choosing self-study and the other half opting for external educational programs. This supplementary training equipped them with the practical skills required for employment in their industry.

These professionals offered recommendations to enhance undergraduate computing/technology education including:

- updating the course curriculum,
- reducing non-computing coursework,
- investing more in internship placements for students,
- fostering academia-industry relationships,
- providing hands-on practical with real-world relevance,
- improving teacher/professor training and professor-student relationships,
- creating distraction-free learning environments for students, and
- establishing a robust alumni network of industry professionals.

Universities' approach to computing education: Professors' perspective

The majority of professors, around 65%, believed that providing additional experiential learning opportunities would benefit students. Professors acknowledged the value of industry internship opportunities for providing some real-world experience for students. However, all professors indicated that they currently do not offer real-world projects for students to apply their course content experientially, for these reasons:

- Lack of synergy between academia and industry.
- The necessity to adhere to an outdated curriculum to maintain accreditation by the National Universities Commission (NUC)
- Insufficient funding and infrastructure.
- Heavy workloads for professors, which impede innovation.

Despite these challenges, all interviewed professors expressed their willingness to integrate real-world projects into their courses if such opportunities were made available.

Implication of results and conclusion

This study suggests several implications for the future of computing education in Nigeria. It emphasizes the need for programs to better equip students with essential skills. It also stresses the importance of collaboration among universities, industry, and the Nigerian government, for the purpose of creating an effective curriculum.

In conclusion, the research reveals that undergraduate computing programs in Nigeria are at risk of decline due to dissatisfaction among graduates. The paper suggests recommendations from professors and recent graduates to improve the quality of computing education, emphasizing the need for a collaborative effort among various stakeholders to enhance undergraduate computing education in Nigeria.

References

- Agbo, F. J., Olawumi, O., Balogun, O. S., Sanusi, I. T., Olaleye, S. A., Sunday, K., Kolog, E. A., Atsa'am, D. D., Adusei-Mensah, F., Adegbite, A., & Ipeyeda, F. W. (2021). Investigating Students' Perception towards the Use of Social Media for Computing Education in Nigeria. *Journal of Information Systems Education, 32*(3), 213 - 227.

- Anyanwu, J. A. (1978). Computer Science Education in a developing nation. [SIGCSE '78: Papers of the SIGCSE/CSA technical symposium on Computer science education](#), 37 - 40. February 1978.
- Arawjo, I. & Mogos, A. (2021). Intercultural Computing Education: Toward Justice across Difference. *ACM Transactions on Computing Education*, 21(4). December 30, 2021.
- Atiase, V. Y., Kolade, O., & Liedong, T. A. (2020). The emergence and strategy of tech hubs in Africa: Implications for knowledge production and value creation. *Technological Forecasting and Social Change*, 161.
- Basson, I. (2021). Twenty Years into the New Millennium: How Integrated Is Mathematics, Physics and Computer Science at Secondary School Level? *Perspectives in Education*, 39(4), 3 - 26.
- Bukar, I. B., Bello, S., & Ibi, M. B. (2016). Role of Computer in Instruction, Assessment and Administrative Delivery of Education Goals in the University of Maiduguri, Nigeria. *Journal of Education and Practice*, 7(20), 81 - 87.
- Chiemeke, S., Longe, O. B., Longe, F. A., & Shaib, I. O. (2009). *Research Outputs from Nigerian Tertiary Institutions: An Empirical Appraisal*. <https://digitalcommons.unl.edu/libphilprac>
- Chukwuodo, S. O., & Ementa, C. N. (2022). Students' Work Placement Learning and Employability Nexus: Reflections from Experiential Learning and Social Cognitive Career Theories. *Industry and Higher Education*, 36(6), 742 - 755, December 2022.
- Dlamini, R. & Dewa, A. (2021). Beyond Optimistic Rhetoric: Social and Cultural Capital as Focal Deterrents to ICT Integration in Schools. *International Journal of Education and Development using Information and Communication Technology*, 17(3), 19 - 37.
- DrugSavant. *Universities That Offer Computer Science In Nigeria 2023/2024*. Retrieved August 31, 2023, from <https://drugsavant.com/universities-that-offers-computer-science/>
- [López-Quiñones, A.](#), Martínez-López, M., Moreno Sandoval, C. D., Carroll-Miranda, J., Lindala, A. E., Chatman, M. C., Fleming, J., Shockley, E. T., Cadeau, D., & Flores-Reyes, E. (2023). Ancestral Computing for Sustainability: Centering Indigenous Epistemologies in Researching Computer Science Education. *TechTrends: Linking Research and Practice to Improve Learning*, 67(3), 435 - 445, May 2023.
- Nigerian Scholars (2019). *List of Universities that offer Computer Science*. Retrieved August 31, 2023, from <https://nigerianscholars.com/school-finder/computer-science/>
- Olutola, A. T., Olatoye, R. A., & Olatoye, O. O. (2021). Assessing the Impediments to E-Learning Utilization by Higher Institution Students. *Journal of Education and Learning (EduLearn)*, 15(2), 297 - 302, May 2021.
- Smith, D. W. (2018). "Phenomenology", *The Stanford Encyclopedia of Philosophy* (Summer 2018 Edition), Edward N. Zalta (ed.). Retrieved September 14, 2023, from <https://plato.stanford.edu/entries/phenomenology/>
- Sunday, K., Wong, S. Y., Samson, B. O., & Sanusi, I. T. (2022). Investigating the Effect of Imikode Virtual Reality Game in Enhancing Object Oriented Programming Concepts among University Students in Nigeria. *Education and Information Technologies*, 27(5), 6819 - 6845, June 2022.
- Thomas, O. A., Adeyanju, J., Popoola, B. G., & Odewale, T. R. (2020). Competency Training Needs of Lecturers for Effective E-Learning Instructional Delivery in Teacher Education Programs in South-West, Nigeria. *Journal of Negro Education*, 89(2), 136 - 145.
- Tshukudu, E., Sentance, S., Adakun-Adeyemo, O., Nyaringita, B., Quille, K. & Zhong, Z. (2023). Investigating K-12 Computing Education in Four African Countries (Botswana, Kenya, Nigeria, and Uganda). *ACM Transactions on Computing Education*, 23(1), March 9, 2023.
- Uzorka, A., & Olaniyan, A. O. (2023). Leadership Role and Professional Development of Technology. *Education and Information Technologies*, 28(1), 713 - 723, January 2023.
- Yong, B., Jiang, X., Lin, J., Sun, G., & Zhou, Q. (2022). Online Practical Deep Learning Education: Using Collective Intelligence from a Resource Sharing Perspective. *Educational Technology & Society*, 25(1), 193 - 204, January 2022.



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