

Table 3. Components of Computer Facilities in Osun State Colleges of Education

| s/n | Computer Facilities | Numbers Available | Numbers Functional |
|-----|---|-------------------|--------------------|
| 1 | Numbers of Computer | 44 | 19 (43.2%) |
| 2 | Numbers of computers with INTEL PIV 3GHZ (100 FSB) MMX | 14 | 14 (31.8%) |
| 3 | Numbers of computers with 2 GB RAM | 0 | 0 |
| 4 | Numbers of computers with 120 GBHD | 14 | 13 (29.5%) |
| 5 | Numbers of computers with DVD ROM Drive | 14 | 14 (31.8%) |
| 6 | Numbers of computers with Flat Screen Monitor | 14 | 14 (31.8%) |
| 7 | Numbers of computers with USB Keyboard and | 14 | 14 (31.8%) |
| 8 | Numbers of computers with USB Mouse | 14 | 14 (31.8%) |
| 9 | Numbers of computers with SUBMIDI PIV casing | 44 | 44 |
| 10 | Numbers of 650 VA UPS for each computer system | 44 | 44 |
| 11 | Numbers of 1000-Watt stabilizers for each system | 44 | 44 |
| 12 | Numbers of computers on Local Area Network | 44 | 44 |
| 13 | Numbers of computers connected to the Internet | 0 | 0 |
| 14 | Numbers of Scanners | 0 | 0 |
| 15 | Numbers of Printer (Laser printers and Desk Jet Printers) | 2 | 2 |
| 16 | Numbers of Computer projectors | 2 | 2 |
| 17 | Laptop Computer to each lecturer of the department | 0 | 0 |
| 18 | Local journals on computer studies education | - | - |
| 19 | International journals on computer studies education | - | - |

Table 4. Available Computer Facilities for Computer Student's Practical demonstration

| Facilities | Number Available | Number of Functional Facilities |
|------------|------------------|---------------------------------|
| Computer | 44 | 19 (43.2%) |
| Scanner | 0 | 0 |
| Projector | 2 | 2 (100.0%) |
| Printers | 3 | 3 (100.0%) |

Table 5. Computer Science Students in Osun State Colleges of Education

| College | Ilesa | Ila | Total |
|-------------------------------|----------|----------|----------|
| Year One | 174 | 200 | 374 |
| Year Two | 67 | 250 | 317 |
| Year Three | 61 | 240 | 301 |
| Total | 302 | 690 | 992 |
| Ratio of Functional Computers | 15.89474 | 36.31579 | 52.21053 |

RQ3: What are the strategies employed by the CSE lecturers for training the pre-service teachers?

To answer this research question, a Computer Teaching Observation Checklist (CTOCL) was used to assess method used by each computer course lecturer to train the would-be computer lecturers in Computer Science Department at the two Colleges of Education in Osun State. The result was analysed and presented in Table 6. According to information on Table 4 and 5, the ratio of available number of computers in the COE to the sample population of the study was 41:11 (approximately 4:1). This implies that, 4 students will be using one computer. However, the ratio of the functional computers to students is 168:19 (approximately 9:1). This translates to nine students on a functional computer.

From Table 1 and 4.3e, the ratio of available number of computers in the Colleges to the population of computer science students was 23:1 (approximately 23:1). This translates to twenty three (23) students to use computer. While the ratio of functional computers in the two Colleges of Education to the population of computer science students in the Colleges is 52:1. That is 53 students to use one computer. It can therefore be concluded that the numbers of computers available for the use of the pre-service teachers' practical demonstration in software programming were not adequate.

RQ3: What are the strategies employed by the CSE lecturers for training the pre-service teachers?

Table 6. Strategies of Teaching Would-be Computer Teachers

| Responses | N | Percent |
|---------------------------|----|---------|
| Methods of Teaching | | |
| Lecture Method only | 22 | 33.8% |
| Lecture Method and Others | 18 | 27.7% |
| Discussion method | 14 | 21.5% |
| Demonstration Method | 2 | 3.1% |
| Project Method | 8 | 12.3% |
| Computer (Practical) | 1 | 1.5% |
| Total | 65 | 100.0% |

To answer this research question, a Computer Teaching Observation Checklist (CTOCL) was used to assess method used by each computer course lecturer to train the would-be computer lecturers in Computer Science Department at the two Colleges of Education in Osun State. The result was analysed and presented in Table 6.

From Table 6, 33.8% of Lecture Method only was used by the lecturers to teach computer pre-service teachers, while 27.7% of Lecture Method and other Teaching Methods was used, 21.5% of Discussion Method, 3.1% of Demonstration Method, 12.3% Project Method, and 1.5% Practical demonstration Method were used. It then implies that

the most commonly used teaching method is Lecture Method. It can therefore be concluded that 1.5% of computer Practical demonstration Method of teaching is not adequate for training the computer pre-service teachers.

RQ4: How proficient are the learners in computer software and hardware utilization?

To answer this research question, Computer Hardware/Software Achievement Test (CHSAT) was administering on the pre-service teachers to determine their proficiency in a computer programming language and computer hardware. The result was analysed using simple percentage. The result is as shown in Table 7.

Table 7. Proficiency in Computer Software and Hardware Components

| Proficiency | Software Component | Hardware Component | % of Software Component | % of Hardware Component |
|-------------|--------------------|--------------------|-------------------------|-------------------------|
| Low | 155 | 112 | 92.3% | 66.7% |
| Average | 6 | 30 | 3.6% | 17.9% |
| Good | 7 | 26 | 4.2% | 15.5% |

From the Table 7, proficiency was rated 0-39.4% represented low proficiency, 39.5%-49.4% represented average proficiency and 49.5% and above represented good proficiency. Based on these scale the study reveals that 92.3% of the pre-service computer teachers had low proficiency in software components, 3.6% had average proficiency in software proficiency and 4.2% had good proficiency in software components. While 66.7% had low proficiency in computer hardware components, 17.9% had average proficiency and 15.5% had good proficiency in computer hardware component. It can be concluded that the CSE pre-service teachers in Osun State Colleges of Education were not proficient in computer software and hardware component because they had low level of computer software and hardware component proficiency.

5. Discussion

The results of this study showed different factors responsible for inadequacy of effective training of pre-service teachers learning how to teach ICT as a

subject at Nigerian Colleges of Education. These barriers also have ripple effect on the teaching and learning of ICT literacy in Nigerian secondary schools.

The study shows that 54.5% of the computer teacher educators in Osun State Colleges of Education were qualified while 18.2% of them could be qualified if enrolled in any of the tertiary institution for teaching Responses Methods of Teaching N Percent Lecture Method only 22 33.8% Lecture Method and Others 18 27.7% Discussion method 14 21.5% Demonstration Method 2 3.1% Project Method 8 12.3% Computer (Practical) 1 1.5% Total 65 100.0% Proficiency Software Component Hardware Component % of Software Component % of Hardware Component Low 155 112 92.3% 66.7% Average 6 30 3.6% 17.9% Good 7 26 4.2% 15.5% qualification programmes. However, 27.3% of them were not qualified to lecture. Therefore, only 54.5% of the CSE academic staff was qualified according to NCCE requirements. This finding was supported by the findings of Nwangwu, Obi and Ogwu [5], and Toscani-Academy [9].

In addition, the study showed that there were 5 and 6 computer teacher educators in Osun State College of Education Ilesa and Ila respectively. Based on this finding, staff-student ratio was examined and the result shown 1:60.4 in Ilesa, 1:115 in Ila and while the total overall staff-student ratio for the two COE was 1:90. According to NCCE document, there must be a minimum of eight (8) Computer Science Education academic staff in a College of Education. It further stated that the staff-students ratio should be 1:25. In view of the requirement of NCCE document, this study result implies that the teacher educators were not adequate as such more computer teacher educators will be required to meet the size of computer pre-service teachers from the two Colleges of Education. According to the findings of Goshit [13], the major challenge confronting Nigeria schools and its ICT programme is workforce training. Lack of ICT teachers was also found in Adomi and Kpangban [1].

Furthermore in the study, 43.2% of the component of computer facilities were functional, 68.2% of the computers were on local network, while 31.8% of the available computers had the following components: computers with INTEL PIV 3GHZ (100 FSB) MMX, DVD ROM Drive, Flat Screen Monitor, USB Keyboard and Mouse. While 29.5% had 120 GBHD and none had 2GB Ram. None of the computers was connected to the Internet, no scanner was found in the laboratories for students and lecturers' use and no teacher educator was presented departmental laptop in the Departments of Computer Science Education of the two Colleges of Education. In view of this finding, the computer facilities in the two Colleges of Education did not met up to the quality expected for use to transmit knowledge. It is inferred that most of the computer systems will be slow to run any object oriented programming software for practice. Even when the software is ran, practical self-efficacy of the learners in software will be low and the learners might not be able to connect to the Internet to get better understandings required. Oyelekan [14] found similar results from a study conducted in the two Colleges of Education in Plateau State. In addition, the findings of Olakulehin [17], Aduwa-Ogiegbaen and Iyamu [18], Yang [19] as well as Yusuf [15] found that in Africa, there is low access to basic ICT equipment, low internet connectivity, low participation in the development of ICT equipment, and even low involvement in software development.

Again, the study revealed that the ratio of available number of ICT facilities in terms of computer component from the two Colleges in relation to the study sample population was 11:41 (approximately 1:4). This implies that, one computer will be shared among a group of 4 students. Likewise, the ratio of functional computers to the respondent was 19:168 (approximately 1: 9). This

also translates to a functional computer to a group of nine students. Furthermore, the ratio of available number of computers in the COEs to the population of Computer Science Education students is 23:1. This translates to twenty three (23) students to use a computer. While the ratio of functional computers from the two Colleges of Education to the population of computer science students from the Colleges is 52:1. This implies that 52 pre-service teachers are to use one computer. According to NCCE document stipulation, two students to use one computer if any College is to float a Computer Science Education programme, as a minimum condition. In view of these findings, it is therefore apparent that, the Colleges are far from reaching the ICT facilities requirement for the programme. As such the learners might not have enough time to practice many practical related courses before they graduated. However, Warschauer [21] study found out that the overall ratio of students to instructional computers with Internet access in U.S. public schools as at 2008 was 1:3.

The finding also showed that 33.8% of Lecture Method (traditional method) was used by the lecturers to teach computer pre-service teachers, while 27.7% shows Lecture Method and other Teaching Methods used, 21.5% of Discussion Method, 3.1% of Demonstration Method, 12.3% Project Method, and 1.5% Practical demonstration Method was used. In view of these results, it shows that some of the strategies specified in NCCE document were poorly applied, such like practical demonstration method which indicates 1.5%. It can be drawn from the results that 61.5% of lecture method used by the computer teacher educators was not appropriate to train pre-service teachers on how to teach ICT as a subject. This is because traditional way of teaching is cannot adequately prepare learners to meet the 21st century challenges. With this, the pre-service teachers' hardware and software programming self-efficacy will be poor as they apply skills acquired to implement ICT curriculum at Junior Secondary Schools. As such, Alade [22] opined that there is an urgent need for a paradigm shift from theoretical teaching and literary application to a practical demonstration application of knowledge necessary for employment and skill development.

Finally, the study showed that 92.3% of the pre-service computer teachers had low proficiency in software components, 3.6% had average proficiency in software proficiency, 2.4% had good proficiency in software components and 1.8% of them had excellent proficiency in computer software component. While 66.7% had low proficiency in computer hardware components, 17.9% had average proficiency, 15.5% had good proficiency in computer hardware components and none had excellent proficiency in computer hardware

components. Yusuf [15] finding also reported low involvement in software development. Based on this finding, it can be concluded that the CSE pre-service teachers in Osun State Colleges of Education had low level of computer software and hardware component proficiency. This could in turn hinder the effective teaching of ICT literacy in Nigerian secondary schools.

6. Conclusion and Recommendations

The study concluded that the CSE pre-service teachers in Osun State Colleges of Education were not proficient in computer software and hardware component because they had low level of computer software and hardware component proficiency. It became apparent that there are factors responsible for the poor performance of the pre-service teachers in the learning of computer science education in Nigeria teacher education. These barriers also could be responsible for the setback being experienced in the teaching of ICT in Nigerian secondary schools. It is therefore recommended that the education stakeholders in Nigerian teachers' education to provide adequate ICT facilities, training opportunities for the teacher educators that will improve the learning of pre-service teachers, as well review the teacher education curriculum to be able to drive the 21st century education effectively in Nigeria.

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