

## Qualification and ICT Knowledge as Predictors of Technical Subject Teaching Competence of Teachers in Osun State, Nigeria

<sup>1</sup>Adebola Oladiji Alaba (Ph.D.), <sup>2</sup>Anthonia Ayobami Oyelade (Ph.D.), <sup>3</sup>Rukayat Oyebola Iwintolu (Ph.D.) & <sup>4</sup>Emmanuel Opeyemi Amusan

<sup>1</sup> Department of Educational Management, Osun State University, Osogbo, Nigeria, ORCID:0000-0003-2438-0338  
[alaba.oladiji@uniosun.edu.ng](mailto:alaba.oladiji@uniosun.edu.ng)

Tel: +2348055218260

<sup>2</sup> Department of Educational Management, Osun State University, Osogbo, Nigeria, ORCID:0000-0003-4814-5236  
[anthonia.oyelade@uniosun.edu.ng](mailto:anthonia.oyelade@uniosun.edu.ng)

Tel: +2348034729347

<sup>\*3</sup> Department of Arts & Social Science Education, Osun State University, Osogbo, Nigeria, ORCID: 0000-0001-7119-2634  
[rukayat.iwintolu@uniosun.edu.ng](mailto:rukayat.iwintolu@uniosun.edu.ng)

Tel: +2347064295728

<sup>4</sup> Ile-Ife Town, Osun State, Nigeria. Tel: +2347042635628

### Abstract

This paper examines the ability of educational qualifications and ICT knowledge to predict the teaching competence of teachers in the technical school setting in Osun State. A descriptive survey research design was adopted for the study. A sample of 40 teachers and 100 students in technical schools from two Local Government Areas (LGAs) were selected from Osun State which formed the participants for the study. Qualification and ICT knowledge were measured using assessment questionnaire and technical subject teaching competence was assessed by students' evaluation of their teachers' competencies in teaching with reliability coefficient of 0.85. Data were analysed using descriptive statistical tools such as mean, standard deviation, frequency counts and linear regression analysis statistic. The result revealed that teachers were proficient in using smartphones, email and internet; while they ranked disc player, film stripes, smart boards and projectors least among facilities they have proficiency in. The result revealed that students' evaluation of teachers' competence was low. The study also showed that teachers' qualification had a positive correlation with their teaching competence while their knowledge of ICT had a negative correlation with their competency in technical secondary schools in Osun State. It was recommended that technical schools should ensure that their teachers upgraded themselves in terms of qualifications, certification and knowledge in ICT in order to meet the demands of technical education.

**Key words:** Competence, ICT, Knowledge, Qualification, Technical subjects.

## 1. Introduction

The significance of information and communications technology (ICT) as a tool for nation-building is emphasized in Goal 17 of the United Nations' (UN) 2030 Agenda for Sustainable Development worldwide policy framework. As a result, the UN urges all of her members to include ICT in their nation building agenda. The body believed that ICT will enhance international cooperation in science, technology and innovation. In doing this, it will encourage developing countries in the world to promote development through transferring and disseminating of relevant information to their citizens without stress. This will further support their educational systems by promoting positive teaching-learning process in the classrooms and also enhance technical subject teachers' competence in their instructional delivery through the utilization of ICT (UN, 2015).

In the recent time, ICT has become an integral part of various sectors in Nigeria and this is because it occupies a central place in any growth and development discourse (Magesh, 2016). The Integration of ICT tools in education has brought a unified focus on how to improve teaching-learning process. This has made the teaching method to be shifted from conventional method to technological based method (Odekeye et al., 2023). ICT has the capacity to improve students' skills, inspire and engage them, help to connect school experiences to work practices, create economic viability for employees of tomorrow and strengthen teaching in order to change schools (Davis and Tearle, 2015). This may have prompted the decision of the Federal Government of Nigeria to make ICT as one of the three vocational electives subject at junior, senior secondary schools and technical colleges (NPE, 2014)

The explosion in the use of ICT in the last two decades has transformed individuals' livelihood, nature of jobs and job performance across various fields of endeavours positively. The rapid development and deployment of ICT in the workplace has made it necessary for education to be adapted to the ever-changing nature of the business and its demands. To achieve this, students' needs to be well-prepared with the knowledge and skills of ICT, so that they can also be relevant and capable of competing with their counterparts in technical and vocational education training. One of the most significant subsectors of the education system, both for national development and educational purposes, is technical school education. Since Technical and Vocational Education and Training (TVET) can produce highly qualified workers, integrating ICT into the classroom is essential to improving TVET graduates' quality and making them the most competitive among employers.

Technical school education is considered as an important sub-sector in the field of education as well as for the development of the country. Technical and Vocational Education and Training (TVET) has the capability of preparing high skilled workforce thereby making the integration of ICT in their classroom germane in order to enhance the quality of TVET graduates and make them the most sought-after by potential employers. However, to integrate ICT in TVET classroom, teachers must have the required skills. The assertion supported the study of Turgut & Aslan (2021), who identified factors affecting ICT integration in education as poor teachers' pedagogical competency and lack self-development. This was also in line with the view of Mahmud & Ismail (2010) who mentioned various factors affecting the integration of ICT as poor teachers' skills, inexperience, age of the

teacher, gender, teachers' level of qualification, the kind of training, availability of computers and administration support from the school management. Another study also carried out by Esfijani and Zamani (2020) found that there is adequate access to computers in school and home by teachers but incompetency of finding suitable software for teaching is one of their major challenges.

Consequently, the question of how well teachers is able to integrate such knowledge is brought forward. It is a common knowledge that limited level of validity in self-report studies are harnessed in research generally; this may have been attributed to an exaggerated self-esteem, conformity with work ethics among others. Therefore, there is need to allow other people to evaluate one's performances on the use of ICT in teaching-learning process without any bias. This would help in making good judgments in the level of competency and engagements. According to Asubiojo, & Ajayi (2017), techniques and procedures that can be used to assess teachers' level of competency, efficiency and effectiveness on the use of ICT in their teaching includes online questionnaires, class observation, peer evaluation, surveys, and analysis of student dropout rates, are used to assess instructors' proficiency in using ICT in their instruction.

Huang (2020) and Aramide et. al (2015) also maintained that data and feedback on teaching may be collected through evaluation done by students, colleagues or associates, and from self-evaluation data. Therefore, it is clearly evident that the idea of asking students to give feedback on the quality of the teaching that they receive has been established for almost a century. Likewise, Moila & Makgato (2014) asserted that it is inevitable that students at all levels pass judgments on teachers or

faculty teaching effectiveness, personality and commitment premised on the fact that students are obviously the direct and immediate consumers of the teaching process.

## 2. Literature Review

According to Marcial & Rendal (2014), Information and Communication Technology (ICT) competency is described as proficiency in knowledge and skills on how to use ICT tools effectively and efficiently thereby placing prominence on ICT competency among teachers as one of the determinants of achieving the objectives of using ICT in teaching and learning education. Agbo (2015) showed that ICT competency is one of the factors that encourage the use of ICT in education. An ICT-competent person is expected to have sound basic knowledge of how to operate any ICT equipment. As a result, ICT competency has emerged as a priority for individuals who wish to use ICT to perform various tasks.

According to Jentsch & König (2022), teachers' competence is seen as one of the factors that can explain how best the students can learn. This also supported the findings of Motshegwe and Batane (2015), who found significant difference between students taught by professional teachers and those taught by non-professional teachers. It further showed that experienced teachers performed better than inexperienced teachers. Therefore, implying teaching qualification as prerequisite for entry into the teaching profession. Also, Apriliyanti (2020), opined that teachers' qualities should be made up of four main competencies: pedagogical, Professional, social and personality competencies; while teachers' attitude, teachers' skills and teachers' self-efficacy in the use of technology are essential human

factors that determines the integration of ICT in the classroom (Clipa, et al, 2023). Other material factors that enhance quality integration on ICT by the teachers in the classroom during teaching and learning process include technical assistance, stable internet connections, and availability of appropriate equipment (Kaware & Sain, 2015; Belay et al 2020; Seifu, 2020).

A study by Ukah & Odey (2018) found that there was no significant influence of mathematics teachers' attitude towards ICT facilities and their teaching effectiveness in public senior secondary schools in Cross River State, Nigeria. Their findings also revealed that facilities utilization had no significant influence on mathematics teachers' effectiveness in public senior secondary schools in the state. Furthermore, Bariu, Chun, and Boudouaia (2022) conducted a study on the influence of teachers' competencies on ICT implementation in Kenyan universities. The result shows that teachers' competencies are crucial in the implementation of ICT in schools and that teachers' competencies increase as teachers employ software tools when teaching. The study revealed significant evidence that teachers' competencies influence ICT implementation. Sailer, Stadler, Shultz-Pernice, Franke, Schoffmann, Paniotova, Husagic and Fisher (2021) reported direct relationships between self-assessed skills in teaching with technology and the self-reported initiation of subject learning activities. The scholars also observed that positive attitudes towards ICT-related teaching promote positive relationships with the initiation of learning activities involving digital technologies.

Fuente and Binas (2020) conducted a study on teachers' competence in ICT as an educational tool in teaching. The study which purposively selected

seventy-two teachers who are competent in the use of ICT basics, word processing, spreadsheets, presentation, information, and communication, computer ethics and security in Philippines found that ICT integration is of necessity for interactive classroom teaching, meaningful impartation of knowledge by teachers and increase in quality of education. The study recommended professional development to enhance teachers' confidence in the use of ICT in teaching in the classroom in order to strengthen teacher's attitudes in the use of technologies in the teaching-learning situations. In addition, it was discovered that ICT makes other work of the teachers simple, creates more time for other engagements and is generally better than the traditional methods of teaching-learning and administrative work of the teachers.

Ghavifekr et. al (2016) in a study involving teachers in Malaysia discovered that teachers are of the view that teacher competencies in the use of ICT in their classroom instructions can be enhanced by the provision of necessary ICT infrastructure and regular training. Okolije (2016) carried out a study on knowledge, accessibility and use of ICT among students and teachers; it revealed that more could be done in the use of ICT in classroom instruction among teachers in the institution. The teaches' use of ICT could be enhanced by exposing them to modern and evolving technology for a better interaction and coverage.

Evidently, from the foregoing, the use of ICT in the teaching of technical subjects cannot be overemphasized. Technology transfer cannot be achieved without the use of internet, computer and other information communication technology related materials. These call for teacher competencies in the use of ICT in teaching technical subjects in secondary schools since it has

been established that teacher competencies have a direct relationship with the training teachers received before qualifying to teach such subjects and qualifications of teachers have been found to impact positively on teaching generally. This study therefore examined teachers' qualification and ICT knowledge as predictors of teacher competency in teaching technical subjects in secondary schools in Osun State.

### 3. Research Objectives

The specific objectives of the study are to:

1. Examine teachers' knowledge of ICT in technical secondary schools;
2. Investigate students' evaluation of teachers' technical subjects teaching competence;
3. Determine if qualification and knowledge of ICT of teachers will predict their technical subjects teaching competence.

### 4. Research Questions

For this study, three research questions were raised:

1. What is the teachers' knowledge of ICT in technical schools?
2. How do students evaluate their teachers' technical subject teaching competence?
3. Will qualification and knowledge of ICT of teachers predict their technical subjects teaching competence?

## 5. Methodology

### 5.1. Methods

Descriptive survey research design was adopted for the study. This design allows for generalization of findings to a representative sample.

### 5.2. Background Information

The instrument was administered to teachers and senior school students in technical secondary schools in Osun state, Nigeria. This is because not all secondary schools have bias for technical studies. Forty teachers (i.e., 89%) and one hundred students (i.e., 95%) were used for the analysis out of the forty-five and one hundred and five questionnaires distributed, while attrition rate was 11% and 5% respectively. Statistical Package for Social Sciences (SPSS) software, version 20 was used to process and analyse the data. Data collected and collated were analysed using descriptive and inferential statistics.

### 5.3. Participants Population

The participants that formed the population for the study comprised students and teachers in technical secondary schools in Osun State. Two Local Government Areas (LGAs) that has technical schools were purposively selected for the study. Teachers and students were randomly selected from two technical schools; while twenty (20) teachers and fifty (50) students were selected from each school, totaling 40 teachers and 100 students. Of the student sample, 88% were males; 24% of the students were 15 years old, 20% were 13 years, 14% were 14 years, 13% were 16 years, 11% were 18 years, 2% were 19 years, while 10, 11 and 21 years old have the least percentage which is 1%. For the teachers on the other hand, 67.5% were males while 32.5% were females; 57.5% were B.Sc holders, 17.5% has M.Sc, 17.5% were NCE holders while 7.5% had other certificates. 25.5% of the teacher had 3 years of working experience, 17.5% had 5 years of working experience 15.0% have 6 years working experience of, 12.5% has 4years, 7.5 of them had 7 years of work

experience, 5.0% have 10 years of working experience, 5.0 had 1 years' experience, 5.0 have 2 years' experience and another 5.0 had 3 months' experience.

### 5.4 Procedure

Permission was sought from the principals of the secondary schools of interest were to administer the instruments to teachers and students. In the process of administering the questionnaire, the researchers were physically present to attend to any questions teachers and students may wish to ask. Data were collected within three weeks of commencement.

### 5.5 Instrumentation

Two instruments were constructed for the study. One self-report (for teachers) titled "Teachers' ICT knowledge questionnaire" and evaluation of teaching competence (for students) titled "Evaluation of Teachers' Competence Questionnaire" were used to gather data in this research work. The questionnaire for teachers was sub divided into two sections; Section A contained personal information of the respondents such as sex, age, educational qualification, teaching experience etc. While section B contained questions on the teachers' ICT knowledge. The response options ranged on a 3-point proficiency scale of 'I do not know how to use it' scored 0; 'I use it occasionally' scored 1 and 'I use it always' scored 2. The questionnaire for students was sub divided into two sections; Section A contained personal information of the respondents such as sex, age, class etc. While section B contained questions on the students' evaluation of their teachers' teaching competence. The instrument was structured on a five-point Likert rating scale of

Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The reliability of the instrument was established through internal consistency. The questionnaire was administered on twenty students in a technical college different from the target sample and an alpha reliability index of 0.85 was obtained.

## 6. Result and Analysis

**Research Question 1:** What are the teachers knowledge of ICT in technical schools in Osun State? To answer this research question, items on teachers' knowledge of ICT through their endorsement of their proficiency in the use of ICT facilities were analysed. The results are presented in Table 1

**TABLE 1: teachers' knowledge of ICT in technical schools**

| S/N | ICT Facilities   | I do not know how to use it | I use it occasionally | I use it always | Mean | SD   |
|-----|------------------|-----------------------------|-----------------------|-----------------|------|------|
| 1   | Desktop computer | 4(10.00)                    | 14(35)                | 22(55)          | 2.45 | 0.68 |
| 2   | Laptop           | 4(10.0)                     | 9(27.5)               | 27(62.5)        | 2.53 | 0.68 |
| 3   | Tablet PC        | 4(10.0)                     | 9(22.5)               | 27(67)          | 2.58 | 0.68 |
| 4   | Smart phones     | 2(5.0)                      | 4(10.0)               | 34(85.0)        | 2.80 | 0.52 |
| 5   | Projector        | 13(32.5)                    | 15(37.5)              | 12(30.5)        | 1.98 | 0.80 |
| 6   | Scanner          | 11(27.5)                    | 17(42.5)              | 12(30.0)        | 2.03 | 0.77 |
| 7   | Smart boards     | 14(35.0)                    | 15(37.5)              | 11(27.5)        | 1.93 | 0.79 |
| 8   | Television       | 2(5.0)                      | 16(40.0)              | 22(55.0)        | 2.50 | 0.60 |
| 9   | Video tapes      | 7(17.5)                     | 15(37.5)              | 18(45.0)        | 2.28 | 0.75 |
| 10  | Email            | 2(5.0)                      | 5(12.5)               | 33(82.5)        | 2.78 | 0.53 |
| 11  | Internet         | 5(12.5)                     | 5(12.5)               | 30(75.0)        | 2.63 | 0.70 |

|    |              |          |         |         |      |      |
|----|--------------|----------|---------|---------|------|------|
| 12 | Film stripes | 26(65.0) | 7(17.5) | 7(17.5) | 1.53 | 0.78 |
| 13 | Disc player  | 25(62.5) | 6(15.0) | 9(22.5) | 1.60 | 0.84 |

Table 1 shows the frequency counts, percentages, means and standard deviations of the responses of the respondents to the items. The result revealed that mean of the responses of the respondents to the items ranged from 1.53 to 2.80 respectively while their standard deviation ranges from 0.52 to 0.84. In rating the tools, out of 100%, the results shows that 32.5% of the teachers do not know how to use projector, 37.5 can use it occasionally, only 30.5% of them can use it always. The results further revealed that 62.5% of the respondents do not know how to use disc player, 15.0% can only use it occasionally, while only 22.5% can use it always. It also shows that 65.0% of the respondents do not know how to use film stripes, 17.5% can use it occasionally and always. In summary, the results revealed that disc player, film stripes, smartboards and projectors were the least ranked facilities that technical school teachers have proficiency in.

**Research Question 2:** what is students’ evaluation of their teachers’ technical subject teaching competence?

In answering this research question, responses of the students to the items on the instrument were analyzed, percentage, means and standard deviations of each of the items are represented in table 2 below. Decisions as to students’ responses to items on teachers’ competence were based on the benchmark of 2.50. To achieve this, average of the numerical points for the response options were obtained as  $(4+3+2+1)/4$ . In which 4 stands for Strongly Agree, 3 stands for Agree, 2 stands for Disagree, and 1 for Strongly Disagree. Items with

mean score of 2.50 and above were regarded as students’ evaluation of teachers’ competence, while items with mean score below 2.50 were not regarded as students’ evaluation of teachers’ competence. The results are presented in Table 2.

**TABLE 2: students’ evaluation of technical subject teaching competence of teachers**

| S/N | Items   | SA       | A        | SD       | D        | Mean | SD   |
|-----|---|----------|----------|----------|----------|------|------|
| 1   | Design and relates classroom content to the lab content in technical subjects         | 2(2.0)   | 4(4.0)   | 54(54.0) | 40(40.0) | 1.70 | 0.70 |
| 2   | Efficiently incorporate and employ ICT in teaching                                    | 37(37.0) | 49(49.0) | 5(5.0)   | 9(9.0)   | 1.70 | 0.83 |
| 3   | Has a good command of the content of technical courses                                | 53(53.0) | 37(37.0) | 8(8.0)   | 2(2.0)   | 1.81 | 0.83 |
| 4   | Present the minimum content of him/her subject matter tailored to students’ knowledge | 36(36.0) | 48(48.0) | 11(11.0) | 5(5.0)   | 1.79 | 0.97 |
| 5   | Encourage student interest and motivation to learn technical courses                  | 47(47.0) | 39(39.0) | 11(11.0) | 3(3.0)   | 1.86 | 0.92 |
| 6   | Allow and encourage students’ participation   | 48(48.0) | 42(42.0) | 7(7.0)   | 3(3.0)   | 1.75 | 0.82 |
| 7   | Promote team work   | 49(49.0) | 33(33.0) | 11(11.0) | 7(7.0)   | 1.96 | 0.92 |

|    |  |          |          |          |        |      |      |
|----|--|----------|----------|----------|--------|------|------|
|    | among students   |          | 3.0)     |          |        |      |      |
| 8  | Maintain an objective and respectful position with students  | 45(45.0) | 42(42.0) | 8(8.0)   | 5(5.0) | 1.79 | 0.87 |
| 9  | Inform students of competencies they will be expected to acquire   | 38(38.0) | 51(51.0) | 5(5.0)   | 6(6.0) | 1.65 | 0.81 |
| 10 | Provide students with scientific information that allows them to gain a better understanding of technical subjects | 45(45.0) | 43(43.0) | 8(8.0)   | 4(4.0) | 1.77 | 0.86 |
| 11 | Applies the established curriculum with a certain amount of flexibility in teaching                                | 43(43.0) | 39(39.0) | 15(15.0) | 3(3.0) | 1.94 | 1.01 |
| 12 | Use material resources that facilitate learning  | 43(43.0) | 39(39.0) | 11(11.0) | 7(7.0) | 1.90 | 0.95 |
| 13 | Interacts satisfactorily with the students when teaching   | 49(49.0) | 37(37.0) | 10(10.0) | 4(4.0) | 1.87 | 0.90 |

Table 2 above shows the frequency counts, percentages, means and standard deviations of the items. The result revealed that the mean of responses of the respondents to the items ranged from 1.65 to 1.90 respectively, while the standard deviation of their responses to the items ranges

from 0.70 to 1.01. This indicates that students' evaluation of teachers' competence is low.

**Research Question 3:** will qualification and knowledge of ICT of teachers predict their technical subjects teaching competence?

A linear regression analysis of the influence of qualification and knowledge of ICT on teachers' competence in teaching technical subjects was explored and presented in table 3.

**TABLE 3: model summary and coefficients of qualification and knowledge of ICT in predicting teaching competence**

| Model summary   | Unstandardized Coefficients | Std. Error | Standard. Coefficient | T     | Sig. |
|---|-----------------------------|------------|-----------------------|-------|------|
| R = 0.128<br>R <sup>2</sup> = 0.016<br>Adj. R <sup>2</sup> = -0.037 | B                           |            | Beta                  |       |      |
| (Constant)  | 23.686                      | 3.435      |                       | 6.895 | .000 |
| Qualification   | .837                        | 1.092      | .126                  | .767  | .448 |
| Know. of ICT  | -.041                       | .159       | -.043                 | -.260 | .797 |

Information from Table 3, showed Pearson correlation index (R = 0.128a) between predictor variables and actual scores of teaching competence, the squared multiple correlation (R<sup>2</sup> = 0.016) and adjusted squared multiple correlation (R<sup>2</sup><sub>adj</sub> = -0.037). This indicated that this model accounted for a negative 3.7% of variance in teaching competence of teachers.

Review of the beta weight in the table specified that, none of the predictor variables significantly contributed to the model; Qualification  $\beta = 0.837$ ,  $t = 0.767$ ,  $p > 0.05$ ; and know. of ICT  $\beta = -0.041$ ,  $t = -0.260$ ,  $p > 0.05$ . The results showed that teachers'

qualification had a positive correlation with teaching competence of teachers while their knowledge of ICT had a negative correlation with the competence of teachers in technical secondary schools in Osun State.

Based on information from Table 3, the equation for the regression line is:

$$\text{Teaching Competence} = 23.686 + 0.837(\text{Qualification}) - 0.041(\text{Know. of ICT}).$$

## 7. Discussion

The findings of the study revealed that teachers were proficient in using smartphones, email and internet; while they ranked disc player, film stripes, smart boards and projectors, the least, among the facilities have proficiency in. This is evident that the teachers only had general knowledge of ICT for information and communication. Despite the emphasis placed on the use of ICT and the necessity of teachers' competencies in the teaching-learning process, as found by Agbo (2015); Ghavifekr et. al (2016); & Okolije (2016) that ICT competency is one of the factors that encourage the use of ICT in education. The result of this study is a pointer to the fact that the teachers are not competent in the use of ICT for teaching in technical schools. The result is further supported by Fuente and Binas (2020) who conducted a study on teachers' ICT competence in the teaching and learning process. The study recommended that teachers enroll in professional development programmes to increase knowledge and boost their confidence in the use of ICT for teaching. This finding may be premised on the previous finding of teachers on the knowledge of ICT facilities.

Furthermore, the results revealed that teachers' qualification had a positive correlation with

teaching competence of teachers while their knowledge of ICT had a negative correlation with the competence of teachers in technical secondary schools in Osun State. This finding is in line with the study done by Sailer, Stadler, Shultz-Pernice, Franke, Schoffmann, Paniotova, Husagic and Fisher (2021) reported direct relationships between self-assessed skills in teaching with technology and the self-reported initiation of subject learning activities. The scholars also observed that positive attitudes towards ICT-related teaching promote positive relationships with the initiation of learning activities involving digital technologies. The study further showed that experienced teachers performed better than inexperienced teachers. The study concluded that teaching qualification must be seen as precondition for entry into the teaching profession. The finding is also corroborated by Bariu, chun, and Boudouaia (2022) on influence of teachers' competencies on ICT implementation in Kenyan universities; they found that teachers' competencies are crucial in the implementation of ICT in schools and that teachers' competencies increases as the teachers' uses and employ software tools when teaching.

## 8. Conclusion and Recommendations

The study which investigated the qualification and ICT knowledge as predictors of technical subject teaching competence of teachers in Osun State has found out that teachers were proficient in using smartphones, email and internet; while they ranked disc player, film stripes, smartboards and projectors least among facilities they have proficiency in. It also revealed that students' evaluation of teachers' competence is low; while teachers' qualification had a positive correlation with teaching competence of teachers and their knowledge of ICT had a negative correlation with

the competence of teachers in technical secondary schools in Osun State.

**Based on the findings of the study, the following recommendations were suggested:**

1. To enhance teachers' skills in ICT, the researchers recommend the inclusion of ICT skills in the curriculum of in-service teachers to strengthen their ICT competency.
2. Government should organize orientation workshop that will enlighten the technical School teachers how to use ICT facilities effectively.
3. Government should provide adequate funding of technical schools to improve the present condition of ICT in TVE
4. There is need to improve power supply and internet connectivity that will help in sustaining ICT utilization for maximum satisfaction for technical students and teachers

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