Teachers' Required Competences in the Use of Icts in Situated and Cooperative Learning Strategies in Technical Colleges

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Abstract: *This study identified the competencies required by teachers in the use of ICT in situated and cooperative learning strategies in technical colleges in Abia state, Nigeria.. The design for the study was descriptive survey, using Borich's needs assessment model. The population for the study was fifty teachers of the technical colleges. The instrument for data collection was a structured questionnaire divided according to the four research questions used. Two null hypotheses were tested at .05 level of significance using ANOVA and t-test statistic respectively. The mean was the statistical tool used to answer the research questions. Three experts validated the instrument. One of the twelve improvements from the study is helping students to analyze assignments of other group of students using personal computers. The disclosure of the ANOVA is that there is no significance difference among mean responses of teachers with varying years of teaching experiences on the competencies needed in the use of ICTs in situated learning strategies in teaching vocational subjects. Based on the findings, it was recommendeds that ICT courses should be studied and implemented in TVE programmes.*

I. Introduction

Humans have used technology in various spheres of life to harness the natural resources provided in the earth. It is obvious that the use of technology creates challenges, but has benefits as well. One of the benefits is its ability to make the world become a global village. This, it has done through its ability to facilitate the sharing of information globally. This phenomenon is facilitated by the use of Information and Communication Technology (ICT).

ICT is anything which allows people to get information, to communicate with each other, or to have an effect on the environment using electronic or digital equipment (Rachel, 2004). The term ICT could include computer hardware and software, digital cameras and video cameras, the internet, telecommunication tools, programmable toys, and many other related devices and resources. The Computer which is an electric machine for receiving, manipulating, storing and retrieving information, can aid teaching and learning in several ways. Information can also be acquired from the computer faster than flipping through the pages of a book, going through catalogues in the library or any other conventional method of acquiring information. Information that is saved in any storage device of the computer such as flash drive, floppy diskette or in the Central Processing Unit (CPU) can be retrieved at a tremendous speed in the computer. It is a matter of calling up the information through the input hardware such as the keyboard and mouse, in the file or web address it was saved. The teacher can use computer packages such as word processing to store students' progress report, MS-Access to manage the students' registers, MS-Excel to calculate their achievement; Auto-cad, Archi-cad and CorelDraw to teach technical drawing. Recent and updated global information from several people can easily be accessed through the internet using the computer.

Other ICT devices relevant in teaching vocational subjects include television, radio, and cassette player. Television and radio are media which help different students to gain information from several resource persons. The television is an audio-visual device which sensitizes the senses of listening and sight. Cassette player helps a student to record audible information and also to play it repeatedly as the student wants. These devices help to enhance the teacher's teaching strategies of vocational subjects. These teaching/learning strategies include situated learning and co-operative learning strategies among others.

Situated and cooperative learning strategies involve teaching more than a single student at a time. Situated learning strategies which is based on situativity theory involves changing the culture of schools so that teaching is a more public practice open to regular discussion among peers (Spillane, 2002). Situativity theory, according to Barab and Duffy (2000), emphasizes learning occurring within a particular social environment, through group discussion, shared understanding and input, as well as practical activities to work with new ideas. Situated learning can be achieved when a teacher gives an assignment, and encourages the students to surf for the information, maybe be from the Internet, and have discussion on the topic among themselves before solving the assignment individually.

A related teaching strategy to situated learning is cooperative learning in that both emphasize group work among students. Blosser (1993) defined cooperative learning as a teaching strategy that encourages

student's success by alleviating overt competitiveness and substituting group encouragement. There is however, a subtle difference between situated learning strategy and cooperative learning strategy in that the former may encourage different goals among the students even as they work in group, while the later encourages the individuals to work with their peers to achieve a common goal rather than competing against their peers or working separately from them. Cooperative learning can be achieved when a teacher group the class and gives each group different assignment allows the group to discuss among them and come up with answer/s according to each group, rather than individually. Each group may have a group representative that would share the decisions of the group. These study strategies can work well in vocational subjects.

The vocational subjects offered in technical colleges include: Office technology, Accounting, Welding and Fabrication, Metalwork, Foundry and Forging, Machine Practice, Technical Drawing, Electronics, Building construction, Woodwork, Auto mechanics work, Electrical Installation, Poultry, Fish farming, Word processing and Data processing. These subjects are designed to achieve the goals of technical and vocational education in Nigeria. One of which is to give training and impart the necessary skills to individuals who shall be self-reliant economically (Federal Republic of Nigeria (FRN), 2004). These individuals, who shall be self-reliant economically, need theoretical and practical skills which technical information, through ICT would provide. In order to acquire these information faster, the federal government introduced national virtual library project which has some of its objectives as: improvement of the quality of teaching and research at all levels of education in Nigeria through the provision of current books, journals and other library services and; enhancement of scholarships, research and lifelong learning through the establishment of permanent access to shared digital archival collections. To achieve this, government provided appropriate Information and Communication Technology (ICT) facilities, (FRN 2004). Sourcing information on the digital archival collection can be faster than going through manual library catalogues. The implementation of the provisions of the policy can be made possible by the teachers.

Teachers as facilitators of learning are faced with challenges of doing so. They involve themselves on various instructional strategies to achieve the aim of facilitating learning. Technology which humans invented to facilitate their activities has been introduced to teaching and learning. Information can be communicated among individuals and groups of individuals through technology, even in education. This information communication through technology is known as information and communication technology (ICT). ICT, according to Ajagun (2003), encompasses different types of technologies which are utilized for processing, transmitting or communicating data and information. The author went on to state that tools such as computers, internet, interface boxes, email varieties of software and materials form important aspects of ICT. These tools can be effectively used in education to facilitate learning.

The Federal government of Nigeria, in 2004 introduced ICT in various aspects of her educational services. The ICT can facilitate some instructional strategies in improving study such as in technical and vocational education (TVE). One of such instructional strategies is situated learning and cooperative learning strategies. Bill (2004) put forward three principles of effective online pedagogy in situated learning strategies which facilitate faster means of acquiring information. They include: Firstly, letting the students do most of the work through: student led discussion; finding and discussing web resources; helping each other learn (peer assistance), grading their own homework assignments, and analyzing case studies. Secondly, interactivity is at the heart and soul of effective asynchronous learning involving: collaborative research papers and team projects. Thirdly, striving for presence including: social presence; cognitive presence, and teaching presence.

Analyzing the aforementioned learning strategies or principles as it relates vocational subjects include for instance, students' discussions in the internet such as through yahoo messenger chatting, facebook and other social networks. This could help them discuss vocational subjects. The students become aware of the right words not only in pronunciation (as in web conferencing) but also in the right spellings (as in the written chatting). The ideas and information they gain from their peers would be faster than when they learn individually. Through such discussions, they suggest to each and among themselves the web address they would gain more information from during their personalised instruction, thereby helping each other to learn faster. Another instructional strategy which would arouse the students' interest in vocational subjects using ICT is the cooperative learning strategies.

Cooperative learning strategy would increase the student's interest in vocational subjects. Johnson (2009) define cooperative learning strategy as the instructional use of small groups so that students work together to maximize their own and each other's learning that encourages students' success by alleviating overt competitiveness and substituting group encouragement, would increase these students' interest in vocational subjects. The ICT instructional strategies or principles of cooperative learning are basically the same as that of the situated learning strategies, but the teaching methods differs. Cooperative learning strategies can easily be achieved through project method, which refers to any method involving practical problem that involves the physical making of a product (Nwachukwu, 2006). The students work together to accomplish the project. Within cooperative activities, individuals seek outcomes that are beneficial to themselves and beneficial to all

other group members. Class members, after receiving instruction from the teacher, are organised into small groups (two-six) that are mostly heterogeneous.

The heterogeneity includes academic achievement, gender, ethnicity, task orientation, ability and learning style. They then work through the project until all group members successfully understand and complete it. There is a positive interdependence among students' goal attainments; students perceive that they can reach their learning goals if the other students in the learning group also reach their goals (Johnson, 1989). They will be interested to learn more of vocational subjects as no one group member possess all information, skills or resources necessary for the highest possible quality project. Presently, the teachers of vocational subjects in technical colleges in Abia State, Nigeria do not use ICT in situated and cooperative learning strategies in teaching the students. The ICT policy in Nigeria encourages the teachers to use ICT facilities in teaching the students. There is therefore the need that the teachers are aware of different teaching strategies or principles which ICT could be used to facilities teaching. Situated and cooperative learning strategies are few among many strategies which ICT could be used in teaching the students.

II. Statement Of The Problem

It has been observed that there is poor performance among graduates of technical colleges in Abia State, Nigeria, in the National Technical Certificate Examination (NTCE) in recent times (Okonkwo, 2010). NTCE is the examination taken by the graduates of technical colleges in Nigeria. There are many factors which could cause the poor performance of the students. Not having enough information before the examination could be one of them. It could be observed that in technical colleges, students are exposed to several subjects. The information to be acquired is so vast for just three years, which is the duration a student should spend in technical college in Nigeria. Most take home assignments are given by teachers to the students in order to increase the information the students acquire. The sourcing of the information for solving the take home assignments are faster when ICT is used in situated and cooperative learning by the students than when they source it manually, and in most cases individually. The information the students need to acquire in order to succeed academically demands faster means of acquiring them, because the faster they gain the information, the greater the amount of information they will acquire (all things being equal). It is unfortunate to state that the learning experiences of these students are slow. For instance, they waste time going to the library to source for information they would have easily got through technological means. The question now is how would these students gain this practical and theoretical knowledge sufficiently in the short period of technical school? Secondly, Elekwa (2011) found out that there is poor performance of technical college graduates due to their lack of interest in vocational subjects. The next question here is how would these students improve their interest in vocational subjects? The interest of the students can be aroused when using ICT in situated and co-operative learning strategies or principles. However, the transmitters of knowledge need to be equipped with the competencies so that the learning strategies will be effective. Therefore, this study sought to determine the competencies required by teachers, to use ICT in situated and cooperative learning strategies in technical colleges in Abia state, Nigeria. To achieve this, the study specifically sought to determine:
1. The competencies required by teachers for utilizing ICT in situated learning strategies.
2. The level of competencies teachers can exhibit in utilizing ICT in situated learning strategies in technical colleges in Abia State.
3. The competencies required by teachers for utilizing ICT in cooperative learning strategies.
4. The level of competencies teachers can exhibit in utilizing ICT in cooperative learning strategies in technical colleges in Abia State.

Research Questions
1. What are the competencies required by teachers for utilizing ICT in situated learning strategies in teaching vocational subjects?
2. What are the levels of competencies teachers can exhibit in utilizing ICT in situated learning strategies in technical colleges in Abia State?
3. What are the competencies required by teachers for utilizing ICT in cooperative learning strategies in teaching vocational subjects?
4. What are the levels of competencies teachers can exhibit in utilizing ICT in cooperative learning strategies in technical colleges in Abia State?

Hypotheses:
H_{O1}: There is no significant difference in the mean responses of teachers with varying years of teaching experiences on the competencies required by them for the use of ICT in situated learning strategies in teaching vocational subjects.

H_{O2}: There is no significant difference between mean responses of male and female teachers on the competencies required by them in cooperative learning strategies in teaching vocational subjects using ICT.

III. Methodology

The study adopted descriptive survey research using Borich needs assessment model. Borich 1980 needs assessment model requires that a mean weighted discrepancy score be calculated for each item, competency or activity included in the needs assessment. A discrepancy can be calculated by comparing the participants' behaviours, skills, and competencies, with the goals of the programme: "a discrepancy analysis that identifies the two polar positions of what is and what should be". Further, a comparison could be made to determine a group of individuals' perceived level of competence to complete a task, with their desired level of competence to complete a task. Descriptive survey research was used because the opinions of the teachers are sought. Since the levels of competence required by the teachers are also sought, Borich needs assessment model was used. The population for this study comprises of 50 vocational subject teachers in technical colleges in Abia State of Nigeria. Among these 50 teachers, 12 computer studies teachers answered the required category, since they are experts in the use of ICT.

The instrument for data collection for this study was structured questionnaire and it consisted of 12 items. The questionnaire was face-validated by three experts. Cronbach Alpha method was used to determine the internal consistency of the instrument, which yielded a reliability coefficient index of 0.93. The index of 0.93 indicated that the instrument is reliable. The questionnaire has two columns of required category and level of competence that can be exhibited as follows: Very Highly Required (VHR)/ Very High Performance (VHP) - 5, Highly Required (HR)/ High Performance (HP) - 4, Averagely Required (AR)/ Average Performance (AP) - 3, Slightly Required (SR)/ Low Performance (LP) - 2, and Not Required (NR)/ Very Low Performance (VLP) - 1.

In answering the four research questions, weighted mean and Improvement Needed Index (INI) were used. The mean was utilized in answering research questions 1 and 3; while INI was utilized to analyze data on the level of competencies required by the teachers (research questions 2 and 4). Any item with a mean rating of 3.50 and above is considered required, while any item with a mean rating below 3.50 is regarded as not required. The difference between each required mean (xn) and mean of level of competence (xp) a teacher can exhibit, were calculated (xn-xp). This gave the value that indicated whether the item is required or not. A positive difference indicates that the item is required by the teacher. Analysis of variance (ANOVA) and t-test statistic were used to test null hypotheses 1 and 2 respectively at 0.05 level of significance and appropriate degrees of freedom. At each case, the null hypothesis is upheld if the significant value or p-value is greater than 0.05 (the level of significance at which the hypothesis was tested).

IV. Results

The results are presented according to the research questions and hypotheses that guided the study.

Research Questions 1 and 2

What are the competencies required by teachers and the levels of competencies they can exhibit for utilizing ICT in situated learning strategies in teaching vocational subjects in Abia State?

Table 1: Mean Responses of Teachers on Competences required and possessed in situated learning teaching strategies using ICT

S/N	Item Statement	x̄N	x̄P	x̄N-x̄P	Remark
1	Handling online discussion classes	4.89	2.87	2.02	Required
2	Accessing student group discussions on web resources relevant to vocational information	5.00	2.74	2.26	Required
3	Handling web conferencing among students of related interest from other geographical area	4.98	2.64	2.34	Required
4	Using ICT to solve exercises collectively among students which they were unable to solve individually	4.67	2.65	2.02	Required
5	Using web discussion to help students discover their strengths and weaknesses	4.90	2.87	2.03	Required
6	Helping Students to analyze assignments of other group of students using personal computers	4.65	1.90	2.75	Required

Table 1 shows that competency is required for improvement in all the items by the teachers.

Research Questions 3 and 4

What are the competencies required by teachers and the levels of competencies they can exhibit for utilizing ICT in cooperative learning strategies in teaching vocational subjects in Abia State?

Table 2: Mean Responses on Teachers Competences in cooperative learning teaching strategies using ICT

S/N	Item Statement	$\overline{x}N$	$\overline{x}P$	$\overline{x}N$-$\overline{x}P$	Remarks	
7	Ability to record discussions in vocational subjects in a cassette	4.56	2.32	2.24	Required	
8	Ability to use Auto-cad and Archi-cad to construct technical drawings	5.00	1.34	3.66	Required	
9	Ability to use Multimedia authoring tools such as web-based authoring tools to enable groups of students to work together as a team to complete their projects	4.35	1.00	3.35	Required	
10	Ability to develop a simulated instructions and suggesting the best simulated approach to solve a presented assignment	4.89	1.03	3.86	Required	
11	Ability to learn vocational contents through group activities and work as a team to achieve the learning goals through the provisions on the web	4.67	1.34	3.33	Required	
12	Ability to display group leadership and responsibilities for work given ICT devices	5.00	4.30	0.70	Required	

Table 2 shows that competency is required for improvement in all the items by the teachers.

Table 3: ANOVA of the responses of the Teachers, based on their Experiences, on the Competencies needed in the use of ICT Devices in situated teaching strategies

n- 17(0-5 years); 6(6-10 years); 5(11-15 years); 4(16-20 years); 6(21-25 years); 8(26-30 years); and 4(31-35)

Source of Variance	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	0.9135	6	0.152	0.035	0.34
Within Groups	185.334	43			
Total	186.2475	49	4.310		

n= number of respondents

The data in the Table 3 shows that the significance value (p-value) is 0.34, which is greater than 0.05, indicating that there was no significance difference in the mean ratings of responses of the teachers, based on their experiences, on the competencies needed in the use of ICT in situated teaching strategies. The null hypothesis (Ho$_1$) is therefore upheld.

Table 4: t-test of the responses of male and female Teachers on the Competencies needed in the use of ICT Devices in cooperative teaching strategies

	T	Df	Sig.	Mean difference	Std. Error Difference	95% interval of the difference Lower	Confidence upper
Male	1.164	11	.234	.434	1.352	-3.433	1.233
Female	.443	22		.544	1.233	3.455	2.34

The data in the Table 4 shows that the significance value (p-value) is 0.23, which is greater than 0.05, indicating that there was no significance difference in the mean ratings of responses of the teachers, based on their gender, on the competencies needed in the use of ICT in cooperative teaching strategies. The null hypothesis (Ho$_2$) is therefore upheld.

V. Discussion

The findings as presented in Tables 1 and 2 showed that improvement is required in all the 12 items. Table 1 showed that competencies are required by teachers for utilizing ICT in situated learning strategies in teaching vocational subjects in Abia State. This is in consonance with the findings of Mills (2011), Schell and Black (2000) who found out that situated learning is effective in social networking and collaborative learning respectively. This signifies that students should have discussion class on information they got from resource persons through a mass media, internet or any other ICT devices. In that discussion, they should suggest among themselves on resources relevant to vocational information. The teacher should guide them in order not to be distracted by the provisions of the internet, some of which are detrimental to their moral and academic health. Adikpe (2004) found out that the internet displays or advertises crime, sex and other anti-social materials that students can imbibe. It therefore becomes important that students' activities in the web should be monitored, not only by their teachers but also by their parents and other stakeholders in their upbringing. Teachers on their part should ask the students to bring the information they got for scrutiny. They should be advised to involve themselves in a web conferencing with other students of related interest from other geographical area. This will enable them learn and be aware of recent technology globally. Other implicit benefit of web conferencing which Adikpe (2004) referred to as on-line communication, helps youths, students inclusive, to enjoy global friendship with other youths. When they are exposed to this web conferencing they can solve exercises collectively which

they were unable to solve individually. Through these discussions they discover their strengths and weaknesses. They exploits on their strengths and thereby improving themselves collectively. The information they got from the web conferencing, after teacher's scrutiny should be analysed by the students to discover its relationship and differences with what they receive through conventional class work. Their personal computers can help them in doing that.

The findings in Table 2, regarding the competencies which are required by teachers for utilizing ICT in cooperative learning strategies in teaching vocational subjects in Abia State, also showed that all the six items listed were rated as required. This is in agreement with the findings of Wendy (2011) and Robert, Sheard, Pam, Louise, Bette and Alan (2013) who found out that cooperative learning is effective in teaching primary and secondary school students in England. This signifies that students should record their discussion in vocational subjects in a cassette for teacher's scrutiny. Students should learn how to construct technical drawings using Auto-cad and Archi-cad. This will arouse their interest on the course. The conventional way of using chalk to teach technical drawing on the chalkboard has its limitations which include among other things the imperfection of the degree of accuracy expected in such drawings which mere hand-drawn has. The students see the figure as it is when Auto-cad and Archi-cad is projected through the multimedia. Group leadership and responsibilities for work are inculcated as the students work together using ICT devices. This is particularly true when they are grouped together to solve a problem which ICT will help them solve. The hypotheses also show that there is no significant difference among mean responses of teachers with varying years of teaching experiences on the use of ICT in situated learning strategies in teaching vocational subjects; and there is also no significant difference between mean responses of male and female teachers on the use of ICT in cooperative learning strategies in teaching vocational subjects.

Findings on the hypotheses tested showed that years of experience and gender did not significantly influence the responses of the teachers on the competencies needed in the use of ICT in situated and cooperative teaching strategies respectively. The null hypothesis (Ho_1 and Ho_2) were therefore upheld.

VI. Conclusion

Situated and Co-operative learning strategies are vital teaching methodologies in vocational/technical studies. The use of ICT in these strategies brings out the efficiency and effectiveness of these strategies in teaching and learning. Therefore, the identified competencies needed by teachers in the technical colleges studied should be addressed through capacity building in other to harness all the benefits of situated and co-operative learning through ICT.

VII. Recommendations

Based on the findings of the study, the following recommendations are made:
1. Situated learning strategies using ICT should be implemented in TVE to facilitate students' faster means of acquiring information in TVE.
2. Cooperative learning strategies using ICT should be implemented in TVE to improve the technical students' interest in vocational subjects.
3. These instructional strategies in TVE using ICT can be implemented in Nigeria through the procurement of the ICT devices in technical colleges identified in the study, such as personal computers, digital cameras, internet services, cassette recorders.
4. ICT courses should be implemented in TVE programmes in Nigerian higher institutions in order to train teachers to be ICT literate, especially on the use of ICT for situated and cooperative learning.
5. The practicing teachers should be encouraged to undergo in-service training in the use of ICT in situated and cooperative learning strategies.

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