



Competencies Needed by Automobile Technology Teachers towards the Development of ICT for Teaching-learning Purposes

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Abstract—The study determines the competencies needed by automobile technology teachers towards the development of ICT for teaching-learning purposes. Specifically, this study identifies the ICT competencies needed by automobile technology teachers in computer appreciation, word processing, PowerPoint presentation, data processing, computer aided design (CAD) and the use of the internet. Six research questions and null hypotheses guided the study. The survey research design was used. The population for the study consisted of twenty-four technical college teachers in Niger State, Nigeria. Fifty-three structured questionnaire items were used as instruments to collect data from the respondents. Data obtained were analyzed using mean, Analysis of Variance (ANOVA) and Scheffe's test. The findings of the study showed that fifty-three ICT competencies were needed by the automobile technology teachers towards the development of ICT for effective teaching-learning purposes in the technical colleges. In order to assist in the integration and utilization of ICTs in education, it seems to suggest that teachers in higher institutions of learning should be retrained.

Keywords—ICT; education; competencies; automobile technology teachers

I. INTRODUCTION

One of the yardsticks used for measuring the standard and civilization of any nation is the Information and Communication Technology (ICT). It is an umbrella that covers two inseparable concepts, that is, information technology (IT) and communication technology (CT). These concepts wrap all the technical equipment to communicate, process and send out information. IT is used as a tool to process, manipulate and manage information while CT is everything linked with the utilization of tools to process and convey data from one gadget to another. According to [1], the application of ICTs in education is divided into two broad categories: ICTs in education and ICTs for education. The former entails the implementation of the general components of ICTs in the teaching-learning process while the latter involves the development of ICT for teaching-learning purposes. [2] emphasized that the use of ICT in school curriculum depends on the teacher who will make use of ICT to educate the students. These necessitate the need for

teachers to have the skill to incorporate ICT into the classroom instruction.

Therefore, ICT calls for any activity associated with the manipulation, management, processing and transfer of information between media. In a similar vein, [3] define ICT as electronic technology for collecting, storing, processing, and communicating information. Therefore, ICT provides an atmosphere and unique environment in an electronic communication system through which a teacher and student can enlarge and share their cognitive set.

[4] affirmed that there is no doubt that Nigeria has not had its own share of technological development in every system in the nation most especially the education system. It must be noted that ICT for education is one of the means to amend not something that is profoundly changing education, but its impact is the major concern in vocational and technical colleges' especially in trade courses such as automotive technology (AT). According to [5], AT is a division of mechanical engineering that deals with the practical application of physics and material science that deals with the design, manufacturing and maintenance of mechanical systems using a wide range of tools to regulate, check, identify, tune-up completely any fault for safe and reliable operation, according to manufacturer's specification to achieve teaching and learning objectives.

The National Board for Technical Education (NBTE) developed new curricula for teachers in which ICT has been included in the new teacher education curricula. The main purpose of the computer courses is to help prospective AT teachers possess basic computer skills on commonly used computer applications. AT teachers needed to be knowledgeable and skilful in ICT so as to enhance teaching-learning practices. [6] defined skills as the ability to do something well, usually gained through training or experience.

The ICT competencies in education are a set of technology principles that delineate proficiency in using computer technology in the classroom. Early on, efforts to develop these principles for teachers were isolated from the broader teacher competencies and were primarily focused on technological competencies. Consequently, these competencies were ignored by teacher-training institutions. Teaching is a complex activity, some teachers in technical

colleges find it challenging to effectively tally their ICT instructional material such as audio, video clips, computers, slides, visual aids, electronic whiteboard and electronic conferencing material with the goal of their instructional objective which instigates an information exploration and attribution formulation.

Therefore, AT teachers need to possess different ICT competencies in basic areas of computer, such as the computer appreciation and applications software like word processing, spreadsheet (excel), powerpoint, computer aided design (CAD) and the use of the internet. Word processing is an area of competencies needed by an AT teacher for effective performance in the classroom. It is the most well-liked computer application software AT teachers need at all grade levels to create a book report, lap sheet, letterhead stationery and flyers [7]. According to [8] data analysis deals with the analysis and organisation of data by the repeated use of one or more computer programmes such as the spreadsheet (Excel). It is a potent instrument used in the calculation, manipulation of data, plotting of Graphs and analysing of errors that enhance teaching and learning process. The AT teacher also needs to be competent in using presentation software and presentation management tools such as the power point, to allow AT teachers to fabricate something from basic slide shows to complex presentations. It offers word processing, graphing, drawing, outlining and presentation management tools, all designed to be easy to use and learn in the classroom.

Another aspect of ICT competencies needed by AT teacher is in the area of using Computer Aided Design (CAD) software for 2 dimensional (2D) and 3 dimensional (3D) and drafting which support drawing of circles, lines and other shapes; management of colour, layer, creation of comment boxes and measurements in both portrait and landscape modes. The internet is a computer-based universal information system [9] composed of numerous interlinked computer networks. Each network enables the sharing of information between tens, hundreds, or even thousands of computers.

II. STATEMENT OF THE PROBLEM

The shift in the nature of teaching and learning concerning the competency of teachers of ICT in the technical colleges today is that teachers find it very difficult to integrate some application software such as powerpoint, word processor, AutoCAD and excel among others with the curriculum to build learning environments and activities for students. [10], state that ICT gadgets promote classroom discussion and understanding about complex thoughts, especially through the display of simulation via guided web tours, electronics whiteboard, television, overhead projector where the students can concurrently view the resources on Visual Display Unit (VDU).

Therefore, the effects of the above changing demands of educational systems to answer national and international issues, which are mostly caused by or related to the utilization of ICT in higher institution of learning underscores to study the competencies needed by AT teachers towards the development of ICT for teaching-learning purposes in the technical colleges.

III. AIM AND OBJECTIVES OF THE STUDY

The main aim of the study is to identify the competencies needed by automobile technology teachers towards the development of ICT for teaching-learning purposes in technical colleges in Niger State, Nigeria.

Specifically, this study seeks to identify the ICT competencies needed by AT teachers in computer appreciation, word processing, power point presentation, data processing, computer aided design (CAD) and the use of the internet.

IV. HYPOTHESIS

The following hypothesis was formulated and tested at 0.05 level of significance to guide the study.

- H₀₁: There is no significant difference in data processing application competency among the automobile technology teachers in Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora)
- H₀₂: There is no significant difference in word processing application competency among the automobile technology teachers, Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora).
- H₀₃: There is no significant difference in the use of internet application competency among the automobile technology teachers, Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora).

V. METHODOLOGY

The study adopted the descriptive survey design method. In a typical survey, the researcher selects a sample of respondents and administers a standardised structured questionnaire in order to elicit information from them [11]. The population comprises of one (1) technical college in zone A, B and C of Niger State, Nigeria. No sampling was employed since the population is small; hence, the whole population was used. The instrument used for data collection was a structured questionnaire with fifty-three (53) items. The data were analysed using the mean, Analysis of variance (ANOVA) and Scheffe's test. The items on the instrument with a mean score of 2.00 and above were highly needed (HN) while items with a mean response of 1.50- 1.99 were needed (N) and items with 1.49 below were equally highly not needed (HNN) in the section parts accordingly. The ANOVA and Scheffe's test are used to test the hypothesis at 0.05 levels of significance. A critical value of ± 2.13 and 7.78 were chosen and tested at 0.05 levels of significance. Thus, the item with F- calculated or F_S -Scheffe's value less than the F- critical was regarded as not significant while the item with an F-calculated value equal or greater than the critical was regarded as significant.

VI. RESULTS

A. Research Question 1:

What are the ICT competencies needed by automobile technology teachers in computer appreciation?

TABLE I. MEAN RESPONSES OF THE RESPONDENTS ON THE ICT COMPETENCIES NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN COMPUTER APPRECIATION

$N_1 = 9, N_2 = 10, N_3 = 8$						
S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Connect basic computer components and peripherals	3.19	3.41	3.22	3.27	HN
2	Boot up and shut down computer	3.43	3.57	3.30	3.43	HN
3	Install basic computer application softwares	3.50	3.54	3.59	3.54	HN
4	Store and retrieve documents in the computer	3.51	3.45	3.47	3.48	HN
5	Configure print settings	2.73	2.62	2.83	2.73	HN
6	Print documents	3.58	3.40	3.55	3.51	HN
7	Use the computer keyboards efficiently	2.76	2.65	2.98	2.80	HN
8	Scan a document	2.61	2.75	2.81	2.72	HN
9	Move cursor effectively around an active document	2.60	3.54	3.73	3.29	HN
10	Troubleshoot	1.69	2.55	1.75	1.99	N
Grand Mean (\bar{X}_g)					2.59	HN

Key: N_1 = GTC Bida, N_2 = GSTC Kuta, N_3 = GTC Kontagora \bar{X}_1 =Mean of response GTC Bida, \bar{X}_2 = Mean of response GSTC Kuta \bar{X}_3 = Mean of response GTC Kontagora, \bar{X}_t = Average mean responses of the respondents, Grand Mean (\bar{X}_g) response of the respondents, HN= highly needed, N= needed and HNN= highly not needed

The result in Table I revealed that the Grand Mean value (2.59) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in computer appreciation.

B. Research Question 2:

What are the word processing competencies needed by automobile technology teachers for effective performance in technical colleges?

The result in Table II revealed that the Grand Mean value (3.13) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in word processing.

TABLE II. MEAN RESPONSES OF THE RESPONDENTS ON THE WORD PROCESSING COMPETENCIES NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Format headers and footers	3.85	3.67	3.72	3.75	HN
2	Manage page layout	2.65	2.76	2.75	2.72	HN
3	Working with text	3.12	3.33	3.49	3.31	HN
4	Use of proofreading tools	2.81	2.98	3.19	2.99	HN
5	Creating bullet and numbered lists/ tables	3.19	3.79	3.70	3.56	HN
6	Creating table of content and index	3.28	3.43	3.66	3.46	HN
7	Format data: font, size, color, and style	3.93	3.98	3.87	3.93	HN
8	Preview/Printing of document	3.13	3.32	3.65	3.37	HN
9	Insert an equation and symbol into a word document	2.97	3.43	3.65	3.35	HN
10	Use smart art to create timeline	3.71	3.63	3.47	3.60	HN
11	Inserting Pictures, Object, Hyperlink, Page number and word Art into documents	2.70	3.15	3.30	3.05	HN
12	Align, centre and justify text in documents	3.10	3.28	3.64	3.34	HN
13	Merge/Compare two or more documents	3.19	3.65	3.70	3.51	HN
Grand Mean (\bar{X}_g)					3.13	HN

C. Research Question 3:

What are the Powerpoint competencies needed by Automobile technology teachers in technical colleges?

TABLE III. MEAN RESPONSES OF THE RESPONDENTS ON THE POWER POINT COMPETENCIES NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES.

S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Copy web text, Multimedia into power point environment	3.60	3.50	3.70	3.60	HN
2	Organize tables and charts into slides	3.73	3.75	3.70	3.72	HN
3	Use of multimedia portfolio	3.41	3.40	3.42	3.41	HN
4	They know how to use slide layout	2.35	2.22	2.47	2.35	HN
5	The use of task pane	3.37	3.41	3.32	3.37	HN
6	They can use transition	3.93	3.95	3.90	3.93	HN
7	They can manipulate power point viewer	3.17	3.00	3.33	3.17	HN
8	The use of slide master out results	2.26	2.32	2.17	2.25	HN
Grand Mean (\bar{X}_g)					3.22	HN

The result in Table III revealed that the Grand Mean value (3.22) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in power point competencies.

D. Research Question 4:

What are the data processing competencies needed by Automobile technology teachers in technical colleges?

TABLE IV. MEAN RESPONSES OF THE RESPONDENTS ON THE DATA PROCESSING COMPETENCIES NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Classify data into groups	3.21	3.19	3.41	3.27	HN
2	Sort data into sequence	3.10	3.43	2.57	3.03	HN
3	Enter and edit data	3.42	3.50	3.54	3.49	HN
4	Insert rows and columns	3.52	3.51	3.45	3.49	HN
5	Create a record and move from record to record	3.40	3.58	3.62	3.53	HN
6	Use statistical tools	3.82	3.80	3.78	3.80	HN
7	Create simple database structure	2.59	2.76	2.65	2.67	HN
8	Format and print out results	2.88	2.61	3.06	2.85	HN
9	Collect and store data	3.40	2.88	3.01	3.10	HN
10	Interpret result of analysis	3.14	2.60	2.93	2.89	HN
11	Make use of autofill	2.85	2.69	3.00	2.83	HN
12	Count cells based on criteria	2.44	2.54	2.33	2.44	HN
13	Protect worksheet	2.63	2.85	2.40	2.63	HN
14	Filter unique items from a list	2.47	2.27	2.67	2.46	HN
Grand Mean (μ)					3.03	HN

The result in Table IV revealed that the Grand Mean value (3.03) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in data processing.

E. Research Question 5:

What is the Computer-aided design (CAD) competencies needed by Automobile technology teachers in technical colleges?

The result in Table V revealed that the Grand Mean value (3.09) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in CAD.

F. Research Question 6:

What are the ICT skills needed by automobile technology teachers in the use of the internet?

The result in Table VI revealed that the Grand Mean value (3.20) of the items is above the cutoff point (2.00). Therefore, all the respondents highly needed the ICT competencies in the use of the internet.

G. Hypothesis 1:

There is no significant difference in data processing application competency among the automobile technology teachers in Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora).

TABLE V. MEAN RESPONSES OF THE RESPONDENTS ON THE COMPUTER AIDED DESIGN (CAD) NEEDED BY AUTOMOBILE TEACHER FOR EFFECTIVE PERFORMANCE IN TECHNICAL COLLEGES

S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Use layers and template to create drawing	4.00	3.87	3.94	3.94	HN
2	Interacting with the user interface	3.10	2.69	2.90	2.90	HN
3	Format data: font, size, color, and style	2.59	2.83	2.71	2.70	HN
4	Add 2D and 3D design modeling	3.00	2.96	2.98	2.98	HN
5	Draw curves, lines and circle	2.98	3.67	3.33	3.33	HN
6	The use of finite element tools	3.40	3.57	3.49	3.49	HN
7	They make use of pick tools	2.02	3.32	2.67	3.00	HN
8	Adding of text	3.49	3.51	3.50	3.50	HN
9	Making outline of text, numbers and object	3.14	2.40	2.77	2.77	HN
10	Rotate and skewing of object	3.40	2.69	3.06	3.05	HN
11	Integrate the use of transparent effect on object	2.05	2.83	2.44	2.44	HN
12	Manipulate and filling of object	2.44	3.40	2.92	2.92	HN
Grand Mean (μ)					3.09	HN

TABLE VI. MEAN RESPONSES OF THE RESPONDENTS ON THE ICT COMPETENCIES NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN THE USE OF THE INTERNET

S/N	Item	\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	Remarks
1	Understanding of web browsing applications	4.00	3.94	3.87	3.94	HN
2	Navigating through different Websites	3.10	2.90	2.69	2.90	HN
3	Download files and applications	2.59	2.71	2.83	2.71	HN
4	Sending emails and file transfer	3.00	2.98	2.96	2.98	HN
5	Distance education, education knowledge and understanding of online learning tools	3.40	3.49	3.57	3.49	HN
6	Understanding of web browsing applications	4.00	3.94	3.87	3.94	HN
Grand Mean (μ)					3.20	HN

TABLE VII. ONE- WAY ANALYSIS OF VARIANCE (ANOVA) OF THE MEAN RESPONSES OF THE RESPONDENTS ON DATA PROCESSING APPLICATION COMPETENCY NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

Source	SS	MS	F-cal	df	F-crit	Sig.	Decision
Between treatment	0.69	0.35	2.82	2	3.26	NS	Accepted
Within treatment	4.39	0.12		36			
Total	5.08			38			

Keys: df= degree of freedom, SS= Sum of Square, MS= Mean Sum of Square, F-cal= F-calculated, F-crit.= F- critical, Sig.= Significance

The hypothesis shows the f-cal value in Table VII which is 2.82 since the calculated f ratio is below the f-critical of 3.26 (F-crit > F-cal), the state null hypothesis is accepted at 0.05 level of significance, meaning “There is a significant difference between the mean responses of the respondents on data processing application competency needed by Automobile technology teachers in technical colleges.”

H. Hypothesis 2:

There is no significant difference in word processing application competency among the automobile technology teachers, Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora).

TABLE VIII. ONE-WAY ANOVA OF THE MEAN RESPONSES OF THE RESPONDENTS ON WORD PROCESSING APPLICATION COMPETENCY NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

Source	SS	MS	F-cal	df	F-crit	Sig.	Decision
Between treatment	0.02	0.0081	0.04	2	3.24	NS	Accepted
Within treatment	3.15	0.2108		39			
Total	3.17			41			

The hypothesis shows the f-cal value in Table VIII which is 0.04 since the calculated f ratio is below the f-critical of 3.24 (F-crit > F-cal), the state null hypothesis is accepted at 0.05 level of significance, meaning “There is no significant difference between the mean responses of the respondents on word processing application competency needed by Automobile technology teachers in technical colleges.”

I. Hypothesis 3:

There is no significant difference in the use of internet application competency among the automobile technology teachers, Government technical college Eyagi Bida (GTC Bida), Government science and technical college Kuta (GSTC Kuta) and Government technical college Kontagora (GTC Kontagora).

The hypothesis shows the f-cal value in Table IX which is 0.03 since the calculated f ratio is below the f-critical of 3.89 (F-crit > F-cal), the state null hypothesis is accepted at 0.05 level of significance, meaning “There is no significant difference between the mean responses of the respondents on the use of internet application competency needed by Automobile technology teachers in technical colleges”

TABLE IX. ONE-WAY ANOVA OF THE MEAN RESPONSES OF THE RESPONDENTS ON THE USE OF INTERNET APPLICATION COMPETENCY NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

Source	SS	MS	F-cal	df	F-crit	Sig.	Decision
Between treatment	0.02	0.0073	0.03	2	3.89	NS	Accepted
Within treatment	3.15	0.2625		12			
Total	3.17			14			

TABLE X. SCHEFFE’S TEST OF THE MEAN RESPONSES OF THE RESPONDENTS ON THE USE OF INTERNET APPLICATION COMPETENCY NEEDED BY AUTOMOBILE TECHNOLOGY TEACHERS IN TECHNICAL COLLEGES

S/N	Schools	F _s	F ^l	Sig.	Decision
1	A and B	0.062	7.78	NS	Accepted
2	B and C	0.096		NS	Accepted
3	C and A	0.280		NS	Accepted

Keys: A= GTC Bida, B= GSTC Kuta, C= GTC Kontagora, F_s= F- Scheffe, F^l= F-Critical

From the comparison, GTC Bida and GSTC Kuta are not significantly different since F^l (7.78) with F_s (0.062) F^l > F_s; GSTC Kuta and GTC Kontagora are not significantly different F^l (7.78) with F_s (0.096) F^l > F_s; GTC Bida and GTC Kontagora are also not significantly different F^l (7.78) with F_s (0.25) F^l > F_s.

Since GTC Bida and GSTC Kuta, GSTC Kuta and GTC Kontagora and GTC Bida and GSTC Kontagora are not significantly different, i.e the groups did not show the source of major difference. This gives the impetus to conclude that the groups give rise to the need for the use of the internet.

VII. DISCUSSION OF FINDINGS

From the study, it was revealed that the twelve (12) computer appreciation skills were needed by AT in Niger State, Nigeria for effective teaching in the technical colleges. The findings concur with the view of [12] stated that a computer literate teacher should have skills with the ability to programme and control a computer for professional, personal and academic goals.

The findings on word processing skills show that the sixteen (16) word processing skills identified were needed by AT teachers. The findings coincide with [13] accentuated that it is imperative for teachers to get the knowledge and competencies in word processing to be efficient in the performance of their work.

The findings on internet skills needed by an AT teacher in Niger State, Nigeria were in conformity with the work of [14] declared that the internet proffers the best opportunity of acquiring exceptional facts from the web. [15] supported that the internet is one of the cardinal transformations of the computer that has found its way deeply into the academic sector; using the internet makes available to the teacher's information that cannot be found in any other way except through the World Wide Web (WWW). In a similar vein, [16] affirmed that the internet provides access to more information than the librarian could dream of; therefore, teachers need skills on the internet before they could access it.

The findings on data processing skills needed by AT teachers in technical colleges were in concurrence with the work of [8] acknowledged that data processing is used extensively in automobile and in nearly all areas in which computers are used such as education to process data electronically by the teachers; therefore, it is necessary for AT teachers to possess the needed skills in these areas. This will make them be more efficient in their teaching of the required skills.

VIII. CONCLUSION

It is evident that AT teachers in Niger State, Nigeria technical colleges highly need all the fifty-three (53) ICT competencies identified for effective teaching. This implies that retraining of AT teachers is necessary for the attainment of these emerging information technology competencies in ICT for education.

IX. RECOMMENDATIONS

Based on the findings of the study, the following recommendations were proffered

- Higher institutions of learning where automobile teachers and other technical related teachers are being trained should be retrained frequently on the use of ICTs so as to assist in the integration and utilization ICTs in education.
- Taking into cognizance from the findings of this study, the curriculum of technical colleges should be reviewed on a regular basis to reflect the workplace needs and expectations.

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