



# NIGHTINGALE PUBLICATIONS AND RESEARCH INTERNATIONAL

## COMPUTER-BASED GRAPHICS SKILLS NEEDED AMONG VOCATIONAL AND TECHNICAL EDUCATION STUDENTS IN NIGERIAN TERTIARY INSTITUTIONS FOR SELF- EMPLOYMENT

<sup>1</sup>ISIYAKU DAUDA DANSARKI;  
<sup>2</sup>ATTAMAH CHUKWUNWIKI  
EMMANUEL; AND <sup>3</sup>FIDELIA ABANG

<sup>1&2</sup>Department of Office Technology &  
Management Education, FCE(T) Bichi

<sup>3</sup>Department of Electrical Electronics, FCE(T)  
Bichi,

### Introduction

The current technological trend across the globe is indicative of the emergence of a digital world. Teaching and learning, governing, business, banking and almost every aspect of human endeavor is now executed digitally. As a result of this, for vocational and technical education students in Nigerian tertiary colleges to be able to gain self-employment after graduation they need to be properly trained in computer/information communication technologies (ICTs) for the challenges posed by the changes and the

### Abstract

*The purpose of this study was to postulate specific computer-based graphics skills needed by vocational and technical education students in Nigerian tertiary institutions for self-employment. Eighteen graphic skills were itemized as essentially imperative for vocational and technical education students in Nigerian tertiary institutions for self-employment after graduation. The study sample consists of 60 respondents (made up of 40 students and 20 teachers) from school of business education and the school of technical education (FCE-T Bichi) who were asked to specify those computer-based graphic skills that they considered imperative for their self-employment after graduation. Findings have revealed that out of the eighteen skills listed, seventeen were required by the respondents; and the test*

*Of hypothesis has revealed that there is no significant difference between the mean ratings of the responses of vocational and technical education Lecturers and vocational and technical Students on the computer-based graphics skills needed for self-employment by vocational and technical students in Nigerian tertiary institutions on graduation. Considering the trends of unemployment and economic in Nigeria and the entire world that was prompted by the outbreak of COVID 19 pandemic, the study recommends that computer-based graphic skills should be included in the curricula of business education and technical education programs in Nigerian tertiary colleges to enable them attain self-employment after graduation. The study also recommends that researchers in education should investigate the need for including other computer-based skills such as multimedia skills, internet skills and database skills in the scopes of tertiary education curricula.*

**Keywords:** *computer-based graphics skills, self-employment, business education, technical education, tertiary institutions, Nigeria*

---

developments of the present computer-driven society. UNESCO (2002) has identified ICTs as fundamental in shaping the new global economy and producing rapid changes in society; bringing significant transformations in education, industry, agriculture, medicine, engineering, business and all other fields. Hence, in order to empower vocational and technical education students in Nigerian tertiary institutions for positive impact in the society, they should be taught important computer-based skills such as computer-based graphics.

### **Literature Review**

In the current circumstance, when the world (Nigeria inclusive) is just recovering from the blows of the COVID 19 pandemic, with significant indications of economic downturn, it is fundamental to give emphasis to programs such as Vocational and technical education (VTE) for human economic empowerment and survival.

Vocational and technical education (VTE) consists of a series of programs that support the economic and social development of individuals and prepares them for jobs in the enterprise or for engagements as self-employed people. It is a canopy program to several courses, including business education and

electrical electronics education and it is designed to provide platforms for the intellectual developments of individuals and for the provision of enabling environments for productive living (Okoro, 1993).

Equipping vocational and technical students with appropriate skills for engagement as employees in the enterprise or as self-employed persons has been listed as one of the strongest objectives of VTE (NCCE, 2009). However, while employment may be available in large companies, government organizations and various employment agencies, there are varying specific skills needed for work. Most jobs require competency in computer operations in contemporary times, and the underpinning to every job schedule has significant correlation with mastery of the computer (Isiyaku, 2012). When seeking for employees, employers often itemize computer literacy as part of the conditions for employment. Yet, although VTE programs comprise a wide range of spectrum of activities geared toward general skills acquisition and selfemployability, activities that support computer-based skills acquisition are not adequately provided in VTE curricula for Nigerian tertiary institutions (Isiyaku D.D. 2018). In this regard, it is fundamental to ensure that vocational and technical education students in tertiary institutions of Nigeria are equipped with typical computer skills such as word processing skills, spreadsheet skills, internet skills, multimedia skills, database skills and computer graphics skills in order to certify that they are suitable for any gainful employment after graduation.

Based on the foregoing the purpose of this study was to determine specific computer-based graphic skills needed among vocational and technical education students in Nigerian tertiary institutions for self-employment.

### ***Computer-based Graphics***

Computer-based graphics can be described as images or visual representations of objects that are generated by a computer. Graphics are often contrasted with texts, which are comprised of characters, such as numbers and letters, rather than images (Christensson, 2009). As observed in (Woodford; 2019) if you sketch something on a piece of paper – a building or an animal; what you have is a piece of analog information, and depending on the materials you use, changing what you draw can be easy or difficult. For instance, if you use pencil erasing your sketch would be easy, but if u use permanent colours, erasing or changing your sketch could be awful and a lot

trickier. Hence, as every sketching child knows too well, if you draw the first part of your picture too big, you will struggle to squeeze everything else on the page; and if you change your mind about where to put something or you want to swap red for orange or green for blue you might have to rip up sheet after sheet of spoiled paper and toss it in the trash before you get what you want (Woodford, 2019).

However, with the dawn of computer graphics designing and creating images and objects has become easier and more spectacular. Draw a picture on a computer screen and what you have is a piece of digital information. It probably looks similar to what you would have drawn on paper—the ghostly idea that was hovering in your mind's eye to begin with—but inside the computer your picture is stored as a series of numbers. Change the numbers and you can change the picture, in the blink of an eye or even quicker. Hence, it is easy to shift your picture around the screen, scale it up or down, rotate it, swap the colors, and transform it in all kinds of other ways. Once it is finished, you can save it, incorporate it into a text document, print it out, upload it to a web page, or email it to a client or work colleague—all because it is digital information. Therefore, whether you are an architect or a web designer, a business student or a scientist, computer graphics can make your work quicker, easier, and much more effective (Woodford, 2019).

Computer graphics can be either two or three-dimensional. Early computers only supported 2D monochrome graphics, meaning they were black and white (or black and green, depending on the monitor). Eventually, computers began to support color images. While the first machines only supported 16 or 256 colors, most computers can now display graphics in millions of colors (Christensson, 2009)

2D graphics come in two flavors — raster and vector. Raster graphics are the most common and are used for digital photos, Web graphics, icons, and other types of images. They are composed of a simple grid of pixels, which can each be a different color. Vector graphics, on the other hand are made up of paths, which may be lines, shapes, letters, or other scalable objects. They are often used for creating logos, signs, and other types of drawings. Unlike raster graphics, vector graphics can be scaled to a larger size without losing quality (Christensson, 2009). Basically, simple computer graphic programs like Microsoft Paint and PaintShop Pro are based on raster graphics, while more

sophisticated programs such as CorelDRAW, AutoCAD, and Adobe Illustrator use vector graphics (Woodford; 2019)

3D graphics started to become popular in the 1990s, along with 3D rendering software such as CAD and 3D animation programs. By the year 2000, many video games had begun incorporating 3D graphics, since computers had enough processing power to support them. Now most computers now come with a 3D video card that handles all the 3D processing. This allows even basic home systems to support advanced 3D games and applications. (Christensson, 2009).

### ***Computer-based Graphics skills***

Studies have shown that acquiring skills is fundamental to optimizing productivity of individuals at work (Attamah & Isiyaku, 2017). The majority of schools, colleges, and universities around the world empower their students with the skills of graphic design and art (Steven & Seymour 2011). Computer-based graphics skills are taught in a broad variety of ways, each course teaching its own distinctive balance of craft skills and intellectual response to the client's needs (Steven & Seymour 2011). Some graphics courses prioritize traditional craft skills—drawing, printmaking, and typography—over modern craft skills. Other courses may place an emphasis on teaching digital craft skills. Still, other courses may downplay the crafts entirely, concentrating on training students to generate novel intellectual responses that engage with the brief. Despite these apparent differences in training and curriculum, the staff and students on any of these courses will generally consider themselves to be graphic designers (Steven & Seymour 2011). The typical pedagogy of a graphic design (or graphic communication, visual communication, graphic arts or any number of synonymous course titles) will be broadly based on the teaching models developed in the Bauhaus school in Germany or Vkhutemas in Russia. The teaching model will tend to expose students to a variety of craft skills (currently everything from drawing to motion capture), combined with an effort to engage the student with the world of visual culture (Steven & Seymour 2011).

In computer based graphics, software packages like Adobe Suite CS, Premiere, Media Cleaner, Dreamweaver, Flash, Director, Corel Draw, PowerPoint, Soundforge, ACID, Shockwave, Adaptec CD, 3D Studio Max, are used in



manipulating, displaying and storing computer data in the form of graphic images, texts, sounds, pictures, animations, and videos.

Computer based graphics skills for creating, manipulating, storing and retrieving information to express ideas and communicate with others in the form of images and pictures as listed in <http://www.schools.nsw.edu.au> include the following:

- Using freehand drawing tools – pencil, straight and curved lines
- Using shape tools/objects
- Using paintbrush, paint box/fill with colour, spray can/air brush and eraser
- Using text tool
- Selecting objects with selection tool
- Deleting selected objects
- Cropping selected objects
- Copying/duplicating graphic elements
- Using line properties – thickness/colour
- Using fill pattern/colours/shading
- Flipping, rotating objects
- Using layers for objects – moving to front/back
- Inserting graphics from various sources e.g. clip art, digital image
- Changing the size of displayed clip art/graphics
- Using digital camera to create a graphics file
- Moving clip art/graphics within a document
- Using a scanner to convert a picture into a graphics file
- Understanding animation/illusion of movement

### ***Self-employment***

Self-employment refers to a situation where a person or group of persons are engaged in economic activities on their own account and at their own risk. Such a person or group of persons can be self-employed with employees or without employees (Markku 2020). Self-employment has also been defined as a state of not working for an employer but finding work for yourself, having your own business (Cambridge, 2020). Consistently, a person acting in a limited company, who alone or together with his/her family owns at least one half of the company, is counted as self-employed (Markku 2020).

Whereas self-employment offers individuals compensations such as independence to work without command and opportunity to generate personal income; it also has some potential weaknesses, including uncertain levels of income and long working hours. People choose selfemployment for a wide variety of reasons. Some desire a change in lifestyle, some are unable to find paid employment, some want to work at home in order to care for small children, and some are retirees seeking additional income. Regardless of the under-lying motivation, however, there are ways for self-employed persons to overcome the potential drawbacks and increase their chances for success (Umar & Abubakar 2015).

Dawson, Smith & Jack (2009) postulated that self-employment may be a less desirable situation for some individuals and therefore may probably be chosen reluctantly when appropriate employment under current labour market conditions have become unattainable. However, individuals wanting flexible working hours might deliberately choose self-employment if a paid employment contract offering sufficient flexibility is unavailable. Yet, for other individuals, selfemployment may be chosen as the only available alternative to unemployment. Hence, in many developing economies such as Nigeria, self-employment may be viewed as a form of informal sector employment activity.

Unfortunately, although Nigeria has over the past several years struggled with reducing its unemployment rate, data from National Bureau of Statistics (NBS) has indicated that the unemployment rate was 23.1% in Q3 2018 from 22.7% recorded in the previous quarter. According to the NBS data the labour markets have been adversely affected by economic shutdown due to the Covid-19 outbreak, resulting in higher unemployment rates across the globe. Hence, the federal ministry for labour and productivity had disclosed that Nigeria's unemployment rate is likely to hit 33.5% this year (2020) given the downturn triggered by the ongoing COVID 19 pandemics (FBN Quest Research, 2020).

On the basis of the foregoing discourse, it is expected that by acquiring computer based graphic skills, vocational and technical students in Nigerian tertiary institutions can on graduation be gainfully engaged in organizations offering computer graphics services or as self-employed persons. In this way, they can avoid being unemployed after graduation. Hence, this study was steered by one research question, stated thus: *what are the computer-based*

*graphic skills needed by vocational and technical education students in Nigerian tertiary institutions for selfemployment? The study has also hypothesized as follows: There is no significant difference in the mean ratings of the responses of vocational and technical education teachers and vocational and technical education students on the computer-based graphic skills needed for self-employment?*

### **Methodology**

Survey research design was used in this study to obtain the responses of 60 vocational and technical education teachers and students from FCE (T) Bichi on the computer-based graphic skills they needed for self-employment on graduation.

### **Sample of the Study**

The sample of the study was made up of 60 respondents, including teachers and students from school of business education and the school of technical education (FCE-T Bichi) who were asked to identify those computer-based graphics skills that they need to possess to be able to gain selfemployment on graduation.

### **Instrument for Data Collection**

The instrument for data collection was a structured questionnaire titled Graphics Skills Questionnaire (GSQ). The questionnaire was subjected to face validation by three experts, one from the Department Vocational Teacher Education, University of Nigeria, Nsukka and two from the Schools of Business Education and the school of Technical Education, Federal College of Education (Technical) Bichi, Kano.

The reliability of the instrument was determined through a pilot study on a sample of 20 respondents (15 students, 5 teachers) from FCE Kano, Kano State of Nigeria. The instrument generated a Cronbach-Alpha reliability coefficient of 0.86, indicating that it was reliable at measuring what it was made to measure in this research.

### **Method of Data Analysis**

SPSS v22 was used in analyzing the data collected for the purpose of this study. Mean and Standard Deviation values of the variables of study were all



valid and t-test statistics was used for testing the hypotheses at  $P \leq 0.05$  level of significance. 5-point Likert rating options was assigned real limit values as follows:

VHR	=	Very Highly Required	4.50 - 5.00		
HR	=	Highly Required	3.50 - 4.49		
AR	=	Averagely Required	2.50 - 3.49		
LR	=	Less Required	1.50 - 2.49		
NR	=	Not Required	1.00 - 1.49		

From the above rating, any item with mean value is 3.50 or above was considered as "Required" while those items whose mean values are below 3.50 were regarded as 'Not Required'. The hypothesis of no-significant difference was upheld for items whose t-calculated (t-cal) values are less than the t-table (t-tab) value at  $P < 0.05$  level of significance. Consistently, the hypothesis of no significant difference was rejected for items whose t-calculated values are greater than the t-table value at  $P < 0.05$  level of significance.

## Results

On the basis of the research question and hypothesis of the study, results of the analysis of data are presented below. Table 1 supplies data on the computer-based graphic skills needed by vocational and technical students in Nigerian tertiary institutions for self-employment

*Table 1: Mean Ratings of the Responses of VTE teachers and students on the computer-based graphic skills needed among VTE students in Nigerian tertiary institutions for selfemployment (N = 60).*

S/N	Item Statement (Computer-based Graphic Skills)	X	SD	Remarks
1	Using freehand drawing tools - pencil, straight and curved lines	4.13	0.89	Needed
2	Using shape tools/objects	4.46	0.72	Needed
3	Using paintbrush, paint box/fill with colour, spray can/air brush and eraser	4.25	0.99	Needed

4	Using text tool	4.25	0.85	Needed
5	Selecting objects with selection tool	4.03	0.93	Needed
6	Deleting selected objects	4.17	0.99	Needed
7	Cropping selected objects	3.73	0.95	Needed
8	Copying/duplicating graphic elements	3.95	0.86	Needed
9	Using line properties – thickness/colour	3.68	0.83	Needed
10	Using fill pattern/colours/shading	3.62	0.79	Needed
11	Flipping and rotating objects	3.83	1.10	Needed
12	Using layers for objects – moving to front/back	3.30	0.91	Not Needed
13	Inserting graphics from various sources e.g. clip art, digital image	4.03	0.92	Needed
14	Changing the size of displayed clip art/graphics	3.81	0.80	Needed
15	Using digital camera to create a graphics file	3.65	0.93	Needed
16	Moving clip art/graphics within a document	3.61	0.88	Needed
17	Using a scanner to convert a picture into a graphics file	4.08	0.98	Needed
18	Understanding animation/illusion of movement	3.82	1.10	Needed

**Note:** X = Mean.

SD = Standard Deviation.

N = Number of Respondents

From the data presented in Table 1, the mean ratings of the responses of vocational and technical education teachers and students on the 8 multimedia skill items in this research have ranged between 3.88 to 4.65; all being greater than the cut-off point value of 3.50 on a 5-point rating scale. This implies that all the 8 identified 8 multimedia skill items are required by NCE graduating students of vocational and technical education in Federal College of Education (Technical) Kano for survival in a period of economic recession.

Consistently, Table 2 supplies data on the mean ratings of the responses of Vocational and Technical Education Teachers and students on the multimedia skills needed by NCE graduating students of Vocational and Technical Education in Federal College of Education (Technical) Kano for survival in a period of economic recession

*Table 2: T – test Analysis of the Mean Ratings of the Responses of Vocational and Technical Education Teachers and Vocational and Technical Education Students on the computerbased graphic skills needed among VTE students in Nigerian tertiary institutions for selfemployment*

SN	Groups	X	SD	N	DF	Std.	t- Cal	t-Tab	Level of	Rmks
						Error	Sig.			
1.	Voc& Tech Teachers	4.21	0.941	40						
2.	Voc & Tech Students	4.14	0.979	80	5	0.265		2.00	0.05	NS
				8		0.272				

**Note:** Level of Sig = 0.05

From Table 2, the t-test analysis has revealed that the t-calculated (t-cal) value of 0.272 is less than the t-table (t-tab) value of 2.00 at  $P \leq 0.05$  level of significance and at 58 degree of freedom (df). This shows that there is no significant difference between the mean ratings of the responses of vocational and technical education teachers and vocational and technical students on the computer-based graphic skills needed among VTE students in Nigerian tertiary institutions for self-employment. Therefore, the null hypothesis of no significant difference for the hypothesis of the study is supported.

### **Findings of the Study.**

From the analysis of data in this study, the following computer-based graphic skills are needed among VTE students in Nigerian tertiary institutions for self-employment:

- Using freehand drawing tools – pencil, straight and curved lines
- Using shape tools/objects
- Using paintbrush, paint box/fill with colour, spray can/air brush and eraser
- Using text tool

- Selecting objects with selection tool
- Deleting selected objects
- Cropping selected objects
- Copying/duplicating graphic elements
- Using line properties – thickness/colour
- Using fill pattern/colours/shading
- Flipping, rotating objects
- Inserting graphics from various sources e.g. clip art, digital image
- Changing the size of displayed clip art/graphics
- Using digital camera to create a graphics file
- Moving clip art/graphics within a document
- Using a scanner to convert a picture into a graphics file
- Understanding animation/illusion of movement

Furthermore, the test of the hypotheses of the study has revealed that there is no significant difference between the mean ratings of the responses of vocational and technical education Lecturers and vocational and technical Students on the computer-based graphics skills needed by vocational and technical students in Nigerian tertiary institutions on graduation. Consistent with the findings of this study, Agomuo (2005) has revealed that information processing skills are required by NCE students of vocational and technical education on graduation.

### Conclusion

This study has important implications for vocational and technical education teachers and students as it proposes important ideals for skills acquisition and human economic empowerment among students in Nigerian tertiary institutions. Emphatically, the current trend in education suggests a wide stride from basic theories to acquisition of skills and the application of computer technologies in the world of work. With the shortage of employment opportunities in the country's labour market, students of vocational and technical education on graduation could earn sustainable living with computer-based graphic skills. Hence, equipping students with computer skills should be strongly emphasized in Nigerian tertiary institutions.

## Recommendations

Based on the findings and conclusions drawn from the study, the following recommendations are made for implementation by the Nigerian government:

- Unemployed individuals that have graduated from tertiary institutions in Nigeria should be counseled and enrolled in skill acquisition training for their economic independence.
- Nigerian government should make efforts to include the identified computer-based graphic skills in the curricula of tertiary education to provide a platform for tertiary students to gain self-employment on graduation

## References

- Agomuo, E. E. (2005). Business Education Graduates' Assessment of ICT Skills Needed in Business Teacher Education Programs, *Business Education Journal* Vol 1. 111-121
- Attamah C. E. & Isiyaku D.D. (2017). Employers' perception of the applied skills of NCE graduates of electrical-electronics technology in Nigerian public and private organizations. *IOSR Journal of Research & Method in Education (IOSR-JRME)* e-ISSN: 2320-7388, p-ISSN: 2320-737X Vol 7(6) II, PP 12-23 [www.iosrjournals.org](http://www.iosrjournals.org) Cambridge (2020) *Dictionary Plus*. Cambridge University Press. <https://dictionary.cambridge.org/plus/>
- Christensson, P. (2009) *Graphics Definition*. Retrieved 2020, Jun 18, from <https://techterms.com>
- Dawson A., Smith M & Jack A.S. (2009) *Self-employment*. Retrieved on May 15<sup>th</sup> 2020 from <http://www.answers.com>
- International Labour organization (2000). Training for employment: *Social inclusion, productivity and youth employment*. Geneva: Author.
- Isiyaku D.D. (2012) *Computer skills needed for self-employment by NCE business education graduates of Federal College Of Education Kano*. A Project for the Award of PostGraduate Diploma in Technical Education, University of Nigeria, Nsukka
- Isiyaku, D. D., Ayub A.F.M., & Suhaida A.K. (2018) Antecedents to teachers' perceptions of the usefulness of ICTs for business education classroom instructions in Nigerian tertiary institutions. *Asia Pacific Education Review (2018)*: 1-16.



- Markku H. (2020) *Self Employment Concepts*.  
[https://www.stat.fi/meta/kas/yritlkm\\_en.html#tab1](https://www.stat.fi/meta/kas/yritlkm_en.html#tab1)
- NCCE (2009). *Minimum Standards for Nigerian Certificate in education*. 5<sup>th</sup> Edition
- Steven H. & Seymour C. (2011). *Graphic Style: From Victorian to New Century*. Abram
- UNESCO (2002). *Planning guide for information and communication technologies in teacher education*. Paris: United Nations Educational, Scientific and Cultural Organizations.
- Woodford, C. (2019). *History of invention: A science and technology timeline*. Explain That Stuff. <https://www.explainthatstuff.com/computer-graphics.html>
- Umar G. I & Abubakar S. G (2015) Analysis of students' attitudes toward self-employment intention in tertiary institution in Nigeria. *International Journal of Small Business and Entrepreneurship Research* Vol.3, No.3, pp.1-11, European Centre for Research Training and Development UK. ISSN 2053-5821(Print), ISSN 2053-583X(Online)