

## **IMPACTS OF VIRTUAL CLASSROOM LEARNING ON STUDENTS' OF NIGERIAN FEDERAL AND STATE UNIVERSITIES**

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### **ABSTRACT**

The paper adopted a descriptive approach to examine the impacts of virtual classrooms on students' learning. Virtual classrooms are technologically-driven classrooms that support self-directed and self-regulated learning. The study was carried out in two federal and two state universities in the South-East zone of Nigeria. Four research questions and four hypotheses guided the study. The sample comprised of 280 federal university students and 226 state university students given a total sample of 506 respondents. Stratified random sampling due to ownership (federal and state) was used. Other sample techniques used were; those students who have been involved in online programmes recently and those currently in the programme. Students' consent was also sought before the selection. The instrument was validated. Internal consistency was computed using Cronbach alpha for the four sections, thus; Section A = 0.80; Section B = 0.83; Section C = 0.79; and Section D = 0.85. The instrument was administered and data collected. The data collected were analysed using means for research questions and independent sample t-test to test the hypotheses at 0.05 level of significance. The results showed among others that virtual classrooms have positive impacts on the students of federal and state universities, they reported positively on their continued support and preparedness for virtual classrooms. Based on the findings, the recommendation were that many more students should be made to be more aware of the impacts of the virtual classrooms. They should also be motivated to be participating more in virtual classrooms.

### **INTRODUCTION**

Learning is the part of human existence. Each day of a man's life, he learns new things to survive in a changing world. This is an informal learning in that as man interacts with his environment at any stage in time, he learns new things. But in a formal learning situation, learning starts at home in a credle format, continues in the school, college, universities, workplace (Singh, 2011). "Learning is breaking out of the narrow boxes that it was trapped in during the 20<sup>th</sup> century: teachers' professionalism, reflection and ingenuity are leading learning to places genuinely exciting to this new generation of connected young school students – and their teachers too". In effect, virtual learning environments (VLE) are making students not to be confined to a particular building, or restricted to any single location or moment".

The school learning environment offers opportunities for teachers and students to come together for institutional teaching/learning process. In this learning process, various technological gadgets are employed to facilitate the process. Such advanced technologies include internet, e-mail, website, mobile phone, ipod etc (Mangal and Mangal, 2009). These advanced technologies are variable tools for rendering valuable assistance and good alternative to traditional method of education. This alternative could be in form of virtual classroom.

Virtual classroom has been described by Turoff (2007) as a web-based environment that allows an individual to participate in live training events without traveling to any other place. You can sit in the comfort of your environment and listen to lectures. You can participate in the lab exercises, ask questions and effectively interact with the teacher as if the action is taking place in a conventional classroom but it is done with the convenience of technological gadgets as desktop that have internet and phone connection. The internet on the other hand provides such advantages and new ways of communicating, interacting, and assessing information for both teachers and students.

Writing on the definition of virtual classroom, technopedia viewed it as, “an online classroom environment facilitated via specialized video conferencing applications”. In this environment, the people concerned will be in the position to interact with one another, communicate, view and discuss lecture contents presented via internet connectivity while working in groups in an online setting to actualize learning. From the Whatis.com, a virtual classroom is, “an online learning environment”. It is like the real classroom world where students are participating in virtual classroom in synchronous instruction. That is to say that both the teachers, the student should be logged into the virtual learning environment (VLE) simultaneously.

Bringing more light on the concept of virtual classroom (VC), Turoff (2007) in Mangal (2009:774) opined that “virtual classroom is a web-based environment that allows you to participate in live training events without the need to travel. You listen to lectures, participate in lab exercises, ask questions, and receive feedback just as you would do in a conventional classroom – except you do it from the convenience of your desktop or anywhere you have an internet and phone connection. It saves the hussle, expense, and travel time to a training site”.

In another words, virtual classroom could be seen “as the classrooms”, capable of replacing partially or totally the conventional educational, evaluative and administrative functioning of a regular classroom by adopting the advanced computer and ICT technologies like the internet, e-mail, on-line chatting, www, CD-ROMS, DVDs, teleconferencing and video conferencing” (Mangal and Mangal:774).

The modern system of using internet in teaching and learning is receiving great attention the world over. The use is phasing out the traditional method of teaching which is limited to chalk and talk system of teaching and learning (Olibie, Ezoem and Ekene, 2014). The students are like the raw materials in education production while the teachers are the producing machines. The teachers wound send out the materials to the students to learn for character transformation with the necessary instructions to be applied in the process. The following are the merits accruable from the virtual classroom:

- It provides the learners the flexibility of getting the learning experiences at the time, place and rate of assimilation.
- Virtual classroom can help in good class organization. The operational documents, assignments, class notes and other related information in the internet can be readily categorized for easy accessibility for the teachers and students. The information posted on the internet could be easily revised and updated for more effective teaching and learning.
- Virtual classroom provides the learners with the opportunity of gaining learning experiences 24 hours of every 7 week days without tampering with the learners leisure time.

- The system has the capability of employing the services of most experienced personnel in different areas of need which is not possible in traditional classroom setting.
- Another educational value is the intellectual and social partnership created by the technology of virtual classroom. Students in their use of technological equipments cultivate the habit of leadership role in relation to other students (Husu, 2000). The implication is that the technology used increases group cohesion and mutual support more especially in remote classrooms. Besides the virtual classroom enables the students to develop a range of communicative skills that enable them perform creditably in class.
- Cost effectiveness is a great advantage. Virtual classroom saves money, time and transport for students. The students who are motivated could work on their own at their home environment without wasting time and money to travel to school.
- The teacher equally enjoys the teaching because everything is digital and these works in general are sent through e-mail typed. The teacher can easily re-use his materials and can easily get materials elsewhere.
- The system can prove quite advantageous to the students in various ways with regard to its on-line features. It will help in admission, information about the courses and academic activities, assignments and projects, tests and evaluation, grading and results, faculty available for interaction, guidance and needed help, information about the commencement of the public examinations, merit schemes, entry in a vocational and professional streams etc.

Despite the merits of virtual classrooms as listed above, there are some demerits associated with it. They include the following:

- Flexibility of the system: The flexibility of the system to the learners as they go about their studies with ease and convenience, comforts and adjustment of the space and timings to suit them could be abused. When they are young in age and immature to handle responsibilities to build up their career, they play away their time and fall short of expectation in the long run.
- Poor quality of organization and the poor quality of study materials with low quality of teaching staff make virtual classroom unacceptable in quality educational pursuit. The staff inefficiency and low productivity will adversely affect the students enrolled in the system which will affect the overall assessment of the virtual classroom.
- Training problem of personnels: In a virtual classroom, professional training is very essential. University professions who are not trained in computer and internet functions should not operate effectively. Consequently, the professors should undergo training because the more conversant they are with the online services, the more efficient the teaching strategy and curriculum would be.
- The virtual classroom is not providing real classroom experiment such as teacher-student face-to-face interactions. The warmth of teacher-student relationship is absent in virtual classroom.
- Students at times generate problems for themselves by enrolling on online classes without an e-mail address or account with an internet service. This means that they cannot assess information for virtual classroom consumption. Consequently, they cannot achieve their objectives of effective learning.
- Effective participation in virtual classroom requires 'robust hardware and a broad band internet connection'. Some classrooms or computer labs may not have computers that meet the minimum or recommended specification for optimal use of virtual world (Stacy & Liz, 2008).

- Standard for accessibility is limited. Virtual words do not operate with screen readers which makes the virtual impaired not to benefit from virtual worlds.

### **Theoretical support for Virtual Classroom**

Constructivism is a concept that indicates that knowledge is constructed through an individual's association with a given environment. Individuals in other words construct knowledge of their own when they are actively involved in learning by doing and sharing ideas with peers. In the process, the learner uses sensory knowledge in constructing meaning out of a given task. This concept believes in interacting with the environment by navigating through physical space, reading skills, field trips, research projects, workshops and presentations. Constructivists lay much emphasis on collaborative learning principles. It states that a group of learners, when they team up to solve a given problem, when provided with adequate information and cognitive tools to assist them, they would collaboratively create meaning through their interactions with each other and with the tools (Jonassen, 1997).

On the other hand, in the social learning theory, Bandura (1976) opined that learning is a cognitive process that takes place in a social context. This context could be observed through imitation of behaviours that occur in the immediate contexts of the individual. The tenets of social theory of Bandura are as follows:

- Learning is not purely behavioural, rather it is a cognitive process that takes place in a social context.
- Learning can occur by observing a behavior with its consequences.
- Learning is a function of observation, extraction of information from those observations and making decisions about the performance of the behavior (observational learning or modeling).
- Reinforcement plays a role in learning but is not entirely responsible for learning.
- The learner is not a passive recipient of information. Cognition, environment and behavior all mutually influencing each other (reciprocal determinism).

### **The Relationship Between Constructivist Learning and Virtual Classroom**

The constructivist learning and virtual classroom are relatively related in various forms as outlined below: (Chen, 2000).

1. Constructivist learning is always interesting, attractive, problem representing with contextual issues that surround the problem. But virtual classroom can present problem to students in a three dimensional environments that can portray the real world situation.
2. Constructive learning can give interpretations of a problem to encourage various ways of thinking. While virtual classroom can present multiple viewpoints, independent controlled viewpoints for each learner and can do away with negative elements that would divert the attention of the learner in the learning process.
3. In constructive learning approach, the learner utilizes his sensory potentials to construct meaning out of a given concept. But the virtual learning creates problem space for free exploration. Here feedback and interaction can be observed through visual, auditory and other cues by participating learners.
4. In constructivist learning understanding is enhanced by experience. On the other hand in the virtual classroom, virtual experience is provided without words or pictures. This creates indelible meaning in the students mind without further explanation.

5. Constructivist learning requires the learner to construct his own knowledge. But in the virtual learning, there is no pattern. Any type of interaction is permitted.
6. Constructivist learning provides rich sources of information. Also virtual classroom contains required information and can be supported with other technological gadgets for more relevant information through the web.
7. In constructivist learning, conversation and collaboration tools are used to access and share information and knowledge to help learners construct socially shared knowledge. But in virtual classroom, a shared space for a group of learners could be provided to collaboratively construct knowledge through synchronous and/or asynchronous communication. It could also take control of virtual bodies to actualize the reality of collaborative process.

Linking the virtual classrooms to the theory of constructivism, the participants make use of affordable computers to generate experiences from the virtual environment which are displayed in a computer monitor. Usually, there are interactions with other students as the world collaboratively work in teams. The fact was noted in Chen (No date) who reported that human interaction with the generated virtual world could be done via input technological devices.

Again, when participants are connected to virtual reality system to the networks, it will allow students who are at different locations geographically to interact and also they will be experiencing the same virtual learning worlds. The students do work in groups and ideas are shared and the outcomes of their activities are clearly observed by every participants. Subsequently, these activities which are seen normally influence others behavior in the virtual classroom environment. Therefore, Bandura's social learning theory is in support of virtual classroom learning environment. The networked virtual world available do allow mimic to real-world form of collaborative activities definitely enhance learning experiences.

## LITERATURE REVIEW

Virtual classroom has no single definition because the system is characterized as the learning devoid of time and space. Learning is continuously adopting new formats involving advanced technologies such as multimedia, internet, blogs, website, mobile phone and wikis as these are accessed in the internet. Virtual learning is not a factor that is confined in the walls of a traditional classroom. According to Lokie (2011), virtual learning expands the possibility of using internet facilities, platforms, satellite links, and related system to access, analyse, create, exchange, and use data, information, and knowledge in ways which until recently, were almost unimaginable. In effect, it involves learning acquired by students through the interaction of digitally delivered content. It involves network-based inputs and tutoring support obtained on no-line tool and media such as internet, intranets, extranets, simulations and games, virtual worlds, clouds, satellite broadcasts and web platforms (Jarman, 2011; Schutt & Linegar, 2013; Pelet & Lecarte, 2012). Besides, learning is equally actualized through the use and integration of electronic discourses, such as e-mail, portal, downloadable – executable-file face-book, social networking, web platform electronic dissertations and e-portfolios among others (Bouchard, 2011; Weller, 2010, Wells, de Lange & Fieger, 2008). Moreso, Kharbach, (2013), opined that mobile learning is the ability to obtain or provide educational content on personal pocket devices such as PDAs, smart phones and mobile phones. These devices help the students to actualize virtual learning potentials.

Virtual classroom is actualized through various process such as online learning, web-based training and technology delivered instructions. All these Virtual Learning Environments (VLEs) are defined as computer-based environments which are relatively open systems. They operate by allowing interactions and encounters with other participants who equally have access to a wide range of resources (Pelet & Lecarte, 2013). Downes (2009), Fournier & Kop (2011), Merrih, (2009) all agree that VLEs provide tools that are customized for education. Even in higher education, these tools have become very popular for learning among the students because of the increase in internet technology.

The advent of Information and Communication Technology (ICT) gave rise to the institution of virtual classroom or virtual world. Information and communications technology has rapidly covered the whole nations of the world, improving the technological awareness of students and various individuals in their pursuit to acquire diverse knowledge to harness their professional dreams. With this explosive awareness of technological knowledge, the higher education environment is expected to expand focus on meeting students' expectations with more attention in widening the students' greater involvement in ICT. It is through this ICT that students could develop the lifelong learning skills that would enable them cope with emergencies of new subject disciplines and increased utilization of technology in learning. The potentials of ICT in molding students for greater achievements cannot be overemphasized. Through ICT, innovative learning approaches such as virtual learning is already being widely explored both in traditional and non-traditional educational settings all over the nations. For this course, Crawford and Kirby (2008) noted, the utilization of relevant virtual learning has never been more important and should therefore be a significant element of this generation's approach to education, socializing and normalizing.

Virtual classroom is based on Information and Communication Technology. Tertiary institution should integrate virtual learning effectively into their systems because the world is becoming more technologically inclined. That was why Oye, Lahad, Madar & Ab. Rahim (2012) called the new technological trend an e-driven world. This e-driven world has brought unimaginable changes in all aspects of life. Consequently, students should be well equipped through virtual learning to provide them with the necessary experiences for personal growth and development.

In their contribution, Olibie, Ezoem and Ekene (2014) described virtual learning as an enabling process, which depends on learners awareness. For virtual learning to be achieved, there must be awareness to knowledge and understanding of the meaning, structure and the components of any new technology. When this is done, it will provide the base for effective learning among the students in the universities. In addition, Virtual Learning Environment (VLEs) are defined as computer-based environments that are relatively open systems, allowing interactions and encounters with other participants and providing access to a wide range of resources (Pelet and Lacarte, 2012). The VLEs offer technological gadgets that are customized for education (Downes, 2009; Fourmer & Knof; Olibie et al; 2014:35).

Nevertheless, studies conducted recently have investigated the investigated the roles of synchronous and asynchronous online system at a distance (Fallon, 2011a, 2011b). Hrastinski (2008) compared the types of students interactions which are important in online distance learning (ODL). These are; related content, planning of tasks and social support. When the analysis of the oral discussion of two groups of students; the findings revealed that the related content interactions on asynchrous groups, and the social support communication in the synchronous chat platforms. In the discussion of results in relation to Kock (2005), he

indicated that synchronous communication seemed to have “increased psychological arousal” (Hrastinski, 2008:53) via its ability to disseminate information that show the features of nurtural media. For instance, immediacy, feedback, facial or oral expression and body language. The suggestion was that students might have felt more opportuned in regard to using the synchronous chat to, “exchange social support and discuss less complex issues... since this type of communication more closely resembles face-to-face interaction (Hrastinski, 2008:54).

In all, Hrastinski revealed that the asynchronous platforms showed better in facilitating deeper cognitive involvement as suggested in Garrison and Cleveland – Innes (2005) whereas, synchronous learning platforms enhanced less formal, or social, involvement. The two are very important in Open and Distance Learning experience.

This paper explores the impacts of virtual classrooms have generally on students’ academic performance, the adverse impacts it has on their learning, the level of students preparedness to be part of the online learning and to ascertain areas of improvement as perceived by the students. The problem of this study pose as a question is: How would the virtual classroom be structured so as to have greet impacts on students’ academic performance generally and improvement done in some areas for better students participation in an online learning? Providing answers to this question is the thrust of this paper.

### **Aim and Objectives of the Study**

The main aim of this paper is to ascertain the impacts of virtual classroom on the academic performance of students who have engaged or are still engaging in the virtual classroom programme.

Specifically, this paper sought to:

1. determine the positive impacts of virtual classrooms on Nigerian federal and state university students’ learning.
2. identify the adverse impacts of virtual classrooms on Nigerian federal and state university students’ learning.
3. investigate the extent of Nigerian federal and state university students’ preparedness to be participating in virtual classrooms.
4. ascertain the areas of improvement as perceived by the Nigerian federal and state university students for enhancement of learning in virtual classrooms.

### **Research Questions**

1. What positive impacts do virtual classrooms have on Nigerian federal and state university students’ learning?
2. What are the adverse impacts of virtual classrooms on Nigerian federal and state university students’ learning?
3. To what extent are the Nigerian federal and state university students prepared to be participating in virtual classrooms?
4. What are the areas of improvement as perceived by the Nigerian federal and state university students’ for enhancement of their learning in virtual classroom?

### **Hypotheses**

Four hypotheses were tested at 0.05 level of significance as stated below:

1. The main ratings of Nigerian federal and state university students on the positive impacts of virtual classrooms will not differ significantly.
2. The mean ratings of Nigerian federal and state university students' on the adverse impacts of virtual classrooms will not differ significantly
3. There is no significant difference in the mean ratings of Nigerian federal and state university students on the extent of their preparedness to be participating in virtual classrooms learning.
4. There is no significant difference in the mean ratings of Nigerian federal and state university students on the areas of improvement as perceived by them for enhancement of their learning in virtual classrooms.

## Methodology

The study adopted a descriptive survey research which sought to ascertain the impacts of virtual classrooms on the students of Nigerian universities' academic performance. This design sought to collect information from the subjects without the manipulation of any variable. The study was carried out in the faculties of education in the two federal universities and two state universities of the South-East zone of Nigeria. The two selected federal universities were; The University of Nigeria, Nsukka (UNN) in Enugu State and Nnamdi Azikiwe University (NAU) of Anambra State. The two state universities identified for the study were; Imo State University (IMSU) and Anambra State University, Uli (ANSU). There are four federal and five state universities in the South-East zone of Nigeria.

The targeted population from the two federal universities was 886 while that of the two state universities was 512. Therefore, the total population was 1,398. The stratified random sampling technique based on ownership was used to select two federal and two state universities. Simple random sampling technique based on balloting and students' consent were used to draw the sample size of 280 for the Nigerian federal university students and 226 for the state university students. The students who were involved in online programmes in the last one year and those who are currently in the virtual classrooms program. In all, the sample size for this study was 506 for both federal and state universities.

The instrument for data collection was a 24 – item questionnaire developed by the researcher. The instrument comprised of five sections. Section I was to seek personal information from the respondents. Section A was designed to elicit information on the impacts of virtual classrooms; B was to elicit information on the adverse impacts of VCs; C was on the extent of students preparedness for VCs and D was on the areas of VCs improvement. The respondents were required to state their degree of agreement or disagreement on the item statement. The weightings of the responses were; Strongly Agree (SA) = 4 points; Agree (A) = 3points; Disagree (SD) = 2 points and Strongly Disagree (SD) = 1. The weightings of the responses from research question 3 will be computed using the options of; Very High Extent (VHE) = 4 points; High Extent (HE) = 3 points; Low Extent (LE) = 2 points and Very Low Extent (VLE) = 1point. The options of the responses were added like this, Viz;  $4+3+2+1 = 10/4 = 2.50$ . This is the acceptable mean while the means below 2.50 is not accepted. The instrument was face validated by two experts from the department of Measurement and Evaluation and two experts from the department of Curriculum Studies/Educational Technology, all from the University of Port Harcourt in Rivers State. The experts after examining the instrument, made some corrections based on the ambiguity of the statement, comprehensiveness, adequacy and relevance to set objectives of the study. Corrections were effected after the inputs from the experts. The instrument were trial tested on ten males and



ten females in both the University of Port Harcourt (Federal) and Niger Delta University, Bayelsa State which were not part of the area of study. The data collected were computed using Cronbach Alpha technique. The internal consistency of the instrument was obtained as thus: Section A = 0.80; Section B = 0.83; Section C = 0.79; Section D = 0.85. These reliability co-efficient values were considered appropriate for the study.

The researcher was helped with three research assistances who helped to distribute copies of the questionnaires to the students. The respondents were given enough time to respond to the questions and all the questionnaire were collected back the same day, thereby ensuring 100% percent return.

Mean scores and standard derivation were used to answer the research questions while the hypotheses were tested 0.05 level of significance using independent sample t-test statistics.

## RESULTS

The results were presented according to the research questions and hypotheses in tables 1, 2, 3, 4, 5, 6, 7 and 8.

**Research Question 1:** What positive impacts do virtual classrooms have on students' learning in Nigerian federal and state universities?

**Table 1: Mean and Standard Deviation of Federal and State Nigerian University Students on the Impacts of Virtual Classrooms on their learning**

S/N	Items on the positive impacts of VCs on Students Learning	Federal Universities		State Universities	
		$\bar{x}$	SD	$\bar{x}$	SD
1.	I learn collaboratively with others from diverse environments	3.25	0.88	3.75	0.18
2.	I have opportunity of interacting with experts from other countries	3.81	0.92	3.68	0.28
3.	I have substantial access to variety of curriculum options	3.20	1.18	2.88	1.35
4.	I learn at my own pace within and out the school	2.95	0.10	3.95	0.48
5.	I have acquired digital literacy in creativity	3.00	0.58	3.11	0.63
6.	I have not actually developed problem-solving skills in VCs	3.18	0.71	2.75	0.32
	<b>Total Mean</b>	<b>3.23</b>	<b>0.73</b>	<b>3.35</b>	<b>0.54</b>

The result of data presented as shown in table 1 revealed that students in federal universities had a mean of 3.25 (SD = 0.88) for item 1, while students in state universities had a mean of 3.75 (SD = 0.18). For other items from 2 – 5, the mean values obtained were 3.81, 3.20, 2.95, 3.00 and 3.18 with their corresponding standard deviation as (0.92, 1.18, 0.10, 0.58 and 0.71). For the state universities, the mean values obtained were; 3.75, 3.68, 2.88, 3.95, 3.11 and 2.75 with their corresponding standard deviation as (0.18, 0.28, 1.35, 0.48, 0.63, 0.32). This is an indication that VCs had positive impacts on both the federal and state universities students. A grand mean of 3.23 and 3.35 were obtained for both federal and state universities respectively. These values showed no significant difference. This is an indication that VCs had positive impacts on both the federal and state universities students.

**Research Question 2:** What adverse impacts do virtual classroom have on students' learning in Nigerian federal and state universities?

**Table 2: Mean and Standard Deviation of Federal and State Nigerian University Students on the Adverse Impacts of VCs on their Learning**

S/N	Items on Adverse Impacts of VCs on Students Learning	Federal Universities		State Universities	
		$\bar{x}$	SD	$\bar{x}$	SD
7.	VCs have serious demand on my time	3.12	0.92	3.00	1.02
8.	Online classes do not offer me the opportunity of hands-on-experience e.g. lab classes	2.99	0.25	2.25	0.19
9.	I lack face-to-face interactions with other students	3.55	1.92	2.85	0.11
10.	I normally get so many e-mails and bulletins which are very burdensome to me	3.65	0.33	3.51	0.33
11.	My course schedule is sometimes not developed when needed and work is not completed as when due	3.30	0.15	3.15	1.24
12.	I usually pay very high cost for my studies when compared to conventional university cost	2.18	0.10	2.22	0.17
	<b>Total Mean</b>	<b>2.58</b>	<b>0.61</b>	<b>3.00</b>	<b>0.51</b>

The data in table 2 showed vividly that all the listed items from numbers 7-11 scored up to the acceptable mean of 2.50, thereby indicating that some items like; virtual classrooms have serious demand on studies time, online classrooms do not offer hands-on-experience and students lack face-to-face interaction with other friends. These are among the adverse impacts of VCs on students learning in both federal and state universities in Nigeria. However, the respondents in both universities scored below the acceptable mean of 2.50 with the corresponding SDs in item number 12. This is an indication that the respondents did not agree that they paid higher fees in VCs when compared to conventional universities. However, the grand mean (3.00, SD 0.51) for the state universities showed greater adverse impacts on the state universities than the grand mean(2.58, SD = 0.61) of the federal universities. The possible reason for this might be because the state universities do not have sufficient fund to cater for their state owned universities.

**Research Question 3:** To what extent are students prepared to be participating in virtual classrooms in Nigerian federal and state universities?

**Table 3: Mean and Standard Deviation of Federal and State Nigerian University Students' Preparedness to be Participating in Virtual Classrooms**

S/N	Items on the Extent of Preparedness for continued VCs Learning	Federal Universities		State Universities	
		$\bar{x}$	SD	$\bar{x}$	SD
13.	I am prepared to continue to study in VCs	3.12	1.00	3.50	1.00
14.	I always encourage other students to register courses in VCs	3.88	0.12	2.97	0.81
15.	I am confidence that I will do very well in my online studies	3.19	0.81	3.43	0.33
16.	I have the belief that the courses I study in VCs will make us to be self-reliant	2.95	0.82	3.00	0.81
17.	I am prepared to register for more courses online because the cost is low	3.20	0.90	3.32	0.45
18.	I have enough accessibility to ICT facilities	2.18	0.18	1.95	0.16
	<b>Total Mean</b>	<b>3.09</b>	<b>0.64</b>	<b>3.03</b>	<b>0.59</b>

The results in table 3 revealed clearly that the respondents from both the federal and state universities scored up to the acceptable mean of 2.50 and above in items 13-17 with their corresponding SDs. The grand mean of both respondents are above the acceptable mean. The indication is that the students of federal and state universities are prepared to be participating in VCs. However, the grand mean (3.09) showed slightly greater interest in participation by federal universities students than the students of state universities with the grand mean of 3.03. Nevertheless, all the respondents in both universities did not agree to have enough accessibility to ICT facilities. This is indicated in their mean scores (2.18, SD = 0.18 and 1.95, SD = 0.16) which is below the acceptable mean of 2.50 for both federal and state universities.

**Research Question 4:** What are the areas of improvement as perceived by the students of Nigerian federal and state universities for enhancement of their learning in virtual classrooms?

**Table 4: Mean and Standard Deviation of Federal and State Nigerian University Students on the Areas of VCs Improvement**

S/N	Items on the Areas of Improvement as Perceived by Students	Federal Universities		State Universities	
		$\bar{x}$	SD	$\bar{x}$	SD
19.	More computers/laptops/tablets should be provided for students use	3.20	0.90	3.66	0.88
20.	Internet connectivities to be done in all the classes and computer laboratories	3.65	0.33	3.52	0.82
21.	Free accessibility to the internet networks	3.00	1.03	3.64	0.48
22.	Steady power supply	3.77	0.57	3.28	0.38
23.	Teachers are to be trained and retrained for more competency in VCs operations	3.28	0.32	3.11	0.92
24.	Removing payments for some courses for students	3.35	0.94	3.21	0.85
	<b>Total Mean</b>	<b>3.38</b>	<b>0.69</b>	<b>3.40</b>	<b>0.72</b>

The result of the data presented in table 4 above showed that all the respondents in both federal and state universities unanimously agreed that all the listed items were areas of improvements. This is shown by the fact that all the items scored up to the acceptable mean of 2.50 and above. This is an indication that for VCs to be enhanced; more computers should be provided, internet connectivities in all the classes and above all, there has to be steady power supply among others. This fact is also confirmed by the grand mean (3.38, SD = 0.69, and 3.40, SD = 0.72) of both federal and state universities.

**Table 5: t-test statistics of the Mean Ratings of Federal and State Universities on the Impacts of VCs on Students Learning**

Variation	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Federal University	280	3.23	0.73	504	5.71	1.960	Ho <sub>1</sub>
State University	226	3.35	0.54				Rejected

The independent sample t-test yielded a t-calculated value of 5.71 and the critical value of 1.960 at 504 and 0.05 alpha level. Since t-calculated is greater than the t-critical, the null hypothesis of no significant difference between the mean ratings of students from Nigerian federal and state universities on the positive impacts of VCs is therefore rejected.

**Table 6: t-test statistics of the Mean Ratings of Federal and State Universities on the Adverse Impacts of VCs**

Variation	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Federal University	280	3.00	0.51	504	8.94	1.960	Ho <sub>2</sub>
State University	226	2.58	0.61				Rejected

The independent sample t-test showed that t-calculated 8.94 and t-critical was 1.960 at degree of freedom (df) 504 and 0.05 alpha level. Since t-calculated is greater than the t-critical, the null hypothesis of no significant difference in the mean ratings of students from Nigerian federal and state universities on the adverse impacts of VCs was therefore rejected.

**Table 7: t-test statistics of the Mean Ratings of Federal and State Universities on the Extent of Continue Preparedness of Federal and State Universities Students for VCs Learning**

Variation	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Federal University	280	3.09	0.64	504	2.00	1.960	Ho <sub>3</sub>
State University	226	3.03	0.59				Rejected

The independent sample t-test above showed that t-calculated was 2.00 while t-critical was 1.960 at 504 and 0.05 level of significance. t-calculated (2.00) was greater than t-critical (1.960). Hence, we reject the null hypothesis of no significant difference between the mean ratings of students from Nigerian federal and state universities on the extent of their preparedness for continued participating in virtual classroom.

**Table 8: t-test statistics of the Mean Ratings of Federal and State Universities on the Aras of Improvement for VCs**

Variation	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Federal University	280	3.38	0.69	504	0.45	1.960	Ho <sub>4</sub>
State University	226	3.40	0.72				Rejected

The independent sample t-test in the above table showed that t-calculated was 0.45 while t-critical was 1.960 at 504 and 0.05 level of significance. t-calculated (0.45) was less than the t-critical (1.960). Since the t-calculated (0.45) was less than the t-critical (1.960), we fail to reject the null hypothesis. Hence, there is no significant difference in the mean ratings of Nigerian federal and state university student on the areas of improvement for the enhancement of learning in VCs.

## DISCUSSION OF FINDINGS

In table 1, the mean responses of students from federal and state universities indicated that students from federal and state universities indicated that that there was positive impacts on their learning in virtual classrooms. That means that students learn collaboratively, they have opportunity of interacting with other experts and they learn at their own pace. However, these positive impacts were greater on the part of the state university students when compared with their grand mean. Although, the slight difference has no significant difference. This finding is in line with the observation made in Garrison and Cleveland-Innes (2005) who opined that online learning has great effects on students' learning, although they concluded that online learning interaction needed to be structured, planned and sustained.

Again, the above finding supported the result of the study in Hay, Hodgkinson, Peltier and Drago (2004:200) who “compared students perceptions of the importance of tutor-student and student-student interactions in the face-to-face and online post-graduate business management degree programmes”. The findings revealed in all that students perceptions of teacher-learner interactions showed that “the stronger of the two interaction measures in terms of predicting effectiveness for both types of delivery” (Hay, Hodgkinson, Peltier and Drago, 2004:200). Generally, virtual classrooms have positive impacts on students’ learning in that they have sustained access to IT facilities.

In Table 2, the respondents in both the Nigerian federal and state universities reported that in as much as they agreed that the VCs had positive impacts on their learning, they also have adverse impacts on their learning. All the respondents indicated that the adverse impacts were seen on the serious demand of VCs on their time,, that online studies did not offer them the opportunity to have their hands on experience and sometimes, their course schedules were not developed as at the time they needed it. This findings is in line with the observation made in Posey, Burgess, Eason and Jones (2012) who opined that one of the most persistent problems of VCs has been the factor of time which has too much demand on the students and their teachers. Further, they pointed that lack of face-to-face interactions with other peers and the instructors can be a disadvantage for the students and teachers.

However, Becker (2001) revealed that internet based courses cannot duplicate the hands on approach students experience with an in class laboratories. The independent sample t-test showed significant difference between the mean ratings of federal and state universities students. Hence, the rejection of null hypothesis. This situation might have arisen due to the fact that some states in Nigeria may not have been providing their universities with the needed technological facilities for effective and efficient virtual classrooms activities.

The findings in table 3 showed that all the respondents from both the federal and state universities were prepared for continued participation in virtual classrooms learning. This finding complements the finding in the study carried out in Agar (2010) who examined the factors that impacting e-learning readiness among Bachelor of Education students of the University of Nairobi. His findings revealed that age was one of the factors that impact the readiness of students for e-learning. The independent t-test sample showed that there is a significant difference in the responses of students from federal and state universities. The present study is in agreement with the findings in Olanike (2013) who found that the undergraduate students of the university of Lagos were ready for e-learning. Further, he carried a study on the state of readiness of Nigerian undergraduate students for e-learning. The finding showed that the students were reading which corresponds with the finding of this study.

The results of the findings in table 4 showed that all the respondents from both federal and state universities unanimously agreed that all the listed items like; more computers/laptops, internet connectivity, free accessibility to internet networks and steady power supply were the aras to be improved for effective learning in VCs. This finding is in conformity with that of Ifeakor and Anekwe (2013) who found that internet connectivities and granting of access to them were some of the strategies for the improvement of virtual classrooms’ learning. The independent sample t-test revealed that there is no significant difference in the mean ratings of students from federal and state universities in arousing their preparedness for virtual classrooms’ learning.

## RECOMMENDATIONS

Based on the findings of this study, the recommendations are as put forward:

1. To make students to be more aware of the impacts of virtual classrooms, the lecturers in both federal and state universities should be using online teaching and communications to the students. Most times, lecturers should upload the class assignment through WhatsApp or blog platforms. Gradually, the impacts will be felt and many more students will start to develop interest in an online class.
2. The Nigerian federal and state universities should as a matter of urgency provide adequate and dependable virtual learning environment, application softwares and the necessary technological tools including effective time schedules for students learning. This will help to alleviate the adverse effects of VCs.
3. The Nigerian government should establish in all the universities a virtual classroom learning environment support centres to help meeting the technological needs of the student. This will in no doubt encourage them to be participating more in VC learning
4. The Nigerian government should donate more funds for the provision of more digital facilities needed for effective operation of VCs and for the overall improvement of the areas that need amendment.
5. The universities should have internet connectivities and grant free access to their usage by both the lecturers and the students. This will offer a good opportunity in interconnecting all the students and lecturers for virtual classrooms' learning.

## SUGGESTIONS FOR FURTHER STUDIES

This study was not all that extensive as there are other areas of expansion. The researcher therefore suggest further research areas.

1. The study could be carried out in federal, state and private universities.
2. This study could also be carried out in two geo-political zones of Nigeria other than the South-East zone. For instance, South-South and South-East geo-political zones.
3. A study could examine the impacts of teaching in virtual classrooms among the academics in Nigerian universities.

## CONTRIBUTIONS TO KNOWLEDGE

This study has contributed to knowledge in the following ways as shown below:

1. The study has established that virtual classrooms' learning has positive impacts on the students of Nigerian federal and state universities.
2. The student has revealed the adverse impacts of virtual classrooms on the students' learning experiences so as to draw the universities attentions to solving the identified problems.
3. This study has provided useful information on the continued preparedness of students to be participating in virtual classrooms which by implication has serious demands on universities authorizes for preparation of effective virtual classroom learning.
4. The study has also revealed the areas where improvement are needed for better virtual classrooms' learning which demands priority attention of the federal and state universities' authorities.

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