AVAILABILITY AND UTILIZATION OF MULTIMEDIA PROJECTORS IN TEACHING OF COMPUTER SCIENCE IN SENIOR SECONDARY SCHOOLS IN NNEWI METROPOLIS

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Abstract
This study investigated the availability and utilization of multimedia projectors in the senior secondary schools in Nnewi metropolis. Two research questions guided the study. A descriptive survey research design was adopted in the study. Population for the study comprised 8 principals, 16 vice principals and 19 computer teachers from pubic senior secondary schools in Nnewi metropolis. All the participants constituted the sample size for this study making a total of 43 participants from the 8 public senior secondary schools in Nnewi metropolis using the purposive sampling technique. Two research instruments were used to conduct this study. The first instrument was a checklist containing 14 items and titled: "Availability of Multimedia Projectors in Teaching and Learning of Computer Science Questionnaire (AMPTLCSQ)". The second research instrument was a 14-item researchers-developed questionnaire titled: "Utilization of Multimedia Projectors in Teaching and Learning of Computer Science Questionnaire (UMPTLCSQ)".Construction of the research instruments was guided by the purpose of the study and research questions. Both face validity and reliability of the research instruments were established. Method of collection was through direct observation using the checklist in order to examine the availability of the multimedia projectors. And also a personal hand delivery and on-the-spot method was used to retrieve information from the respondents concerning the utilization of the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. Data were analyzed using different statistical tools such as the frequency, simple percentages, aggregate mean statistics rated at 2.50 and standard deviation statistics. Findings of the study revealed among others that the multimedia projectors were neither available nor utilized in teaching and learning of computer science in majority of the senior secondary schools in Nnewi metropolis. Based on the findings of the study, recommendations were made and among them include that the Anambra State Government in collaboration with the Post Primary School Service Commission (PPSSC) and incorporation with the private sector should provide the necessary multimedia projectors required in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis through adequate funding, financial assistance, multimedia resources donations and facility mobilization (provision).

Keywords: *Availability, Utilization, Multimedia Projectors, Computer science*

Introduction

The Nigerian secondary school level is one of the important educational levelsin students' academics which prepare students for higher education and the world of work in the future. This level of education equally enables students acquire necessary knowledge, skills and attitudes for the development of the self and the nation. According to Chu (2017), the secondary school level offers quality education and instructions that students must learn before going for higher studies. It is education beyond the elementary grades; provided by a high school or college school. Secondary

schools therefore, offer education which is an essential ingredient towards nation building. Secondary schools give the students a wider scope and perspective about the education and what career choices to make in the future. Hence, secondary school education is important for both students' development and national development (Tabotndip, 2004). Chu (2017) further stated that secondary school locally may be called high school or senior high school. In some countries like Nigeria, there are two phases or stages to the secondary education level, that is, the Junior Secondary School level (JSS – lower secondary education stage), which covers junior classes 1 to 3 and Senior Secondary School level (SSS – upper secondary education stage) also referred to as the Post-Basic Education and Career Development (PBECD) in the National Policy on Education (NPE)document by the Federal Republic of Nigeria (FRN, 2014), covering from senior classes 4 to 6. Some secondary schools provide both lower secondary education and upper secondary education in one school, but these can also be provided in separate schools as well in some parts of Nigerian Schools

First phase of the junior secondary education builds on primary education, typically with a more subject-oriented curriculum; while the second and final phase of the senior secondary education prepare students for higher education and provide skills relevant to employment; usually with an increased range of subject options and streams. Different subjects are offered in the senior secondary school curriculum in various fields of studies such as science and mathematics, technology, humanities, business studies, including other compulsory cross-cutting subjects as English language, general mathematics, trade/entrepreneurship education and civic education (FRN, 2014) in order to provide learning experiences that build on secondary education and prepare students for labour market entry or tertiary education (Chu, 2017). Supporting the above statements, Tabotndip (2004) opinioned that the 6-years course of secondary schooling was divided into two stages of three years each, called the junior and senior schools. While the junior secondary is both academic and pre-vocationally oriented, the senior secondary stage provides comprehensive education preparing the students for higher education work and living. The junior secondary school leaving certificate is based on continual assessment while the senior secondary school certificate is based on a national final examination (The West African Examinations Council and the National Examinations Council Examination).

In the Nigerian situation, senior secondary education is the basic or raw material provider for the desired future manpower resources. Taiwocited in Tabotndip (2004) observed that the senior secondary schooling is of great importance to the nation because it is a source of mid-level manpower production that is necessary to sustain and improve the economy. Thus, is the need for the products of senior secondary education to be effectively and efficiently treated with and exposed to wider subjects from different fields of studies in order to achieve the noble objectives of secondary education for sustainable national development in the Nigerian society. Therefore, the goals and objectives of secondary education in the country including those in Nnewi Metropolis, are expected to offer diversified curriculum so as to cater for the differences in talents, dispositions, opportunities and future roles possessed by or open to students after their secondary school course. And likewise, equip students with technological skills to live effectively in the modern age of science and technology. However, at the senior secondary school level which is basically the main focus of this present study, subjects like computer science is offered in the field of science to equip students with the basic knowledge of computer fundamentals, data processing, and other computer software and networking applications. Computer science also referred to as computer education studies or data processing in most Nigerian educational institutions is one of the science subjects taught in the senior secondary school curriculum which was approved by the educational board with the aim of equipping students with the knowledge, concepts of computer and its application in a fast growing ICT-driven economy. Rapaport (2017) described computer science as the science of how machines can be made to carry out intellectual processes. The goal of computer science in this definition is to endow these information processing devices with as much intelligent behaviour as possible. Computer science is the science and study of computers. That is, how to get computers to do what humans can do. In the same manner, Belford (2022) viewed computer science as the study of computers and computing, as well as, their theoretical and practical applications. It can equally be described as the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information. Computer science

emerged as an independent discipline in the early 1960s, although the electronic digital computer, that is, the object of its study was invented some two decades earlier. The discipline of computer science as further indicated by Belford (2022) includes the study of algorithms and data structures, computer and network design, modeling data and information processes, and artificial intelligence. This field of computer science is known as information or data management. Computer science draws some of its foundations from mathematics, engineering and logic to a plethora of functions, and therefore incorporates techniques from areas such as queuing theory, probability and statistics, electronic circuit design, and including algorithm formulation, soft ware and hardware development, and intelligence. Computer science also makes heavy use of hypothesis testing and experimentation during the conceptualization, design, measurement, and refinement of new algorithms, information structures, and computer architectures (Belford, 2022).

From a layman's understanding, computer science can be conceived as the use of various computers or computing devices to carryout operations and functionsin order to accomplish task. Besides, a computer is an electronic device that performs operations based on instructions provided by a software or hardware program. It is an electronic gadget capable of accepting un-processed input (data) through an input device, process them and produce output (information). A computer has the ability to accept data (input), process it, and then produce outputs. Computers can also store data for later uses in appropriate storage devices, and retrieve whenever it is necessary. Modern computers are electronic devices used for a variety of purposes ranging from browsing the web, writing documents, editing videos, creating applications, playing video games, etc. They are designed to execute applications and provide a variety of solutions by combining integrated hardware and software components. In other words, any computer device is designed to execute applications and provides a variety of solutions by combining integrated hardware and software components (Technopedia, 2020). From the foregoing discussions, the study of computer science at the senior secondary school level is of utmost importance and deemed necessary especially during this 21stcentury technology and knowledge-based economy age. Its importance as observed by McVeigh-Murphy (2019) includes that, the study of computer science teaches students how to think, learn and grow in both their studies, work and economy. With the knowledge of how programming languages work, how computing systems operate, and how networks drive connectivity, students understand technology and its adaptations and advancements – how to develop, troubleshoot, improve, and use it. The study of computer science is further essential for preparing students for the future of work. By teaching secondary school students about this domain, schools work to fill an inadequate pipeline of computer science graduates and workers, enhance this profession with a focus on equity, build digital skills that are expected of workers in nearly any profession, and cultivate adaptability by future proofing students' skill sets (McVeigh-Murphy, 2019). Given the important benefits of studying computer science education to both the Nigerian educational system and development of the society generally, education stakeholders and practitioners like the curriculum developers, government, policy makers, educational administrators and teachers have shown priority concern towards introducing this course(subject) into the various school curriculum to expose students to the knowledge of computer science. Oladimeji, Yusuf, Njoku and Owolabi (2018) opined that it was based on the premise that knowledge of computer science education was of paramount importance to national development that the Federal government of Nigeria introduced and incorporated computer studies into the education system from primary schools through secondary schools to tertiary institutions. Also, couple with the fact that many education systems around the world face formidable challenges that are taxing conventional strategies, therefore, fresh approaches are needed in order to address the persistent problems of the past and provide students with an education (that is, computer science) appropriate to the needs of a modern, information-based global economy. Thus, after more than two decades of unfulfilled promises to revolutionized education, computer and communication technologies were finally able to offer opportunities to significantly improve teaching and learning and also provide solutions to educational challenges; which has equally prompted the teaching and learning of computer science in schools (Oladimeji, Yusuf, Njoku & Owolabi, 2018).Moreover, effective teaching and learning of computer science cannot be made possible without supporting its instructions with the use of adequate technological resources (both hardware and software technologies). Teaching and learning in computer science is highly impeccable and promoted to make remarkable

impact/impression when students are exposed to the lesson with the support of any technology.
To effectively teach computer science which will create understanding especially among secondary school students within Nnewi Metropolis, there is the need to provide multimedia technological gadgets such as computers like laptops, desktops, projectors, electricity, computer screen, an including other computer accessories. Students basically learn faster when teaching is highly supported with technological facilities like the multimedia. This statement is equally supported with the comments of Oladimeji, Yusuf, Njoku and Owolabi (2018), which indicated that in any educational system, the level of available resources places a restriction on the degree to which any new subject can be introduced into the school curriculum, especially where only the most basic facilities have so far been provided. Teachers in Nigerian secondary schools cannot implement computer science education because majority of the schools do not have adequate access to multimedia technology infrastructure for a number of reasons (Yusuf, 2005). Hence, Lau and Sim (2008) cited in Oladimeji, Yusuf, Njoku and Owolabi (2018) proposed the need to appropriately put in place measures which will ensure that adequate access to multimedia technology infrastructure and technical support are provided in secondary schools for effective teaching and learning of computer science. Furthermore, a multimedia technology according to the IGI Global Partnerships (2022) refers to applications and technologies that manipulate text, data, images, animations, sound and full-motion-video objects to deliver information. Given the usage of multiple formats, multimedia is capable of delivering a stronger and more engaging message than standard text. Multimedia files are typically larger than text-based information and are therefore usually stored on CD-ROMs. Video games and educational software commonly use multimedia. According to Sahet (2008), the multimedia is simply multiple forms of media integrated together. An example of multimedia is a web page with an animation. Besides multiple types of media being integrated with one another, multimedia can also stand for interactive types of media such as video games, CD ROMs that teach a foreign language, or an information Kiosk at a subway terminal. Multimedia has therefore, become a huge force in education. Practically, any type of information one receives can be categorized as multimedia, from television, to magazines, to web pages, to movies, multimedia is a tremendous force in both informing the students and entertaining them.

Multimedia in education has been extremely effective in teaching individuals a wide range of subjects including in computer science. The human brain learns using many senses such as sight, touch, smell and hearing. While a lesson taught can be extremely informative, a lesson that integrates pictures or video images can help students learn and retain information much more effectively. As technology progresses, so as the multimedia technology. Today, there are many new media technologies being used to create the complete multimedia experience. For instance, virtual reality integrates the sense of touch with video and audio media to immerse an individual into a virtual world. Other media technologies being developed include the sense of smell that can be transmitted via the Internet from one individual to another. Today's video games include bio feed back which can be used to improve instructions (Sahet, 2008). From the discussions of Sahet (2008), the projector can be termed as one of the multimedia technologies which is useful in teaching and learning of computer science in secondary schools. This may include the image projector, a device that projects an image on a surface 3D projection, a method of mapping three-dimensional points to a two-dimensional plane. Video projector, which is termed a device that projects a video signal from computer, home theater system, etc. Movie projector, which is a device that projects moving pictures from a filmstrip, slide projector, among others.

Wajid (2012) opined that the multimedia projector is part of a multimedia technology which is a compact, high resolution, full-colour projector capable of projecting text, images, video and audio content. Typically, the multimedia projector will feature inputs for a computer, DVD player, VCR, CD player and storage device. A video projector or multimedia projector takes a video signal, converts it into a viewable image, and projects it on a screen. It can be used to present PowerPoint slide shows, TV and DVDs, video games, and a lot more information .A multimedia projector processes a specific video signal and projects a corresponding image on a large screen using a lens system (Turcotte, 2022).Turcotte further opined that the multimedia projectors used in teaching and learning of computer science projects an image on a screen, although they vary according to their

types. There are a number of features available, however, that expand this basic functionality. Some multimedia projectors can be configured to project a computer's video signal, outputs from DVD players, and also direct connections from cable and satellite systems. Depending on the needs of the user and their project, there is a projection device designed for almost every application, level of quality, and size of audience. Multimedia projectors are used frequently in classrooms and gatherings at which multimedia presentations are made in order to use such in-built lamp and lens to project smaller images onto a large screen. In filming a computer science class, for example, the teacher can integrate selected video sequences into a slide show of note pages. These projectors can be connected to DVD players, computers and other media sources for presentation and information display. They are popular choices for giving presentations and showing films during teaching and learning of computer science. In essence, the advantages of utilizing the multimedia projectors in teaching and learning of computer science are enormous. Amin, Azim and Kalam (2018) and Cleaver (2020) expressed that using multimedia projectors in the computer science classroom helps the teacher engage the students, helps the student become more involved, aids easier note taking through PowerPoint presentations, improves better use of class time and enables students retain more information from the lesson. Millions of students are using multimedia technology to complete assignments, collaborate with others around the world, research new possibilities and generate hypotheses. Video can take students on a field trip around the world, show science or lab experiments and help explain abstract or new ideas. Multimedia instruction can accommodate many varieties of learning styles, encouraging hard to-reach students in the classroom, and engages students with impactful visuals that leave a lasting memory. Students not only demonstrate mastery and knowledge of a subject to their teacher, but they can broadcast and demonstrate that information around the world. Not only can they share their own work, but they can view so many other resources and gather data from around the world as well educators (Amin, Azim &Kalam, 2018; Cleaver, 2020).

With classroom multimedia projectors, learning could be made easier, more profound and much more fruitful. In fact, all computer science teachers are now expected to make use of the multimedia projector in the teaching and learning environment to improve the students' performance in computer science at senior secondary level which will henceforth enhance future success on the course at tertiary level, personal and societal development. Teachers can use a variety of multimedia and technology tools in their classrooms to appeal to each and every learning style. Texting, video instruction, online games, and podcasts are just some examples of the wonderful and influential technology available to educators (Amin, Azim &Kalam, 2018; Cleaver, 2020). Examples of multimedia projectors that can be used in teaching and learning of computer science will include the wall projectors, interactive projectors, slide projectors, filmstrips projectors, overhead projectors, LCD(Liquid Crystal Display)projectors, HD (High Definition) LED projector such as home theater projectors, mini LED(Light Emitting Diode) multimedia projector, Standalone LED projectors**,** Embedded LED Projectors**,** Media Player**,** USB LED Projectors that allows users to connect an external device to their body using a USB cable, video projectors, CRT (Cathode Ray Tube – commonly used in the early days) projectors, DLP (Digital Light Processing)projectors, Opaque projector, Nebula projector, Movie projector, Short Throw (UST) projector, and Optoma projector, among others(Chugh, 2021;Diaconis, 2020; Swifter Mall, 2022). All these aforementioned multimedia projectors with their different roles and functions can be very useful in teaching and learning of computer science education in secondary schools in Nnewi Metropolis only when they are adequately available and highly utilized. Availability of the multimedia projectors as described by Uzuegbu, Mbadiwe and Anulobi (2013) relates to how much the multimedia projectors are on hand, to which teachers and learners have access to. As a concept, it is an umbrella term that denotes the serviceability, resilience, reliability and maintainability of a component instrument. This summarily tells of the ability of the component to perform its required functions at a stated instance or over a stated period of time. Meanwhile, utilization of multimedia projectors entails the degree of usage of a given material in the execution of a given task such as teaching and learning. In sum, the use of multimedia projectors for teaching and learning of computer science education is the instance of utilization in this study (Uzuegbu, Mbadiwe & Anulobi, 2013).To make teaching and learning of computer science interesting in senior secondary schools in Nnewi Metropolis, computer science teachers have to make adequate use instructional materials such as the multimedia projector.

Therefore, for a rich learning environment, there is need for secondary school students to have access to the multimedia projectors and also for computer science teachers to be equipped with the multimedia projector gadgets for effective teaching and learning of computer science at senior secondary educational level. More so, it is one thing to make the multimedia projectors available in schools but another thing for teachers to effectively utilize them in order to promote effective teaching and learning in schools. Notwithstanding, the benefits and importance of the multimedia projects in teaching and learning in any subject, yet many senior secondary schools including those in Nnewi Metropolis are found wanting in utilizing most of these technologies. Many of the teachers in Nnewi Metropolis seem to still lack the basic knowledge, competence and also find it difficult to use the multimedia projectors in their classrooms.

Traditionally, classroom teachers in the senior secondary schools in Nnewi Metropolis still relied heavily on the 'talk-chalk' method during their teaching, which raises and poses a lot of questions on availability and utilization of the multimedia projectors in teaching and learning of such subject like computer science at the senior secondary school level. This poor situation has equally been observed in the comments of Owe and Anulobi (2013)which indicated that the utilization of instructional materials including technological resources in schools were limited because of their low/lack of availability. Several empirical studies have been conducted by different researchers on use of various multimedia technologies or ICT resources such as the computers, projectors, among others, in teaching and learning in the classrooms.

Statement of the Problem

The study of computer science in the senior secondary schools is an area of increasing interest and concern to educators as well as to computer science professionals. Since the use of computers including other Information Technologies is becoming so vast in the Nigerian society and in Nnewi thus the introduction of computer science in senior secondary schools' curriculum to expose students to the knowledge, principles and uses of computers to solve both educational and human problems. However, computer science cannot be effectively taught or learnt in school without the use and support of technological resources and gadgets. The multimedia projectors not only enhance teaching and learning but also exposes students to the reality of the lesson(s) presented in the classroom for better understanding. Multimedia projectors however creates opportunities where students learn through images, text, videos, films, animation clips, among others, in order to improve learning. Notwithstanding all the significant benefits of using multimedia projectors in teaching and learning of such subjects as computer science in the senior secondary schools in Nnewi Metropolis, yet many teachers still rely on the old traditional and conventional methods of teaching with 'Chalk and Talk. Most of the teachers seem not proficient in using the multimedia projectors in delivering their lesson. The consequences of this practice is that students will continue to have abstract knowledge of any teacher's presentation or lesson in the classroom without in-depth knowledge. Again, without the use of multimedia projectors in the classroom, students will not be exposed to knowledge of operating this technology in future. This poor situation is also detrimental towards equipping students with the necessary technology skills and competences needed to survive in this current knowledge-based economy and technology age. Thus, the need to examine the availability and utilization of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis, which is the problem of this present study and also the gap in which this study sought to fill

Purpose of the Study

The purpose of this study was to examine the availability and utilization of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. Specifically, the study aimed at;

1.Ascertaining the availability of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis.
2. Finding out teachers utilization of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis.

Research Questions

The following research questions guided this study;

1. How available are the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis?
2. How do teachers utilize the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis?

Methods

A descriptive survey research design was adopted in the study. Population for the study comprised 8 principals, 16 vice principals and 19 computer science teachers from 8 pubic senior secondary schools in Nnewi metropolis. All the 43 participants from the 8 public senior secondary schools in Nnewi metropolis constituted the sample size for this present study using the purposive sampling technique. Two research instruments were used to conduct this study. The first instrument was a checklist containing 14 items and titled: "Availability of Multimedia Projectors in Teaching and Learning of Computer Science Questionnaire (AMPTLCSQ)". The second research instrument was a 14-item researchers-developed questionnaire titled: "Utilization of Multimedia Projectors in Teaching and Learning of Computer Science Questionnaire (UMPTLCSQ)". The two instruments were submitted to three experts in computer science department including a Measurement and Evaluation expert from Nnamdi Azikiwe University, Awka, Anambra State who validated the instruments in terms of the wordings, grammatical errors, sentence construction and face value of the instruments. Reliability of the instrument (UMPTLCSQ) was determined through a pilot-test that was conducted and measured and correlated using the Pearson correlation (r)formulae. The reliability score arrived at a coefficient of interval consistency (r) value of 0.81, showing the UMPTLCSQ instrument was reliable and fit for data collection. The researchers engaged the services of five research assistants who assisted in distribution of the questionnaire to the respondents. These research assistants were given directives on how to collect information using both the checklist and questionnaire from the respondents. The analysis was done using frequency and percentage.

Results

Research Question 1: How available are the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis?

Table 1: Percentage Scores on Availability of the Multimedia Projectors in Teaching and Learning of Computer Science in the Senior Secondary Schools in Nnewi Metropolis

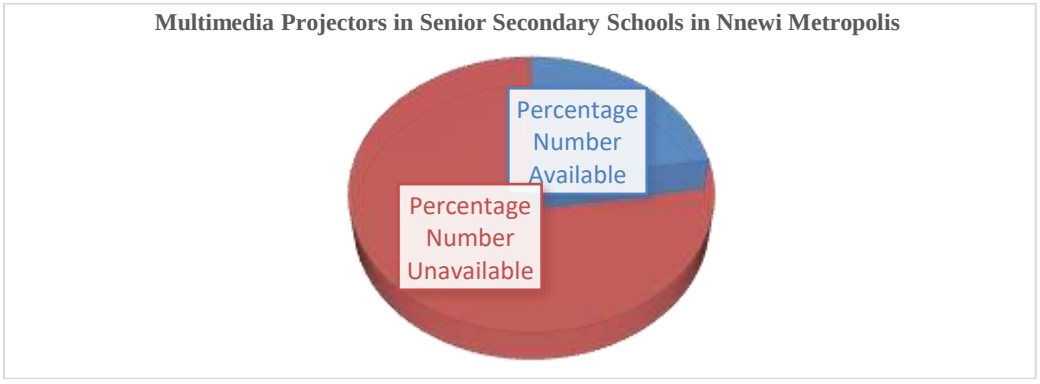
N = (8 Public Secondary Schools)

S/N	Items	Number of Schools Expected	N0. Available		N0. Unavailable	
		8	(F)	(%)	(F)	(%)
1.	Overhead projector traditionally used in the classroom, which works by shining light through a translucent sheet with writing or illustrations on it, casting images onto a screen or whiteboard	8	3	37.5	5	62.5
2.	Film strips projector which has length of 35mm film that project series of still pictures on one roll of film	8	2	25	6	75
3.	Slide projector which shines light through a photograph made into a slide to produce a larger image on a screen	8	2	25	6	75
4.	Modern Digital Light Processing (DLP) projector which makes use of tiny mirrors that reflect light towards the screen	8	1	12.5	7	87.5
5.	Liquid Crystal Display (LCD) projector which uses the liquid crystal display technology that can be found in televisions and monitors to create images using multiple elaborate colours of red, green and blue so that the image is completely coloured	8	0	0	0	0
6.	Light-Emitting Diode (LED) projector which uses the LED lamps as it light source	8	0	0	0	0
7.	Liquid Crystal on Silicon (LCOS) projector which uses three chips to modulate light in red, green and blue channels	8	0	0	0	0
8.	Laser projector which relies on solid-state laser instead of lamp for its light source	8	0	0	0	0
9.	Opaque projector which displays opaque materials by shining a					

	bright lamp onto the object from above likewise used to project images of book pages, drawings, mineral specimens, leaves, etc	8	0	0	0	0
10.	Nebula projector which is a mini, portable and lightweight projector that normally works in three different ways as a standalone projector, where apps can be downloaded and streamed right through with the use of Wifi, wireless and sometimes wired with HDMI Cable	8	0	0	0	0
11.	Cathode Ray Tube (CRT) projector which is one of the most popular types of video projecting device with high brightness, having a tiny cathode ray tube and lens to control the size of the projection	8	1	12.5	7	87.5
12.	Movie projector which is strictly 1080P, solely used for the purpose of projecting movies in widescreen	8	0	0	0	0
13.	Short Throw (UST) projector which has a wide angle lens, easy to install and are placed just under the screen	8	0	0	0	0
14.	Optoma projector popularly known for their video and audio accessories, compatibility with 3D players, equipped with a short throw lens, which has great colours, perfectly designed for gaming including entertainment used comfortably in field of education	8	0	0	0	0
	Total		**22.5%**			**77.5%**

(F = Frequency; % = Percentage)

Analysis of result presented from above Table 1, as shown from the percentage score on the availability of the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis indicated that 22.5% of the multimedia projectors were scantly available in teaching and learning of computer science in a few senior secondary schools in Nnewi metropolis; while 77.5% of the multimedia projectors were highly and grossly unavailable in teaching and learning of computer science in the senior secondary schools. This result showed that items 1 to 4 and 11 were considered under scantly available multimedia projectors in a few senior secondary schools in Nnewi metropolis. The result further showed that such multimedia projectors as the Overhead projector, Film strips projector, Slide projector, Modern Digital Light Processing (DLP) projector, and Cathode Ray Tube (CRT) projector, were scarcely and scantly available in just a few senior secondary schools in Nnewi metropolis. All other items 5 to 10 and 12 to 14 were grossly unavailable multimedia projectors in the teaching and learning of computer science in all the senior secondary schools in Nnewi metropolis. The result further showed that multimedia projectors such as the Liquid Crystal Display (LCD) projector, Light-Emitting Diode (LED) projector, Liquid Crystal on Silicon (LCOS) projector, Laser projector, Opaque projector, Nebula projector, Movie projector, Short Throw (UST) projector, and Optoma projector, were all unavailable in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. This result has further been diagrammatically represented in the 3D pie chart below.



Percentage Number Available – 22.5%
Percentage Number Unavailable – 77.5%

Figure 1: 3D Pie Chart on the Percentage Score of Available and Unavailable Multimedia Projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis

The above diagram showcases that a large amount of the multimedia projectors were unavailable in the senior secondary schools in Nnewi Metropolis. Also, quite a few number of these schools had only a few of the multimedia projectors for teaching and learning of computer studies in the senior secondary schools. This showcases limited number of multimedia projectors available in teaching and learning of computer studies in the senior secondary schools.

Research Question 2: How do teachers utilize the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis?

Table 2: Mean Scores and SD of the Respondents Ratings on Teachers' Utilization of Multimedia Projectors in Teaching and Learning of Computer Science in the Senior Secondary Schools in Nnewi Metropolis
N – 43 (that is, 8 Principals, 16 Vice Principals and 19 Computer Science Teachers)

S/N	Items	Principals			Vice Principals			Computer Science Teacher		
		X	SD	Decision	X	SD	Decision	X	SD	Decision
1.	Overhead projector is used for teaching-learning of computer science in the school	1.63	0.70	**NU**	2.06	1.03	**NU**	2.16	1.04	**NU**
2.	Film strips projector is used to display still pictures on one roll of film in teaching-learning of computer science in the school	2.13	1.05	**NU**	2.00	1.06	**NU**	1.89	0.91	**NU**
3.	Slide projector is utilized to present slide in order to produce a larger image on a screen in teaching-learning of computer science in the school	2.00	1.00	**NU**	1.69	0.85	**NU**	1.79	0.95	**NU**
4.	Modern Digital Light Processing (DLP) projector which makes use of tiny mirrors that reflect light towards the screen is always utilized for delivering presentations in teaching-learning of computer science in the school	1.75	0.66	**NU**	1.63	0.60	**NU**	1.63	0.67	**NU**
5.	Liquid Crystal Display (LCD) projector is used to create colouredimages in order to showcase reality of lesson presented in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
6.	Light-Emitting Diode (LED) projector is utilized to display colourful images so as to create in-depth understanding of the lesson inteaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
7.	Liquid Crystal on Silicon (LCOS) projector is used to project a clear picture of the topic presented in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
8.	Laser projector is used to create moving images in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
9.	Opaque projector is used to display opaque materials in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
10.	Nebula projector is utilized to present lesson in teaching-learning of computer science in	1.00	0.00		1.00	0.00		1.00	0.00	

	the school			**NU**			**NU**			**NU**
11.	Cathode Ray Tube (CRT) projector is used to create and display large image of the lesson in teaching-learning of computer science in the school	2.00	1.00	**NU**	1.58	0.95	**NU**	2.21	1.15	**NU**
12.	Movie projector which is to project movies on widescreen in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
13.	Short Throw (UST) projector which has a wide angle lens is utilized for making the lesson more effective in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
14.	Optoma projector is used for displaying video and audio accessories with 3D players in teaching-learning of computer science in the school	1.00	0.00	**NU**	1.00	0.00	**NU**	1.00	0.00	**NU**
	Grand Mean Score & SD	**1.32**	**0.70**	**NU**	**1.29**	**0.69**	**NU**	**1.33**	**0.74**	**NU**

HU – Highly Utilized, U – Utilized, Moderately Utilized –MU & NU - Not Utilized

Analysis of result presented from above Table 2, as shown from the mean ratings of the respondents (that is, Principals, Vice Principals and Computer Science Teachers) on the teachers' utilization of the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis indicated that all the respondents shared similar results. The result indicated that all the items from 1 to 14 were rated below 2.50 of the acceptable mean score in disagreement with the statements. None of the items were rated above 2.50 of the acceptable mean score in agreement with any of the statements. Their grand mean of 1.32 for the principals, 1.29 for the vice principals and 1.33 for the computer science teachers with their standard deviation(SD) of 0.70, 0.69 and 0.74 respectively indicates closeness in the respondents mean scores. This results further showed that many of these multimedia projectors were not utilized in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis.

Discussion of the Findings

Findings of this study generally revealed that the multimedia projectors were scantly available in teaching and learning of computer science in just a few of the senior secondary schools in Nnewi metropolis. Meanwhile, majority of these multimedia projectors were highly and grossly unavailable in teaching and learning of computer science in majority of the senior secondary schools. This finding showcased that just five of the multimedia projectors were considered scantly available in a few senior secondary schools in Nnewi metropolis. The finding further indicated that such multimedia projectors as the Overhead projector, Film strips projector, Slide projector, Modern Digital Light Processing (DLP) projector, and Cathode Ray Tube (CRT) projector, were scarcely and scantly available in just a few senior secondary schools in Nnewi metropolis. It was further discovered through this finding that majority of these multimedia projectors were grossly unavailable in the teaching and learning of computer science in all the senior secondary schools in Nnewi metropolis. The finding further showed that multimedia projectors such as the Liquid Crystal Display (LCD) projector, Light-Emitting Diode (LED) projector, Liquid Crystal on Silicon (LCOS) projector, Laser projector, Opaque projector, Nebula projector, Movie projector, Short Throw (UST) projector, and Optoma projector, were all unavailable in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. This poor situation could have been responsible for teachers not been able to effectively utilize the various multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis, therefore, jeopardizing students' learning. Also, lack of availability of multimedia projectors would also have been responsible for poor instructional delivery in the teaching and learning of computer science education in senior secondary school in Nnewi Metropolis. This finding agrees and corroborates with Uzuegbu,

Mbadiwe and Anulobi (2013) study which found out that utilization of instructional materials including technological resources in schools were limited because of their low/lack of availability. The finding of Onotai, Tabansi, Asuquo, (2012) study confirmed that lecturers in most higher institutions used projectors, computer and sound system for most of their teachings on campus and these tend to enhance students' learning performance. John, Nwosu, and Akorede (2018) study also found out that Internet-based desktop computers, projectors, CAI, PowerPoint slides, online educational forums, and medical videos/animation clips were adequately available teaching and learning tools for lecturers in the medical colleges. The present study finding is however at variance with these two previous studies findings. Udim and Etim (2016) study on the use of multimedia in teaching and learning of political science in university of Uyo, Akwa Ibom State, Nigeria confirmed that computer sets, sound systems, and use of simulation and projectors were not adequate in the department. This implies that the small number of instructional multimedia in the department has little or no effect on students' participation in class activities and their academic performances. The finding of Udim and Etim (2016) study is in contrast with Onotai, Tabansi, Asuquo, (2012) study which found out that lecturers in most higher institutions used projectors, computer and sound system for most of their teachings on campus and these tend to enhance students' learning performance. Amuchie (2015) study on availability and utilization of ICT resources in teaching and learning in secondary schools in Ardo-Kola and Jalingo, Taraba State found out that the extent of availability of ICT resources which includes the use of projectors and other resources in secondary schools in Ardokola and Jalingo was very low.

It was further discovered through the finding of this study that majority of these multimedia projectors were not utilized in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. In fact, it could be said that all the multimedia projectors such as Overhead projector, Film strips projector, Slide projector, Modern Digital Light Processing (DLP) projector, Cathode Ray Tube (CRT) projector, Liquid Crystal Display (LCD) projector, Light-Emitting Diode (LED) projector, Liquid Crystal on Silicon (LCOS) projector, Laser projector, Opaque projector, Nebula projector, Movie projector, Short Throw (UST) projector and Optomaprojector, were all not utilized in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. This finding further indicated that teaching and learning of computer science was basically done without using the multimedia projects, meaning that lessons were mostly taught in abstract context without in-depth exposure of students to the reality of the topic or lesson presented in the classroom. This means that students were not exposed to have adequate knowledge of computer science subject taught in the classroom. This finding however agrees and concurs with Amuchie (2015) study which found out that the extent of utilization of ICT resources in teaching and learning was equally very low. ICT resources were not available in the schools for the use of teachers and students in their learning activities. This makes them to lag behind in the utilization of ICT resources in teaching-learning process. The scenario was also responsible for the very poor extent of accessibility rating of all ICT resources as availability leads to accessibility. The outcome of Awogbami, Opele and Chibueze (2020) study on lecturers' use of multimedia resources for knowledge transfer: a study of Adeleke University, Ede, Osun State showed that the multimedia resources available at the university were moderately adequate and were less utilized in the institution. Bukoye (2019) study on utilization of instruction materials as tools for effective academic performance of students: implications for counselling found out that the overhead projectors and televisions were the two materials responded not to be available for use as instructional materials in the schools investigated. The study revealed inadequate use of instructional materials in most schools and majority of the teachers did not take cognizance of the importance derived from the use of instructional materials while teaching. Those that adopted the utilization did not appropriately use them. No wonder the high rate of students' failure in external examinations. Therefore, the findings of this present study has shown the need for drastic action and measures to be taken in order to resolve all problems associated with the availability and utilization of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis.

Conclusion

The use of multimedia projectors in teaching and learning of computer science in senior secondary schools have been found and discovered in the present study to have great positive and significant impact on students' academic achievement which is necessary for attainment of educational goals and objectives. this becomes possible when the various multimedia projectors are sufficiently and adequately available and highly utilized by teachers in the secondary schools. The present study however, concludes and submits that the multimedia projectors were neither available nor utilized in teaching and learning of computer science in majority of the senior secondary schools in Nnewi metropolis. For quality education to triumph in the teaching and learning of computer science in the senior secondary schools in Nnewi metropolis, due priority attention and focus must be channeled towards resolving the issues in connection with the availability and utilization of multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis. Hence, the recommendations made further.

Recommendations

The following recommendations have been proffered based on the findings of this study;

1. The Anambra State Government in collaboration with the Post Primary School Service Commission (PPSSC) and incorporation with the private sector should provide the necessary multimedia projectors required in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis through adequate funding, financial assistance, multimedia resources donationsand facility mobilization (provision).
2. The secondary school principals should also improve teachers' utilization of the multimedia projectors in teaching and learning of computer science in the senior secondary schools in Nnewi metropolis by offering technical support through the organization of constant orientation programme, training and retraining programmes in order to boost teachers' competences towards using these devices; likewisem,create awareness to the teachers about those multimedia projectors useful in the classroom.

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