

Skills Possessed by Computer Education Lecturers in Colleges of Education

for Courseware Development Using the Multimedia Authoring Systems

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Abstract

This study investigated the skills possessed by computer education lecturers in Colleges of Education for developing instructional courseware. The study adopted the survey research design. The population for the study is 102 comprised of 77 (51 males and 26 females) Computer Education lecturers in Colleges of Education in the South East, Nigeria and 25 ICT experts from the ICT Unit of the Colleges of Education surveyed. There was no sampling since the population was manageable. Three specific purposes and four null hypotheses guided the study. The instrument for data collection was the researcher-developed questionnaire. The data collected were analyzed using mean and standard deviation for the research questions while t-test and ANOVA statistic were employed to test the null hypotheses at 0.05 level of significance. Findings revealed that computer education lecturers do not possess adequate multimedia authoring skills required for developing enriched captivating digital courseware for instructional delivery. It was therefore recommended that formation of mentoring groups for sharing innovative ideas on effective implementation of multimedia instruction in the classroom; organizing regular trainings for computer education lecturers in the form of internal/external capacity building through funding by TETFund, UNESCO, Federal Ministry of Education among others should be vigorously pursued towards enhancing the skills of lecturers in utilizing multimedia tools in teaching and learning.

Keywords: Multimedia, Authoring Systems, Courseware, Computer Education, Lecturers.

Introduction

There has been a tremendous transformation in the education sector as a result of rapid advances in technology. The role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy (Rosen & Michelle cited in Aduwa-Ogiegbaen and Iyamu, 2005). Teachers and students use smart technologies such as iPhones, iPads, laptops, etc, to create, upload, share, and download learning materials which are accessible anytime, anywhere with the possibility of the internet. One major importance of these devices is that it can

handle a combination of media contents such as text, graphics, audio, video, animation, and simulation.

Several studies (Moran, 2016; Belisle, 2015; Hausman, 2017; Brumberg, 2018) revealed that in this digital age, younger adults prefer to interact with visual contents and social media made up of multiple media (also known as multimedia) and share with friends and classmates. According to Stokes (2013), adolescents have grown up in the epoch of computers, the Internet, instant messaging (WhatsApp, WeChat), mobile devices (cell phones, personalized digital assistants, smartphones, tablets, iPods, iPads, iPhones), interactive

TV, wireless (Bluetooth), SNS (Facebook, Google+, LinkedIn), picture sharing (Instagram, Pinterest, Flickr), micro-blogs (Twitter, Tumblr), video sharing (YouTube, Vine) and many other interactive ICT platforms that enable them to socialize online and assist them with the purchase decision process. A research study by the National Academy of Sciences (2019) revealed that the number of hours young people spend interacting in some way with media, as well as the range and capabilities of the many devices and activities that could be considered media experiences, have increased to an extent far beyond the imagination of today's grandparents when they were young. Based on the aforementioned findings, it is vital and appropriate for lecturers to incorporate multimedia/audio-visual contents in their lesson planning and presentation. According to (Sibley, 2017), visual content drives engagement.

Almost all modern digital technologies support the integration of multimedia, which is the combination of digital elements (text, audio, graphics, video and animation) to form a complete digital learning content. According to Tutorialspoint (2019), multimedia computer system has high capacity to integrate different media including text, image, graphics, audio, and video. National Open University of Nigeria (2006) also states that multimedia describes a number of diverse technologies that allow visual and audio media to be combined in new ways for the purpose of communicating. Educational multimedia resources are created, integrated and implemented using multimedia authoring systems.

Authoring systems or tools (also referred to as integrated design software) are among the multimedia tools used for the integration and synchronization of various multimedia elements, such as text, audio/sound, graphics, video and/or

animation (Nwangwu, 2013). It is the program or software that is used to develop multimedia-based resources. According to Laskaris (2018), authoring tools are software platforms that let trainers incorporate a variety of media (including video) to create engaging and interactive courses. Multimedia authoring simply refers to the production of digital multimedia contents for the purpose of teaching, learning or entertaining. According to Potter (2018), the authoring process can be used to develop many different types of products, including: educational applications, computer-based training, reference systems, simulations, virtual environments, entertainment programs and games, interactive information kiosks, retail CD-ROMs, and training systems.

The term "authoring" results from the fact that the creator of multimedia resources using a computer system is referred to as the author. According to Juan (2016), an authoring system has pre-programmed elements for the development of interactive multimedia software titles. Authoring tools provide an integrated environment for binding together the different elements of a multimedia production. Using the authoring systems, developers can create, edit, and import data into the development platform using a number of interactive tools.

In using authoring tools, the multimedia developer does not need to be highly skilled in writing software codes of programming languages like Python, C++, Java or Visual Basic. However, developers who decide to code for interactivity in a multimedia project, could do so using the authoring system scripting language. A scripting or authoring language is a programming language used to create interactive multimedia computer programs such as courseware used in teaching and learning. Courseware can be described as an

educational software specially designed for the purpose of teaching and learning. According to Rouse (2019), courseware is educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer. Similarly, Lee (2012) refers to courseware as software containing educational content, instruction, and instructional strategies. It could be any learning management system hosted online or recorded on CD/DVDs for personalized and/or collaborative learning. In Computer Education programme of study, courseware is found very useful in learning how to acquire Information Technology (IT) skills that will lead to gainful employment in the contemporary labour market. Educators (especially, the computer education lecturers) should be able to possess the skills required for the development of engaging and memorable courseware using authoring systems. Such skills include ability to import media elements across platforms, produce screencasts, write action scripts for interactivity, trim video and audio files, crop images, brighten pictures and moving images, produce standalone executable files, convert text to speech, among others.

Multimedia authoring systems are of different types: card or page based, icon/event-driven based and time-based tools (Marshall, 2001; McGraw-Hill Companies, 2003; Wikiducator, 2011). The card/page-based authoring tools have multimedia elements organized in the form of pages of a book or stack of cards; and are best used when the bulk of content consists of elements that can be viewed individually, just like book pages. Icon based/event driven tools provide a visual programming approach to organize and present multimedia by providing simple branching that allows for navigating to another section of multimedia production. They are particularly useful during multimedia authoring

development. In time-based tools, elements and events are organized along a timeline, with resolutions as high or higher than 1/30 second. They are best to use when a message has a beginning and an end. Popular authoring programs, according to Potter (2018), include Adobe Flash, Articulate Studio, Articulate Storyline, Lectora Inspire, Adobe Captivate, TechSmith Camtasia, Microsoft PowerPoint, etc. Potter (2018) stated that authoring tools should possess the following capabilities: interactivity, playback, editing, programming or scripting, cross platform, internet playability, delivery or distribution and project organization.

The use of multimedia authoring systems for teaching and learning offers several advantages by motivating students to participate more fully in a course. Roblyer cited in Wang (2008) expressed that multimedia authoring presentations attract students' attention, encourage them to participate in activities, help new teaching strategies, and enhance teachers' productivity. According to Fout (2000), multimedia authoring technologies provide simulations and real-world experiences to develop cognitive thinking and to extend learning. Xu (2012) concurred that multimedia offers students chances to develop deep into subjects as well as encourage them to value teamwork, improve on their research and organizational skills, and advance their presentation and speaking skills. Zhang cited in Shyamlee and Phil (2012) pointed out that through multimedia and network technology, educators can offer students not only rich sources of authentic learning materials, but also an attractive and a friendly interface, vivid pictures and pleasant sounds, which to a large extent, overcomes students' poor interest in learning.

Despite the importance of multimedia authoring in teaching and learning, its implementation in higher

education lecturers for courseware development in Colleges of Education?

2. what are the challenges faced by computer education lecturers in

education in Nigeria has recorded minimal success. Nwangwu (2013) observed that the adoption rate of multimedia at the NCE level was very poor. The conventional approach of whiteboard and marker is widely adopted for instructional delivery by computer education lecturers. Shamin, Aktaruzzaman and Clement (2011) stated that the non-adoption of ICT or modern technologies in the teaching-learning activities could be as a result of lack of skills of instructional staff (teachers) and inappropriate instructional materials to meet the objectives of teaching and learning. However, this paper investigated the perceived authoring system skills possessed by Computer Education lecturers for the development of multimedia-based courseware for the facilitation of their job performances.

Purpose of the Study

The main purpose of this study is to investigate the skills possessed by computer education lecturers in Colleges of Education for courseware development using the multimedia authoring systems. Specifically, the study determined the:

1. multimedia authoring system's skills possessed by computer education lecturers for courseware development in Colleges of Education.
2. challenges faced by computer education lecturers in courseware development using multimedia authoring tools in Colleges of Education.

Research Questions

Three research questions that guided the study. They are as follows:

1. what are the multimedia authoring system's skills possessed by computer

courseware development using
multimedia authoring tools in
Colleges of Education?

Hypothesis

There is no significant difference in the mean ratings of male and female computer education lecturers in Colleges of Education on the multimedia authoring system skills possessed for courseware development.

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Research Method

The study adopted survey research design. This is based on the fact that the study sought answers to computer education lecturers' perception of multimedia authoring skills they possessed for courseware development. The study was conducted in the South-East Colleges of Education that offer Computer Education or Computer Science Education. These Colleges of Education include Federal College of Education (Technical), FCE(T), Umunzic:Nwafor Orizu College of Education, Nsugbe(NOCEN):College of Education (Technical) COE(T), Enugu; Federal College of Education (FCE), Eha-Amufu:College of Education(COE), Ikwo Ebonyi State; Alvan Ikoku Federal College of Education (AIFCE) Owerri; College of Education (Technical), Arochukwu, Abia State. The population for the study is 102 comprised of 77 (51 males and 26 females) Computer Education lecturers in Colleges of Education in the South East, Nigeria and 25 ICT experts from the ICT Unit of the Colleges of Education surveyed. There was no sampling since the population was manageable. Three specific purposes and four null hypotheses guided the study. The instrument for data collection was the researcher-developed questionnaire. The instrument was structured according to modified four-point rating scale of 4=Very Highly Possessed (VHP), 3= Highly Possessed (HP), 2=Possessed a Little (PL) and 1=Not Possessed (NP). The instrument was face-validated by three experts from the

departments of Computer and Robotics Education, Arts Education (Educational Technology option), and Science Education (Measurement and Evaluation option), University of Nigeria, Nsukka. The reliability of the instrument was determined using the Cronbach alpha formula for internal consistency, and reliability coefficients of .91 and .83 were obtained respectively. The values obtained were high enough to consider the instrument as reliable since they were above the threshold of 70 (Gay, 1987). The data collected were analyzed using mean and standard deviation for the research questions while t-test and ANOVA statistics were employed to test the null hypotheses at 0.05 level of significance. The decision rule adopted for the research questions was made using the real limit of numbers as follows: mean scores between 3.50-4.00 are regarded as Strongly

Agree/Very Highly possessed; 2.50-3.49 as Agree/Highly Possessed; 1.50-2.49 as Disagree/Possessed a Little; and 0.50-1.49 as Strongly Disagree/Not Possessed.

Furthermore, for the null hypotheses testing, any item whose P-value is greater than 0.05 was accepted while any item whose P-value is less than 0.05 was rejected. All the data collected were analysed using Statistical Package of Social Sciences (SPSS) version 22.

Results

Results

The results of this study were obtained from the research questions answered and the null hypotheses tested through the analysis of the data presented.

Research Question One: What are the multimedia authoring system's skills possessed by computer education lecturers for courseware development in Colleges of Education?

Table 1: Mean Ratings of the Respondents on Perceived Possession of Multimedia Authoring Skills for Instructional Courseware Development

S/N	Items	x	SD	Decision
Ability to:				
1	Import/Export media elements across authoring platforms e.g. from PowerPoint to Flash or from Flash to PowerPoint	3.12	0.74	HP
2	Produce screencasts for integration into an authoring system	2.31	0.92	PL
3	Record live audio (narration) and save it in different audio formats	2.81	0.84	HP
4	Create clickable buttons such as menu and navigation buttons	2.01	0.88	PL

5	Add timing feature to multimedia elements on a form	3.05	0.86	HP
6	Construct/design e-tests and quizzes using an authoring tool	2.06	0.37	PL
7	Add animation effects to objects and controls on the stage	2.04	0.30	PL
8	Crop images/pictures in order to remove te unwanted parts	3.13	0.82	HP
9	Write code/scripts that add interactivity to content of a courseware	2.44	0.94	PL
10	Convert an authored presentation to vidco or flash file	2.34	0.95	PL
11	Perform Object Linking and Embedding(OLE) tasks.	2.21	0.85	PL
12	Trim video and audio files on the timeline	2.21	0.89	PL
13	Produce stand alone executable (.exe) version of multimedia project.	2.03	0.23	PL
14	Merge objects on the stage together using the blend tool	1.94	0.92	PL
15	Organize multimedia elements in layers	2.01	0.88	PL
16	Create storyboard/flowchant for the courseware to be produced	2.18	0.94	PL
17	Publish multimedia projects in required formats (MP3,MP4.Shockwave-SWF	2.06	0.94	PL

18	Add social media links on the courseware platform	1.84	0.80	PL
19	Create vector graphics using the drawing tools	2.12	0.89	PL
20	Add titles and credits to multimedia-based courseware	2.40	0.85	PL
21	Create hyperlinks (hypertext hypermedial to link to other parts of the courseware	2.30	0.97	PL
22	Add fanciful transition cfects to courseware projects	2.77	0.89	HP
23	Change the color and brightness of image on the stage or canvas	2.70	0.95	HP
24	Convert text to speech	2.26	0.88	PL
25	Import librarics and plugins into multimedia authoring projects	2.42	0.95	PL
26	Create an additional language list for learning with the courseware	1.83	0.80	PL
27	Configure course content(courseware)to run on mobile platforms	1.91	0.83	PL
28	Insert frames and keyframes to organize and control the content of an authoring project	2.08	0.85	PL
29	Insert/configure templates and themes to fit into the design	3.44	0.73	HP
30	Merge different video/audio files on the timeline or stage	2.39	0.96	PL
	Cluster Mean	2.35	0.18	PL

X*Mean SD-Standard Deviation. HP=Highly Possessed: PL=Possessed a Little: d a Little:N=77

The data presented in Table I showed that the mean values of 7 out of the 30 items in the Table ranged from 2.70 to 3.13 which were between the boundary limit of 2.50 3.49 on 4-point rating scale. This means that the items were rated "Highly Possessed" by the respondents. The remaining items had mean values ranging from 1.83 to 2.44 which is within the boundary limit of 1.50 2.49 on 4-point rating scale. This is an indication that the items were rated by the

respondents as "Possessed a Little". Table 1 also shows the valucs of standard deviations ranging from 0.23 to 0.97 which are less than 1.96. implying that there was strong agreement among the respondents on the multimedia authoring system skills possessed by computer education lecturers for courseware development.

Research Question Two: What are the challenges faced by computer education lecturers in courseware development?

Table 2: Means Ratings of the Responses of Computer Education Lecturers on the Challenges Faced by Computer Education Lecturers in Courseware Development

S/N	Items	X	SD	Decision
1	Lack of interest by computer education lecturers in courseware development using multimedia authoring systems	1.47	0.60	SD
2	Incompatibility with the different delivery platforms	2.62	0.96	A
3	Poor possession of multimedia auhoring systems' skills by lecturers	3.53	0.64	SA

4	Heavy workloads of computer education lecturers affect timely development and implementation of courseware in teaching and learning	3.64	0.54	SA
5	Design and development of multimedia courseware is time consuming	3.55	0.72	SA
6	Cost of purchase and production is very high	3.08	0.79	A
7	Computer education lecturers do not possess computers with high configuration needed to run multimedia authoring systems	3.34	0.60	A
8	Poor technical support affects effective implementation of courseware projects in schools	3.45	0.57	A
9	Lack of financial support is a strong factor affecting the overall design and integration of courseware into computer curriculum	3.68	0.59	SA

10	Inability of computer education lecturers to cope with the high level of technological advancement such as software upgrade	3.57	0.62	SA
11	Poor programming skills	3.61	0.49	SA
12	Inability to choose from the numerous multimedia authoring systems in the market	3.14	0.76	A
13	Difficulty in planning and preparing contents for multimedia authoring	3.08	0.82	A
14	Irregular electricity supply	3.57	0.62	SA
15	Lack of mentoring and capacity building of computer education lecturers on courseware development using the authoring tools	3.56	0.64	SA
16	Low level of collaboration among computer education lecturers in courseware development	3.52	0.53	SA
17	Lack of incentives to motivate lecturers to venture fully into courseware development	3.69	0.54	SA
18	Most authoring systems are highly customized and require special technical skills in order to be effectively manipulated	3.27	0.66	A
19	Not enough time in the school calendar/time-table for multimedia-based courseware development and application	3.51	0.60	SA
	C I M		3.32 0.15	A
			3.32	A

The data presented in Table 2 showed that the mean values of 11 out of the 19 items in the Table ranged from 3.51 to 3.69 which were between the boundary limit of 3.50-4.00 on 4-point rating scale. This means that the items were rated "Strongly Agree" by the respondents. The remaining eight (8) items except item number one (1) had mean values ranging from 2.62-3.45 which were between the boundary limit of 2.50-3.49 on 4-point rating scale. This is an indication that the items were rated by the respondents as "Agree". On the other hand, the respondents strongly disagreed with item number one (1) which states that computer

Key: X-Mean SD-Standard Deviation SA Strongly Agree: A-Agree: SD-Strongly Disagree: N=77 e: A-Agree: SD-Strongly

education lecturers lack the interest in using multimedia authoring system for courseware development. The Table also shows values of standard deviations that ranged from 0.49 to 0.96 which are less than 1.96, implying that there was strong agreement among the respondents concerning the challenges faced by computer education lecturers in courseware development.

Hypothesis

There is no significant difference in the mean ratings of male and female computer education lecturers in Colleges of Education

on the multimedia authoring system skills possessed for courseware development.

Table 3: t-test Analysis of Male and Female Respondents on Multimedia Authoring System Skills Possessed for Courseware Development

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Institution	N	x	SD	Sig.	t	df	Sig.(2-tailed)	Rmk
Male	51	2.29	0.14					
				0.05	-4.54	75	0.00	S
Female	26	2.46	0.20					

Key:N Number of respondents.X Mean.SD Standard deviation:RMK Remark;df degree of freedom

The data presented in Table 3 revealed that the t-cal(-4.54) reached a significance level

of 0.00 which is below the p-value (0.05) indicating that there was a significant

difference in the mean ratings of male and female computer education lecturers in Colleges of Education on the multimedia authoring system skills possessed for courseware development. Therefore, the null hypothesis of no significant difference was rejected. Table 3 also shows that female computer education lecturers in Colleges of Education recorded a higher mean score of 2.46 against 2.29 of their male counterparts.

Discussion of Findings

The data presented in Table 1 revealed the perceived multimedia authoring skills possessed by computer education lecturers in instructional courseware development. The findings showed that computer education lecturers do not possess adequate multimedia authoring systems' skills required to develop instructional courseware. This is in line with Okwilagwe and Ogbomo (2012) that lecturers possessed computer skills, such as Word Processing and Internet skills but do not possess skills in other special areas like multimedia authoring. The multimedia authoring systems' skills, as revealed in Table 1 include ability to import/export media elements across authoring platforms, produce screencasts, record live audio (narration), crop images/pictures, write code/scripts, convert an authored presentation to video or flash file, among others. This is in agreement with Noorani (n.d) that multimedia authoring skills are those that enable developer edit and produce multimedia projects: and these skills include ability to edit images, create animations, add text, create digital audio. MIDI music and video clips: ability to build a run-time version of the project using the multimedia authoring software; ability to convert to standard file formats as well as organize, design and produce storyboards and visual flowcharts that help to describe not just graphics of each screen but the interactive elements as well. Rosedi (2008) was of the

opinion that trainers must be capable to transfer their lesson plans and teaching materials into storyboard format for better conceptualization so as to 'visualize' the target courseware units in the form of screen layout on printed pages before the development stage commences.

The data presented in Table 2 revealed the challenges faced by computer education lecturers in courseware development. These challenges include among others the cost of purchase and production of courseware, lack of technical support, lack of financial support, lack of incentives for courseware development, poor collaboration among lecturers in courseware development using the authoring systems. This is in agreement with Rosedi (2008) that challenges of developing multimedia resources include cost of production, technical skills required to manipulate authoring tools, time, budget, focus, expertise, provision of incentives to trainers as a motivational strategy for courseware development, among others. Neo and Neo cited in Rosedi (2008) reported that multimedia authoring skills are perceived to be 'difficult' to be mastered by academicians as they are highly customized and technical, and therefore require special technical skills in order to be produced. Vaughan (2011) observed that the key interactive multimedia investment is not in equipment but in the knowledge and skills of staff to make use of what is available. On the other hand, Babiker (2015) stated that a costlier and capable machine is required for multimedia production. Furthermore, Penuel, Means and Simkins (2000) highlighted that multimedia authoring projects require a tremendous amount of time and effort from teachers and students, and that many teachers lack confidence in using multimedia technology. Makedon, Rebelsky, Cheyney, Owen and Gloor (1994) stated that unlike traditional authoring,

multimedia authoring involves making hard choices, forecasting technological evolution and adapting to software and hardware technology changes. Little wonder that Leland (2017) expressed that switching to a new system is hard.

The result of the null hypothesis presented in Table 3 revealed that there was a significant difference in the mean ratings of male and female computer education lecturers in Colleges of Education on the multimedia authoring system skills possessed for courseware development. Therefore, the null hypothesis of no significant difference was rejected at 0.05 level of significance. Table 3 also shows that female computer education lecturers in Colleges of Education recorded a higher mean score of 2.46 against 2.29 of their male counterparts. This is consistent with the findings of Teo (2006) who acknowledged that computer attitudes between male and female respondents suggest significant difference.

Conclusion

The study investigated the skills possessed by computer education lecturers in colleges of education for courseware development using the multimedia authoring systems. The study revealed that computer education lecturers surveyed do not possess adequate multimedia authoring systems' skills required to design and develop engaging, captivating and memorable instructional courseware. The study also revealed that poor incentives, cost of multimedia authoring tools, heavy workload, lack of mentoring and capacity building of lecturers, poor collaboration are among the challenges faced by computer education lecturers in courseware development. The study therefore concluded that multimedia authoring systems are essential tools required to develop courseware for effective teaching and learning. Furthermore, the challenges impeding effective use of

multimedia authoring tools in courseware development should be urgently addressed.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. School administration, the government and notable educational agencies/foundations should as a matter of urgency fund and equip Colleges of Education with modern ICT facilities required for effective teaching and learning.
2. Computer education lecturers in Colleges of Education should attend regular professional capacity building programmes that will enrich their courseware design and development knowledge and skills.
3. In this era of economic recession, instead of waiting for the government to provide funds for staff training, computer education lecturers should engage in personalized learning. There are various free online courses and training videos and books that can be used to master skills in different vital areas of computing.
4. Computer education lecturers should form collaborative mentoring forum where ideas are shared among the staff. Where there is limited time for physical meeting, online forums should be formed for effective collaborative learning.
5. Computer education lecturers should be sponsored by the Federal Government and school authorities to enroll for further studies abroad. This approach, to great extent will contribute to the development of computer education in Nigeria.

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