
Research Article

Multimedia Design and Development Competencies among Computer Science Lecturers in Federal Universities in Federal Capital Territory (FCT) Abuja, Nigeria

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ABSTRACT

The study is concerned with multimedia design and development competencies among computer science lecturers in Federal Capital Territory (FCT) Abuja, Nigeria. The study adopted a descriptive survey research design. The population of the study comprised 39 Computer Science lecturers and was all studied without sampling as the population was small. A structured questionnaire was used in collecting data for the study. Data collected were analyzed using mean scores and ranked according to the level of ratings on each option. Result from the data analyzed showed that Computer Science Lecturers are competent in textual creation and less competent in audio editing, graphic design and animation creation. With respect to these findings, the researcher recommended that Computer Science lecturers in federal universities should engage in continuous training in the design and development of multimedia technologies. University administration should provide Computer Science lecturers adequate funds and incentives to enable them attend capacity building programmes such as Conferences, Seminars and Workshops on the design and development of multimedia courseware for effective instructional delivery. Federal Ministry of Education and relevant government agencies should fund Computer Science programme in federal universities and ensure that computer laboratories of those universities are fully equipped with computers and appropriate multimedia technologies.

1. Introduction

Technological advancement in the 21st century has brought myriads of transformation in teaching and learning at all levels of education, especially, in universities. The phenomenal change in the way in the patterns of learning and teaching has significant effect on students' academic performance. Instructional technologies such as multimedia have emerged in mainstream education sector as tools, knowledge and systems that provide ease of access to learning or knowledge dissemination. As the use of such technologies in teaching and learning becomes more prevalent, it becomes necessary to assess the competencies of Computer Science lecturers on the creation of multimedia used for educational purposes. The urgent need for adoption of Information Communication Technologies in the Nigerian universities remains a concern to the government (Federal Republic of Nigeria, 2004). This however, presents a huge opportunity for those lecturers in university to utilize their competencies in developing multimedia that promise great transformation in education system.

Competence is basically considered as the ability or dexterity to perform a task very well. Skill however means the professional competence in having a job done accurately and effectively. Nwangwu and Obi (2014) defined competence as effective application of knowledge in such a way that tasks are executed with greater yield of result. Skill requires specialize knowledge, technical know-how or exceptional ability to perform a certain task well. Multimedia technology application skill in this study can be defined as the ability to effectively and efficiently design, developed, integrate and implement multimedia technologies for effective instructional delivery. Multimedia competencies should enable the lecturers in making

judicious use of multimedia to deliver effective instruction. Multimedia competencies in this study are categorized into four which include: text, graphic/images, audio and animation.

1.1 Purpose of the Study

The major purpose of this study is to investigate the lecturers' competencies in multimedia design and development in federal universities in Federal Capital Territory (FCT), Abuja, Nigeria. Specifically, the study intended to:

1. Determine the textual creation competencies among Computer Science lecturers
2. Examine the audio creation and editing competencies among Computer Science lecturers
3. Determine the graphic/image creation and editing competencies among Computer Science lecturers
4. Examine the animation creation competencies among Computer Science lecturers

1.2 Research Questions

The study provided answers to the following questions:

1. What Competencies in textual creation are possessed among Computer Science Lecturers?
2. What Competencies in Audio Creation and Editing are possessed among Computer Science Lecturers?
3. What Competencies in Graphic Design and Editing are possessed among Computer Science Lecturers?
4. What Competencies in Animation Creation are possessed among Computer Science Lecturers?

2. Literature Review

Multimedia technologies appear to have taken a prime position in teaching and learning in 21st Century, and highly employed across the globe for effective classroom instruction. In most educational technology journals, multimedia widely and frequently discussed. In a nutshell, multimedia could however be defined as a combination of various mass media such as print, audio and video. It also involves the combination of text, graphic art, sound, animation, and video elements. In other hand, multimedia merges multiple levels of learning into an educational tool using computer-based hardware and software packages that guarantee diversity in curricula presentation for effective instructional delivery. Over the years, there have been various terms referring to multiple media technologies. These terms include "Audio-visual, hypermedia, courseware, Intelligent Tutoring Systems and multimedia".

Multimedia are electronic resources that involve various media including text, graphic or images, audio or video used to facilitate teaching and learning. (Nwangwu & Obi, 2014). This technology can only be utilised through the aid of a computer (National Open University of Nigeria, 2006). Most of the definitions include the application of multiple forms of media such as texts, graphics, animations, video and sound in the learning process. Multimedia is used as learning resources, means of communication used across topics. Multimedia brings together different resources such as text, graphics, animation, pictures, video, and sound for presentation of concise, precise information. Multimedia are basically computer-aided information resources that preserve, store and transmit. Multimedia combines both computer hardware and software that allow the integrated media to function and enrich students' understanding (Fenrich, 1997 and Surjono, 2015),

Multimedia creation competency of Computer Science lecturers is very essential when considered the role multimedia plays in education. Multimedia creates simplified and easy to understand message; facilitates design of applicable knowledge; makes students to understand and learn at their own pace. Multimedia also makes knowledge more flexible than text or speech; presents teachers and learners with unique learning resources that can be used in a wide variety of ways to simulate various forms of learning; ensures that abstract principles learned by users through text are presented inform of animation or a video; enhances deeper comprehension and also enables users form mental image of abstract verbal realities (Bent and brink, 2013)

From the above viewpoints, multimedia technologies and its application in teaching and learning obviously present university lecturer a golden opportunity to tap from the potentials of multimedia technology in preparing, updating or teaching so as to improve insight and the quality of the course or lessons. In order to have proliferation of experts among computer scientists in Nigeria, Lecturers in the Department of Computer Sciences should possess adequate competencies in multimedia creation and editing such as animation creation, audio recording, graphic/image design and editing. This involves inserting objects or text, deleting of unwanted information, modifying graphics or images, audio clips, video clips or animated objects in order to make them more meaningful and useful as to meet the objective for which such application is meant.

Audio resources are indispensable multimedia component. Audio is described as voice or sound that signifies an action (Nwangwu and Obi, 2014). The relevance of audio in teaching and learning is obvious at different level of education. Audio makes teaching and learning so interesting and gives students a pleasant experience (Uzuegbu, Mbadiwe and Anunobi, 2013).

Graphic / image creation or editing is also another area the researcher investigates to determine how competent the lecturers are. Graphics/images include all forms of drawings, images/ photographs and other non-textual contents represented in a digital format (Nwangwu and Obi, 2014). Graphic/images are digital representations of non-text information such as drawing, chart, or photographs which is found resourceful in educational development (Encyclopaedia, 2016). Graphics/images seem to be more useful in subjects that require illustrations which portray it as effective instructional tool in education. The effectiveness of multimedia may not be possible without graphic presentation (Reddi and Mishra, 2003).

Video on the other hand is an effective tool for demonstrating practical and abstract concepts. Video aspect of Multimedia utilises text, audio, static or motion pictures for pass information which makes learning more engaging; makes presentation of event, situation, and phenomenon more possible and realistic and simplifies with clarity explanations than talking. (Madu and Nwangwu, 2014).

Animation is a vital element of multimedia. It is in form of motionless image or quietly moving image or object in a sequential order on the computer or projector. Animation is one of the important parts of multimedia that has potential of making real objects through simulations (Nwangwu and Obi, 2014). Animation is enriches one's experience and allows user to expand their knowledge boundaries. With its virtual effect and motion potential in providing a objective information, experiential account of an event; it helps to take users to the scene and allows them to experience an event for themselves (Encyclopedia, 2016). Animation creation programs include Microsoft Office PowerPoint, Adobe flash, Cinema4D, and so on (Encyclopedia, 2016)

Multimedia is not complete textual content. Text serves the purpose of passing specific knowledge or information. It is also used to describe or classify information contained in multimedia. Encyclopedia (2016) describes texts as characters that are used to create words, sentences, and paragraph useful at providing basic information. Ali (2019) discovered that textual creation and word processing is very common in very common in academics and being utilized effectively in preparing instructional materials, processing students' results and carry out administrative tasks. Due to frequency of use of Microsoft word and other word processing software, lecturers are more conversant and competent in textual creation. The foregoing form a coherent whole system called, "multimedia". The potential of these media lies in their ability to integrate two or more media to present knowledge or information and also to edit or update as the need arises.

In no little way, technological development has revolutionized classroom experience and transformed teaching and learning from obscured teacher centered to learners participation. Multimedia is becoming prevalent in Nigerian education sector especially in institution of higher learning. The importance of multimedia learning, according to Mayer (2003) is that students pay more attention to learning from multimedia resources containing words and pictures than from an orthodox method of communication involving only words. Nwangwu and Obi (2014) in their study discovered that lecturers do not possess skills in graphics/image editing, audio editing and animation creation, which could be as a result of inadequate training in the area or lack of enthusiasm in engaging in ICT self-empowerment programmes.

However, lack of adequate multimedia design and development competencies could be attributed to various factors. The challenge could be as at result of inadequate financial support to lecturers by federal universities to enable them go for more training in the area which will consequently hinder lecturers from teaching the students how to design, develop, integrate and implement multimedia for effective instructional delivery. Lack of multimedia design and development skills could be as a result of inadequate ICT facilities and requisite skill needed to teach multimedia technologies (Shamim, Aktaruzzaman and Clement, 2011). The study is an attempt to determine the extent to which computer science lecturers in federal universities in Federal Capital Territories (FCT), Abuja possess competencies in multimedia design and development.

3. Methodology

The study adopted a descriptive survey research design. The study was conducted in two federal universities located in (FCT) Abuja, Nigeria. The universities are University of Abuja and National Open University of Nigeria. The population for the study

comprised all the 39 Computer Science lecturers currently teaching in the two federal universities in FCT, Abuja. The entire population was studied as it was too small to be sampled. A structured questionnaire on Multimedia Design and development competencies among Computer Science lecturers (MDADCACOSL) was designed and used for collecting data for the study. The instrument consists of two sections. A and B. Section A contained demographic information on the respondents, while section B sought information on the multimedia design and development competencies. Section B was divided into four clusters with 36 items to take care of the four research questions posed in the study. The questionnaire was validated by three experts – one from the Department of Science Education (Measurement and Evaluation) and Department of Computer Science University of Abuja, and Department of Computer Science, National Open University of Nigeria, Abuja. The experts assessed and face validated the instrument to ensure its clarity and the appropriateness of the questionnaire items. The experts’ inputs were used to restructure the instrument.

The face validated instrument was subjected to reliability test using Cronbach Alpha reliability technique to determine the reliability of the instrument. The questionnaire (MDADCACOSL) was administered personally by the researcher with the assistance of two trained research assistants which facilitated timely collection of the instrument. Each item in the questionnaire had four response options of Highly Competent (HC = 4), Competent (C = 3), Less Competent (LC=2) and Not Competent (NC=1). Data collected were analyzed using mean scores and ranked according to the level of ratings on each option.

4. Results

Research Question 1: What competencies in textual creation are possessed among Computer Science lecturers?

Table 1: Mean Rating Scores of textual creation competencies among Computer Science lecturers

| S/N | Items | Mean | Rank | Decision |
|-----|--|------|-----------------|----------|
| 1. | Creating, naming and saving a document | 3.67 | 1 st | C |
| 2. | Formatting document | 3.43 | 2 nd | C |
| 3. | Inserting image | 3.36 | 3 rd | C |
| 4. | Creating hyperlink | 3.35 | 4 th | C |
| 5. | Adding virtual appeal/cell shading | 3.33 | 5 th | C |
| 6. | Insert header or footer | 3.31 | 6 th | C |
| 7. | Creating Page Orientation | 3.31 | 6 th | C |
| 8. | Creating Custom Margin | 3.30 | 7 th | C |
| 9. | Text alignment in tables | 3.28 | 8 th | C |

Hint: HC = Highly Competent; C = Competent; LC = Less Competent; NC = Not Competent

The data presented in Table 1 show that lecturers are competent in textual creation. These include creation, naming and saving of documents; formatting of document; inserting of images; creating of hyperlink; adding virtual appeal/cell shading; inserting header or footer; creating page orientation; creating custom margin and text alignment in tables. The reason for their competencies on textual creation is attributed to their familiarity and daily use of the system for academic operation.

Research Question 2: What Competencies in Audio Creation and Editing are possessed among Computer Science lecturers?

Table 2: Mean Rating Scores of audio creation and editing competencies among Computer Science lecturers

| S/N | Items | Mean | Rank | Decision |
|-----|--|------|-----------------|----------|
| 10. | Recording live audio | 3.67 | 1 st | C |
| 11. | Convert text into speech with the aid of “text to speech” tool | 2.94 | 2 nd | LC |
| 12. | Expunge or removal of unwanted parts of an audio clip | 2.92 | 3 rd | LC |
| 13. | Export / Import audio files across audio editing platform | 2.64 | 4 th | LC |
| 14. | Remix or mix different audio files | 2.38 | 5 th | LC |
| 15. | Apply noise reduction effect to audio or sound files | 2.36 | 6 th | LC |
| 16. | Fade in and out audio in a video | 2.26 | 7 th | LC |
| 17. | Add audio on youtube | 2.24 | 8 th | LC |

| | | | | |
|-----|---------------------------------------|------|-----------------|----|
| 18. | Change the background music in video. | 2.23 | 9 th | LC |
|-----|---------------------------------------|------|-----------------|----|

Hint: HC = Highly Competent; C = Competent; LC = Less Competent; NC = Not Competent

Result from Table 2 shows that Computer Science lecturers are less competence in converting text into speech with the aid of “text to speech” tool; expunge or removal of unwanted parts of an audio clip; export / import audio files across audio editing platform; remix or mix different audio files; apply noise reduction effect to audio or sound files; fade in and out audio in a video; add audio on youtube and change the background music in video.

Research Question 3: What competencies in graphic design and editing are possessed among Computer Science lecturers?

Table 3: Mean Rating Scores of graphic/image creation and editing competencies among Computer Science lecturers

| S/N | Items | Mean | Rank | Decision |
|-----|---|------|-----------------|----------|
| 19. | Create images for motion pictures and animation | 3.78 | 1 st | C |
| 20. | Design themed presentation | 3.76 | 2 nd | C |
| 21. | Crop Images to maximize copy space | 3.76 | 2 nd | C |
| 22. | Resize and skew images to a particular dimension | 3.64 | 3 rd | C |
| 23. | Design visual assets for social media | 2.38 | 4 th | LC |
| 24. | Match colours within design to enhance beauty | 2.36 | 5 th | LC |
| 25. | Convert graphic image file formats to other formats | 2.26 | 6 th | LC |
| 26. | Merge objects together using the blend tool | 2.23 | 7 th | LC |
| 27. | Pair Contrasting fonts and add transparent icons | 2.07 | 8 th | LC |

Hint: HC = Highly Competent; C = Competent; LC = Less Competent; NC = Not Competent

Result in Table 3 shows that Computer Science lecturers are competent in the following tasks: create images for motion pictures and animation; design themed presentation; crop images to maximize copy space and resize and skew images to a particular dimension. Result also shows the areas of less competent among lecturers which include: design visual assets for social media; match colours within design to enhance beauty; convert graphic image file formats to other formats; merge objects together using the blend tool and pair contrasting fonts and add transparent icons. From the above result, it is obvious that the lecturers are making efforts to improve on their graphic/image creation and editing skills, but their efforts are not encouraging especially in the information age when multimedia instruction is gradually replacing the traditional method of teaching and learning.

Research Question 4: What competencies in animation creation are possessed among Computer Science lecturers?

Table 4: Mean Rating Scores of animation creation competencies among Computer Science lecturers

| S/N | Items | Mean | Rank | Decision |
|-----|---|------|-----------------|----------|
| 28. | Develop a custom show in PowerPoint | 3.52 | 1 st | C |
| 29. | Convert PowerPoint presentation to video | 3.28 | 2 nd | C |
| 30. | Design instructional picture slide show in flash | 3.12 | 3 rd | C |
| 31. | Export image/movie files for use in others platform | 2.64 | 4 th | LC |
| 32. | Create storyboard for animation video | 2.36 | 5 th | LC |
| 33. | Write a stellar video script | 2.34 | 6 th | LC |
| 34. | Import multimedia elements into adobe flash stage | 2.28 | 7 th | LC |
| 35. | Organize multimedia elements in layers | 2.25 | 8 th | LC |
| 36. | Design motion tween animation | 2.25 | 8 th | LC |

Hint: HC = Highly Competent; C = Competent; LC = Less Competent; NC = Not Competent

It is obvious in Table 4 that though many lecturers are competent in developing a custom show in PowerPoint; converting PowerPoint presentation to video and designing instructional picture slide show in flash, they demonstrate less competent in areas such as export image/movie files for use in others platform; create storyboard for animation video; write a stellar video script; import multimedia elements into adobe flash stage; organize multimedia elements in layers and design motion tween animation.

5. Discussion and Findings

Findings from the study revealed that Computer Science lecturers in federal universities are competent in textual creation. This could be as a result of consistent usage in daily work of a lecturer. In agreement with the findings, Ali (2019) discovered that textual creation and word processing is very common in academics and being utilized effectively in preparing instructional materials, processing students' results and carry out administrative tasks. Due to frequency of use of Microsoft word and other word processing software, lecturers are more conversant and competent in textual creation.

Findings from the study revealed that Computer Science lectures are only competent in recording live audio but less competent in other aspects of audio creation and editing tasks. In line with the study conducted by Nwangwu and Obi (2014), lecturers do not possess skills in audio editing. They stressed that audio editing requires special software, state of the art technologies and practical training which improper training in this area results to lack of adequate skills.

The study revealed further that Computer Science lecturers are competent in some graphic design and editing tasks such as creating images for motion pictures and animation, designing themed presentation and cropping images to maximize copy space. Unfortunately, Computer Science lecturers in federal universities are less competent in major areas of graphic design and editing. In agreement with the findings of the study, Nwangwu and Obi (2014) found that lecturers do not possess skills in graphic/image editing, which could be as a result of inadequate training in the area or lack of enthusiasm in engaging in ICT self-empowerment programmes.

Finally, the study showed that Computer Science lecturers are competent in some animation creation tasks such as development of a custom show in PowerPoint, conversion of PowerPoint presentation to video and design of instructional picture slide show in flash. Nevertheless, Computer Science lecturers in federal universities are less competent in major components of animation creation. The result is in line with the result of the study conducted by Nwangwu and Obi (2014) who maintained that Computer Education lecturers in Colleges of Education in South East, Nigeria do not possess skills in animation creation which could be as a result of adequate training in animation creation and development.

Lack of adequate multimedia design and development competencies could be attributed to various factors. The challenge could be as at result of inadequate financial support to lecturers by federal universities to enable them go for more training in the area which will consequently hinder lecturers from teaching the students how to design, develop, integrate and implement multimedia for effective instructional delivery. Lack of multimedia design and development skills could be as a result of inadequate ICT facilities and requisite skill needed to teach multimedia technologies (Shamim, Aktaruzzaman and Clement, (2011). The study is an attempt to determine the extent to which computer science lecturers in federal universities in Federal Capital Territories (FCT), Abuja possess competencies in multimedia design and development.

6. Conclusion

The study determined the multimedia design and development competencies among Computer Science Lecturers in universities in Federal Capital Territory (FCT), Abuja Nigeria. The study discovered the need for Computer science lecturers to get trained in multimedia design and development as this will lead to production of appropriate instructional technologies that will facilitate teaching of practically oriented computer courses or abstract concepts. The study revealed competencies of Computer Science lecturers in textual creation but found them less competent in audio editing, graphic design and animation creation.

7. Recommendations

Based on the findings of this study and conclusions, the researcher recommended that

1. Computer Science lecturers in federal universities should engage in continuous training in the design and development of multimedia technologies.
2. University administration should provide Computer Science lecturers adequate funds and incentives to enable them attend capacity building programmes such as Conferences, Seminars and Workshops on the design and development of multimedia courseware for effective instructional delivery.
3. Federal Ministry of Education and relevant government agencies should fund Computer Science programme in federal universities and ensure that computer laboratories of those schools are fully equipped with computers and appropriate multimedia technologies.

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