

DEVELOPMENT AND EVALUATION OF INSTRUCTIONAL VIDEO FOR TEACHING AND LEARNING WOODWORK TECHNOLOGY PSYCHOMOTOR SKILLS IN NIGERIAN UNIVERSITIES: IMPLICATION FOR THE PRODUCTION OF COMPETENT GRADUATES

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ABSTRACT: *Woodwork is one of the areas of Technical Education programme at the University level in Nigeria. The objectives of this programme have not been achieved due to the inadequate nature of materials and human resources for implementing its curriculum. In order to address the issue of Technical Education graduates not possessing employable skills, an intervening measure is to develop and evaluate instructional video for teaching and learning Woodwork Technology. The purpose of this study is to develop and evaluate Woodwork Technology instructional video. Five (5) research questions guided the study. The population of this study comprised of twenty two (22) heads of units of Building/Woodwork Construction Technology in all the twenty two (22) Universities in Nigeria whose Technical Education programme were accredited as at 2012. The purposive sampling technique was used to select 10 Heads of Units of Building/Woodwork Construction Technology. Primary data were collected using camera and its accessories, and the modified Province of Prince Edwards Island Department of Education DVD/ Video Evaluation form. The data collected was analyzed using frequency count and mean. Based on the findings of the study, it was concluded that the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of its content, instructional design, technical design, and social consideration.*

KEYWORDS: development, evaluation, woodwork technology, technical education, instructional video, teaching, learning, psychomotor skills, Nigerian universities

INTRODUCTION

The role of Technical Vocational Education and Training (TVET) to prepare skilled manpower for economic and sustainable development is no doubt recognized globally. TVET is considered essential because a country cannot achieve economic and sustainable development without a skilled workforce that can meet the rapidly changing industrial needs of the society. In Nigerian educational system, universities offer Technical and Vocational Education and Training (TVET) programmes for the purpose of producing skilled manpower required for the nation's economic and technological development Federal Republic of Nigeria (FRN , 2009), as well as Technical Education teachers that will impart technical skills and knowledge to secondary school and technical college students. Bachelor of Science in Education (B.Sc Ed.) Technical Education Certificate is awarded by the universities to students who have fulfilled the University Faculty of Education requirements.

According to National University Commission (NUC, 2007), with current emphasis on self-reliance and job creation for the teeming population, Technical Education programme is expected to make significant contribution to the Nigerian Education Industry. Therefore the students are expected to:

- ❖ Develop high level skill in the design, production, and improvisation of various instructional technology resources.
- ❖ Acquire teaching skills and appropriate methods needed in importing knowledge in their field of specializations.
- ❖ Demonstrate competency in the handling of various hardware to achieve maximum result for a wide variety of target audience.
- ❖ Gain insights on maintenance of industrial materials, tools, machines and facility.
- ❖ Develop problem solving and creative thinking abilities.
- ❖ Develop safety consciousness, creativity and good judgment over the use of technology.

According to Okwelle and Okeke (2012), in the field of Technical Vocational Education and Training (TVET), practical skills activities form an important part of the implementation of TVET programmes. This implies that the implementation of TVET programmes for the acquisition of practical skills involves the utilization of precise educational resources and methods which will help the learners to successfully replicate the practical skills that was transferred during the teaching-learning process (Donkor, 2010). Woodwork Technology like any other TVET courses is practical oriented and requires highly skilled manpower, power tools, machines and handtools. Unfortunately, the implementation of Technical Vocational Education and Training (TVET) curriculum in Universities in Nigeria for skills acquisition and production of employable craftsmen has not been yielding the expected results in Nigeria (Okoye & Okwelle, 2013). This is traceable to the poor funding of TVET programmes which is characterized by the lack the basic infrastructure needed to facilitate teaching and training, unequipped workshop, inadequate training materials, lack of equipment, and obsolete machine (Okorie, 2000; Boyi, 2008; Aromolaran, 1985 in Umunadi, 2009). Furthermore, Oranu (1990) posited that the lack of physical facilities is one of the challenges of educational institutions in Nigeria.

These challenges faced in the implementation of TVET programmes in schools are responsible for graduates not possessing practical skills that will make them employable in the world of work. Gwarzo (1999) threw light on the problem of graduates not possessing practical skills and competence when Gwarzo posited that lack of equipment in schools is responsible for our students not to have opportunities to see and manipulate different equipment in order to acquire the necessary practical knowledge and skills while Imarhiagbe (1998) further explained that inadequate physical facilities in wood workshops are taking a heavy toll on the quality of graduates produced. According to Okwori (2012) physical facilities such as workshops, machines and handtools are not enough. These inadequacies affect students' performance in both theory and practical work. This means that the objectives of Technical Vocational Education and Training (TVET) will be difficult to achieve. Also, there are situation where skilled personnel are available but no material resources to work with. In some educational institutions, the few resources that are available are old and not properly installed due to poor funding. There are instances where some resources are available but the teachers are not able to utilize them in teaching and learning process as a result of lack of skills. Also in some of these Technical Education department, some modern equipment such as sophisticated sewing

machines, computer machines, wood cutters and others are not used by teachers because of their inability to use them (Akinfolarin, Ajayi, & Oloruntegbe,2012).

These challenges negatively affect the quality delivery of TVET courses (Woodwork Technology inclusive) especially at the University level. Furthermore, it worthy to note that TVET is cost effective, involving expensive training machines, hand tools, and consumable materials. In the face of the worsening economic conditions as a result of the fall in crude oil price and problem of poor leadership in the country, it may be very difficult to find ways to solve the challenges of TVET. In recent times, various techniques have been used to improve educational resources especially in area of improvisation of instructional materials in TVET instruction. It is against these backdrops that this study sets to address the implementation challenges of inculcating practical skills by developing and evaluating Woodwork instructional video which will be used for teaching and learning Woodwork Technology in Nigerian Universities.

Statement of Problem

The challenges of TVET graduates not possessing employable skills have been in the frontline of discourse amongst stakeholders of education, government, and industries to proffer solution to the high rate of unemployed TVET graduates in Nigeria. As such several scholars have been advocating for improved funding of TVET programmes for effective implementation to produce employable graduates with practical skills that will be useful to themselves and the society. As well, the issue of poor funding is seen as barrier to the acquisition of physical and material resources. Physical and material resources such as hand tools, consumable materials, equipments, and instructional video are predictors of quality assurance in educational institutions. In same vein, Adeogun (2001) posited that there is positive and significant relationship between instructional materials and academic performance. Adeogun further explained that, students from schools that have more instructional materials performed better than students from schools that have less instructional material. Similarly, Newton (1997) in Adeogun and Osifila (n.d) stressed the importance of instructional materials when the researchers posited that instructional materials make teaching more productive; give instruction a more scientific base; make teaching and learning more individualistic; make instruction more powerful and immediate; and finally make attainment of objectives easier. Despite the role of physical and material resources in improving quality, many educational institutions (Universities inclusive) in Nigeria do not have the physical and material resources and those which have do not have current and relevant ones which now make practical lessons to be taught as theoretical while equipment and materials are inadequate (Ezewu, 1986, Okoye & Okwelle, 2013). One alternative to improving quality delivery of practical skills is video-based instruction (Hampton, 2002; Mishra, 2001). Instructional video for teaching and learning Woodwork Technology in Nigerian Universities has not being in used due to the fact that such instructional video are not available. In this context, there is need to improve the teaching and learning of Technical Education courses such as Woodwork Technology by using valid and reliable instructional video which will enhance the processes of acquiring Woodwork Technology psychomotor skills. However, literatures available to the researcher indicated that no such instructional video for teaching and learning Woodwork Technology is in use in Nigerian Universities. It is against these backdrops that this study seeks to develop instructional video for the teaching and learning of practical skills in Woodwork Technology at University level to enhance teaching and learning of Technical Education courses in Nigerian Universities.

Purpose of the Study

The purpose of this study was to develop and evaluate the suitability of woodwork instructional video for the construction of office chair, stool, door frame, brace and batten door, and panel door.

Specifically, the study seeks to:

- i) Develop instructional video for teaching and learning practical skills in Woodwork Technology at the University level
- ii) Evaluate the suitability of the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level based on the content of the video.
- iii) Evaluate the suitability of the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level based on the video design.
- iv) Evaluate the suitability of the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level based on the video social consideration.

Research Questions

The following research questions guided the study:

- i) What are the steps taken to develop instructional video for teaching and learning practical skills in Woodwork Technology at the University level?
- ii) Does the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of its content?
- iii) Does the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of instructional design?
- iv) Does the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of its technical design?
- iv) Does the developed instructional video for teaching and learning Woodwork Technology at the University level suitable in terms of its social consideration?

Significance of the Study

This study will be of great significant to TVET teachers, instructors and student in Technical Education Department in Nigerian Universities. They will find the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level viable since it will serve as supplementary resources for teaching and learning practical skills in Woodwork Technology. More so, the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level will help to promote the integration of instructional video in teaching and learning Technical Education in Nigerian Universities.

Scope of the Study

This study was limited in scope to Development and Evaluation of Instructional Video for Teaching and Learning Practical Skills in Woodwork Technology at the University level. Specifically, four concepts were the contents of the developed instructional video. These concepts include; the use of handtools, woodwork machines, consumable materials and fabrication of timber to produce stool, office chair, door frame, brace and batten door, and panel door.

METHODS AND PROCEDURE

Instrumentation research design was used in this study. The population of this study comprised of twenty two (22) Heads of Units of Building/Woodwork Construction Technology in all the twenty two (22) Universities in Nigeria whose Technical Education programme were accredited as at 2012 (NUC ,2012). The purposive sampling technique was used to select 10 Heads of Units of Building/Woodwork Construction Technology. Two types of data were collected for this study. The first being data collected for developing the instructional video for teaching and learning practical skills in Woodwork Technology. The materials that were used for collecting the video footage include: camera and its accessories, and editing software. The instructional video footage were collected using the camera and its accessories to produce the developed instructional video while the researcher, skilled workers and supervisors of Woodwork Unit of Delta State University Consultancy Service (DELSU Investment LTD), Abraka displayed the various tasks associated with the four concepts in Woodwork Technology such as the use of hand tools, woodwork machines, consumable materials, Woodwork and fabrication of timber for the construction of stool, office chair, door frame, brace and batten door, and panel door. The developed instructional video was evaluated using a modified Province of Prince Edwards Island Department of Education DVD/ Video Evaluation form which comprised of four sections based on the four research questions that have to do with the evaluation of the suitability of the instructional video based on its content, instructional design, technical design, and social consideration. The modified instrument has 57 items and section 1-4 has 21,18,11 and 7 items respectively. The instrument is on a 4 point scale of Strongly Agree (SA=4), Agree (A=3), Disagree (D=3), and Strongly Disagree (SD=1).The researcher sent the developed woodwork instructional video and the modified instrument together with the objectives of developing the instructional video to the evaluators selected to evaluate the video. After watching the developed instructional video, the selected Heads of Units of Building/Woodwork Construction Technology completed the modified DVD/Video Evaluation form and sent back to the researcher. Frequency count and mean were used to analysed the data collected with the aid of SPSS computer software. Any mean response of 2.50 and above was regarded as suitable while mean response below 2.50 was regarded as not suitable.

RESULTS AND DISCUSSION

The results were presented based on the research questions

Research Question 1: What are the steps taken to develop instructional video for teaching and learning practical skills in Woodwork Technology at the University level?

The various steps were taken to develop the instructional video for teaching practical skills in woodwork technology at university level include the following steps:

First Step : Identify the Problem the Instructional Video will solve

The researcher identified the problem of material resources for teaching practical skills in woodwork technology as such in order to cut cost of purchasing consumable materials and to address shortage of technicians in woodwork shops in schools, hence the need to produce work instructional video for teaching practical skills.

Second Step: How to Address the Problems the Woodwork Instructional Video will solve

The researcher selected key areas that require the basic practical skills that graduates of woodwork can use to earn a living if the graduates possessed the skill competencies. The key areas selected were the use of handtools, woodwork machines, and consumable materials for the production of stool, office chair, door frame, brace and batten door, and panel door.

Third Step: Planning for the Development of the Woodwork Instructional Video

The researcher gets formal approval to use the woodwork shop and personnel working on the workshop. After the formal approval the researcher had meeting with the woodwork supervisor to explain the practical skills the instructional video content will contain and the various woodwork products to produce in the instructional video. Hence, the researcher with the supervisor of the woodwork workshop drafted the scripts for the video after understanding the purpose of the instructional video. Furthermore, the woodwork workshop supervisor listed the consumable materials to buy for the job and choose date to start the production.

Fourth Step: Developing of the Woodwork Instructional Video

The researcher consulted a video production specialist and explained to the video production specialist the purpose of developing the woodwork instructional video and possible date to start production. The video specialist agreed to produce the woodwork instructional video, and all production equipment such as the video camera and its accessories were moved to the woodwork workshop where the production took place. The production of the woodwork instructional video lasted for 3 months. After production of the woodwork instructional video, it was edited to get the final woodwork instructional video that was evaluated.

Research Question 2: Does the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of its content?

Table 1: Shows the mean response of Heads of Woodwork Construction Units on the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitability based on its content

S/N	Item Statement: The content of woodwork instructional video shows correctly the practical skills using handtools, woodwork machines, and consumable materials:	Frequency				Mean	Remark
		SA (4)	A (3)	D (2)	SD (1)		
1	Planing of wood using planing machine	6	4	0	0	3.60	Suitable
2	Cutting of wood using crosscut sawing machine	7	3	0	0	3.70	Suitable
3	Cutting of wood using circular sawing machine	8	2	0	0	3.80	Suitable
4	Cutting of wood design using bandsaw machine	4	6	0	0	3.40	Suitable
5	Use of sanding machine to smooth wooden surface	6	4	0	0	3.60	Suitable
6	Use of spraying machine	8	2	0	0	3.80	Suitable
7	The use of measuring tape	5	5	0	0	3.50	Suitable
8	The use of handsaw to cut wood	7	3	0	0	3.70	Suitable
9	The use of jackplane to smooth wood surface	5	5	0	0	3.50	Suitable
10	How to mark and cut tenon	4	6	0	0	3.40	Suitable
11	How to mark and cut mortise using mortising machine	5	5	0	0	3.50	Suitable
12	The use of chisel to dress mortise	6	4	0	0	3.60	Suitable
13	The use of spokeshave to dress curves	7	3	0	0	3.70	Suitable
14	The use of hammer to drive nails	8	2	0	0	3.80	Suitable
15	The use of cutter to cut nail head	7	3	0	0	3.70	Suitable
16	How to apply glue on tenon and mortise	3	7	0	0	3.30	Suitable
17	The use of clamp to clamp wood members	6	4	0	0	3.60	Suitable
18	The use of sand paper on completed article	7	3	0	0	3.70	Suitable
19	How to mix materials for spraying	4	6	0	0	3.40	Suitable
20	The use of try square	6	4	0	0	3.60	Suitable
21	Safety practices in woodwork workshop	4	6	0	0	3.40	Suitable
Mean of Mean Responses						3.59	

Table 1 revealed that the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of its content. The instructional video displayed correctly the use of woodwork machines (crosscut saw, circular saw, planing machine, bandsaw, mortiser, sander, and spraying machine), handtools (hammer, chisel, jackplane, measuring tape, nail cutter, try square, cramp, handsaw, spokeshaves, and mallet), and consumable materials (wood, nails, wood glue, sand paper, filler, and thinner) for the construction of stool, office chair, door frame, brace and batten door, and panel door.

Research Question 3: Does the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of instructional design?

Table 2: Shows the mean response of Heads of Woodwork Construction Units on the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitability based on its instructional design

S/N	Item Statement: the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of instructional design	Frequency				Mean	Remark
		SA (4)	A (3)	D (2)	SD (1)		
1	Instructional goals and learners objectives are clearly stated	6	4	0	0	3.60	Suitable
2	Resource is suitable for a wide range of learning/teaching styles	4	6	0	0	3.40	Suitable
3	Resource promotes students engagement	7	3	0	0	3.70	Suitable
4	Methodology promotes active learning	3	5	1	1	3.00	Suitable
5	Methodology promotes development of communication skills	0	2	8	0	2.20	Not Suitable
6	Resources encourage group interaction	7	1	1	0	3.30	Suitable
7	Resources encourage students creativity	6	2	1	1	3.30	Suitable
8	Concepts are clearly introduced	8	2	0	0	3.80	Suitable
9	Concepts are clearly developed	0	3	7	0	2.30	Not Suitable
10	Concepts are clearly summarized	0	1	8	1	2.00	Not Suitable
11	Integration across curriculum subjects is supported	0	1	9	0	2.10	Not Suitable
12	Non technical vocabulary is appropriate	5	5	0	0	3.50	Suitable
13	Technical terms are consistently explained/introduced	7	3	0	0	3.70	Suitable
14	Pedagogy is innovative	6	4	0	0	3.60	Suitable
15	Video extends or build upon students knowledge	4	6	0	0	3.40	Suitable
16	Sequencing (chunking) allows for appropriate contextual	3	7	0	0	3.30	Suitable
17	Adequate/appropriate pre and post viewing activities are suggested in the support materials	0	1	9	0	2.10	Not Suitable
18	Adequate/appropriate assessment/evaluation tools are provided	0	2	8	0	2.20	Not Suitable
Mean of Mean Responses						3.03	

Table 2 revealed that the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of instructional design. The response shows that the :Instructional goals and learners objectives were clearly stated; Resource was suitable for a wide range of learning/teaching styles; Resource promotes students engagement; Methodology promotes active learning; Resources encourage group interaction;

Resources encourage students creativity; Non technical vocabulary was appropriate; Pedagogy was innovative; Video extends or build upon students knowledge; and Sequencing (chunking) allows for appropriate contextual. However, in terms of the instructional design some areas were not suitable because the: Methodology does not promotes development of communication skills; Concepts were not clearly developed and summarized; the integration across curriculum subjects was not supported; Adequate/appropriate pre and post viewing activities were not suggested in the support materials; and Adequate/appropriate assessment/evaluation tools were not provided.

Research Question 4: Does the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitable in terms of its technical design?

Table 3: Shows the mean response of Heads of Woodwork Construction Units on the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitability based on its technical design

S/N	Item Statement: the technical design of the woodwork instructional video are suitable	Frequency				Mean	Remark
		SA (4)	A (3)	D (2)	SD (1)		
1.	Volume and sound quality of the woodwork instructional video	6	4	0	0	3.60	Suitable
2	Narration of the woodwork instructional video	5	5	0	0	3.50	Suitable
3	Music and sound effects of the woodwork instructional video	3	7	0	0	3.30	Suitable
4	Appropriate support materials are provided of the woodwork instructional video	0	1	9	0	2.10	Not Suitable
5	Visual effects/transitions are used appropriately to highlight topic of the woodwork instructional video	3	7	0	0	3.30	Suitable
6	Animation and graphics of the woodwork instructional video	2	6	2	0	2.60	Suitable
7	Title and caption of the woodwork instructional video	3	7	0	0	3.30	Suitable
8	Presentation is logical and varied of the woodwork instructional video	1	8	1	0	2.70	Suitable
9	Introductory information of the woodwork instructional video	3	5	2	0	3.10	Suitable
10	Audio Visual relationship of the woodwork instructional video	5	2	3	0	3.20	Suitable
11	Visual Quality of the woodwork instructional video	6	2	2	0	3.40	Suitable
Mean of Mean Responses						3.10	

Table 3 revealed that the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of its technical design in the following areas: Volume and sound quality; Narration ; Music and sound effects ; Visual

effects/transitions; Animation and graphics; Title and caption ;Presentation; Introductory information; Audio Visual relationship ; and Visual Quality.

Research Question 5: Does the developed instructional video for teaching and learning Woodwork Technology at the University level suitable in terms of its social consideration?

Table 4: Mean response of Heads of Woodwork Construction Units on the developed woodwork instructional video for teaching and learning practical skills in Woodwork Technology at the University level suitability based on its social consideration

S/N	Item Statement: the developed instructional video for teaching and learning Woodwork Technology at the University level suitable in terms of its social consideration	Frequency				Mean	Remark
		SA (4)	A (3)	D (2)	SD (1)		
1	Gender/sexual roles	8	2	0	0	3.80	Suitable
2	Sexual orientation	7	3	0	0	3.70	Suitable
3	Belief systems	7	2	1	0	3.60	Suitable
4	Age	9	1	0	0	3.90	Suitable
5	Socio-economic status	0	0	10	0	2.00	Not Suitable
6	Language	10	0	0	0	4.00	Suitable
7	Safety standards compliance	8	2	0	0	3.80	Suitable
Mean of Mean Responses						3.54	

Table 4 revealed that the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of its social consideration in the following areas: Gender/sexual roles; Sexual orientation; Belief systems; Age; Language and Safety standards compliance. However, the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level was not suitable in the area socio-economic status.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it was concluded that the developed instructional video for teaching and learning practical skills in Woodwork Technology at the University level is suitable in terms of its content, instructional design, technical design, and social consideration. This implies that the Woodwork instructional video is suitable for transfer of woodwork practical skills in the construction of stool, office chair, door frame, brace and batten door, and panel door. Hence, it the following recommendations were made:

- i. The developed Woodwork instructional video for the construction of stool, office chair, door frame, brace and batten door, and panel door should be used to teach practical skills in Technical Education department at the University level in Nigeria.
- ii. Government and stakeholders in Technical Education should organize workshop and training programmes for Technical Education lecturers on how to develop instructional video

in every areas of Technical Education to help address the challenges of ill equipped graduates in the areas of practical skills.

- iii. School administrators should made provision for the integration of instructional video in the teaching and learning process of Technical Education at the university level in Nigeria.
- iv. Government and stakeholders should provide grant for the development of instructional video in every aspect of Technical Education to make learning meaningful and interesting which will in turn help to produce employable graduates with indebt practical knowledge.

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