(RESEARCH ARTICLE)

Assessment of technical and vocational trainers' competence to adopt E-learning technologies into TVET curriculum implementation in higher education institutions

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Abstract

This study examined the level of expertise of Technical and Vocational Education Training (TVET) educators to use e-learning technologies for the delivery of TVET curriculum at higher levels of education. Gender influence on the TVET educators' competencies to use the technologies for their educational duties was also examined. The descriptive survey research design was adopted. Two research questions and one hypothesis were posed to guide the study. A total of Ninety Three (93) TVET educators made up of 67(72%) male and 26 (28%) female drawn from the authors of articles and participants in panels at all the proceedings and workshops of the International Conferences on e-learning technologies for innovative education organized by the: Online Learning consortium (OLC); Association for Talent Development (ATD) and Association for Educational Communications and Technology (AECT) between the periods of 2010 to 2019 were screened and used through convenience random and purposive sampling methods. The data collected through questionnaire were analyzed and tested using frequency count, percentage, mean, standard deviation and T-test. The instrument had face validity and reliability co-efficient of 0.81 obtained using Cronbach Alpha formulas. The findings revealed that TVET educators were highly competent users to the use of most of the studied e-learning technologies (such as: Use of Projectors and power point presentation; Using Online networking sites..; Utilizing Learning Objects; Creating/delivering web-based instruction; etc) with average mean score greater than 3.5.However, the study reported a low level of expertise by the TVET educators in the use of smart (electronic) Board to deliver instruction (31.2%) with average Mean score of 1.96.In addition to this, the study revealed a significant difference between the level of expertise/competence of male and female TVET educators on the use of e-learning technologies (t-calculated (12.702) > t-tabulated (1.960) at 0.05 level of significant).Conclusively, the study recommended that more customized e-learning technologies for the teaching and learning of TVET courses should be made available in the higher education and TVET educators be professionally trained on how to use them for their core business of teaching.

Keywords: TVET educators; TVET curriculum; E- learning technologies; Level of expertise; Adoption

1. Introduction

Distance education has made e-learning more popular as it has become a veritable way to bridge the distance between the teacher and the learner, between the writer and the speaker [7]. Obuh also views e-learning as comprising all forms of electronically supported teaching and learning. He contends that e-learning is to brick wall classroom learning, what mobile phone is to analogue fixed telephone line. To him, whereas the block wall classroom is situated at a place where teachers and students physically meet and interact, e-learning is diffused, capable of taking place anywhere and anytime, without face-to-face interaction between the teacher and students.

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The initiatives and the rising investment in e-learning technologies to teach TVET programmes in tertiary institutions do not guarantee its effective use or what impact it will have [5]. Teachers differ on whether they feel e-learning technologies makes their jobs easier or adds to their workloads. While teachers may recognize the positive potential that e-learning technologies can offer in the classroom, that potential is rarely realized [9].

In terms of competencies required to use the e-learning technologies for teaching, researches (e.g.[5] & [1]) have shown that most teachers educators in the tertiary institutions, most especially, in the developing countries (such as Libya) lack the Technological Pedagogical Content Knowledge (TPCK) " i.e. the skill and knowledge on how to adopt the e-learning technologies into their classrooms for teaching and learning purposes. Ajayi and Lawal also claim that, traditional teaching methods have dominated the lecture delivery and have been the adopted practices in tertiary institutions in developing nations and that, pre-and in-service teachers have insufficient access to digital technologies and the internet in their classrooms and other centres within their schools premises in the Nigerian teacher training institutions.

Literature study [10] & [6] reveal that the successful adoption of ICT enhanced teaching and learning largely depends on the availability of the e-learning infrastructure and teachers' attitude to embrace of e-learning technologies in their teaching. [8] also maintain that teacher competency is another indispensable variable to ensure the successful use of e-learning in the teaching and learning environment.

This research focuses on these factors that impede the e-learning technologies usage in the teaching and learning of TVET programmes in tertiary institutions in the developing nations and makes recommendations that aim at improving the adoption by technical and vocational teachers to use the digital equipments with the intention of improving the quality of teaching and learning of TVET programme in the developing nations.

The research work will help to provide a qualitative assessment on the level of expertise / competence of TVTE educators to utilize e-learning technologies meant for the teaching and learning of TVET programmes across a target sector of education in developing nations and encourages greater use of the digital equipments for teaching and learning of TVET programme in the sector. Specifically, it will provide useful information by evaluating the perception of the TVET teacher educators around the world about: important e-learning technologies that will improve the teaching and learning of TVET programmes in the tertiary institutions and determine how capable the TVET teacher educators are, to integrate different e-learning technologies into the TVET curriculum delivery in tertiary institutions.

2. Theoretical Framework

This research work is underpinned by the e-learning systems theory framework, which was constructed upon the three main components of an information system: people, technology, and services provided by technology itself.The goal is to identify the participants, technology, and services related to e-learning. The e-learning systems' theoretical framework contains the three main components of information systems. These components are people, technologies, and services. People interact with e-learning systems. E-learning technologies enable the direct or indirect interaction of the different groups of users. Technologies provide support to integrate content, enable communication, and provide collaboration tools. E-learning services integrate all the activities corresponding to pedagogical models and to instructional strategies. The complex interaction combination is the direct or indirect action with e-learning systems. At the same time, systems provide services according to the specified strategies for activities. In other words, service specifications are e-learning activities aligned with the e-learning pedagogical models and the instructional strategies.

3. Statement of the problem

The rapid interventions and adoptions of e-learning technologies by higher education institutes around the world in recent years have resulted in significant changes in the way the teaching and learning operates in the educational sector. This in turn has had a positive impact on educational and training needs, both in terms of the content and the delivery of educational and training services. However, in the delivery of TVET programme, simply providing access to e-learning technologies is not enough to radically change the teaching and learning of the TVET programmes for the better. A clear picture of what TVET education should be seeking to achieve is the need for TVET educators to be competent enough to handle and utilize modern e-learning technologies to their full potential within their domain. Policy makers need to be aware of the level of TVET educators' expertise/competence on how to adopt e-learning technologies into TVET curriculum delivery/implementation in the tertiary institutions to provide supportive policy environment and framework at the national level for the successful integration of e-learning technologies in enhancing the reach and quality of teaching and learning of TVET programmes in the higher education institutes. However, not much has been

reported in the literature concerning information about TVET educators' level of expertise in using various e-learning technologies for academic purposes in the higher education institutes. This is the problem this study intends to address.

4. Purpose of the Study

The main purpose of this study was to examine and evaluate the level of expertise or competence of TVET educators to adopt e-learning technologies into tertiary TVET curriculum delivery/implementation at higher education levels.

Specifically, the study sought to:

- Ascertain the level of TVET educators' capability in integrating different e-learning technologies into TVET curriculum delivery/implementation at higher education institutes
- To determine whether there is difference between the competency level of male and female TVET educators towards the use of e-learning technologies for their professional activities

4.1. Research Questions

The following research questions guided the study:

- What is the level of TVET educators' capability in integrating different e-learning technologies into tertiary TVET curriculum delivery/implementation?
- Is there any difference in the capability level towards the utilization of e-learning technologies between the male and female TVET educators in higher education?

4.2. Research Hypothesis

The null hypothesis formulated to guide the study is:

H_o: There is no significance difference between the competence of male and female TVET educators in higher education institutes

4.3. Research Methodology

The study adopted descriptive survey research design. The research was carried using mailed questionnaires with researchers in e-learning technologies and TVET educators around the world. The population for the study comprised of researchers in e-learning technologies and TVET educators in higher education institutes around the world. Ninety three (93) e-learning researchers and TVET educators that offer TVET programmes at higher education levels were sampled and participated in the study through the simple random and purposive sampling methods.

The instrument for the study was the researchers designed questionnaire. The questionnaire consists of four sections (1, 2, 3 & 4). Section 1 sought information about the respondent's Bio data. Section 2 sought to know the level of availability, accessibility and utilization of e-learning technologies by the TVET educators. Section 3 sought information on the TVET educators' competence to use e-learning technologies for their teaching. A five-point scale rating of VH = Very High (5), H = HIGH (4),M = Moderate (3),L = Low (2)and VL = Very Low (1) was used. Section 4 sought for information about obstacles to the successful adoption of e-learning technologies for the teaching and learning TVET programmes in higher education institutes. Analysis and findings of sections 1and 2 were presented in this paper and section 4 will be presented in future article.

Pilot testing was conducted on the instrument by 15 TVET educators that were not in the sample to determine the instrument validity.The instrument was tested for reliability using the test- retest method. The second test was administered after three weeks. The reliability coefficient obtained for the sections of the instrument under consideration were 0.88 (TVET educators competency level). In addition, the researchers carried out a random face to face interview with some TVET educators to collaborate the information obtained from the questionnaire.

5. Results

5.1. Perception of TVET educators on the level of importance of the studied e-learning technologies for TVET curriculum delivery/implementation in tertiary institutions

Results presented in the Table 1 showed that TVET educators attributed high level importance to the *Effective* use of *projectors and power point presentation* having Mean & SD scores of 3.533 and 1.556 respectively.

Table 1 Level of importance of integrating the studied digital equipment into TVET curriculum delivery in higher education institutes

Level of Importance	F	N	Mean	Std. Dev.	Decision
Use of Projectors and Power Point Presentation	87	93	3.5335	1.55506	High
Utilizing Videos	90	93	3.5081	1.58081	Medium
Effective Operation of Laptops/Tablets	82	93	3.5178	1.64249	High
Creating Instructional Power Point	89	93	3.5455	1.54400	High
Using Skype for Instructional or academic Purposes	49	93	2.4358	1.54410	Low
Utilizing Yahoo Messenger in instruction delivery	45	93	2.4939	1.55613	Low
Effective Operation and use of Computer System	83	93	3.5126	1.52613	High
Using smart (electronic) Board to deliver...	54	93	3.0870	1.51882	Medium
Using e-mail in project supervision	88	93	3.3947	1.49103	Medium
Employing Google scholar and other engines...	49	93	2.7955	1.51286	Medium
Using Online Networking sites...	48	93	3.5417	1.31401	Medium
Utilizing Learning Objects (LOs)	90	93	3.5543	1.57407	High
Creating/delivering web-based instruction	91	93	3.0850	1.42879	Medium
Using of MS Word for instructional Purpose	84	93	3.5279	1.56717	High
Effective use of iPod and apps	90	93	3.5637	1.52542	High

Other technologies that were perceived to be of high importance for the teaching and learning of TVET courses are: Effective Operation of Laptops/Tablets (3.52 & 1.64), Creating Instructional Power Point (3.55 & 1.54), Effective Operation and use of Computer System (3.51 & 1.53), Utilizing Learning Objects (3.55 & 1.57), Using of MS Word for instructional Purpose (3.53 & 1.57) and Effective use of iPod and Apps (3.56 & 1.53).Also, TVET educators reported a medium level of importance to the Utilizing Videos, Using smart (electronic) Board to deliver..., Using e-mail in project supervision, Employing Google scholar and other engines...,Using Online networking sites..., Creating/delivering web-based instruction, with Mean & SD scores of 3.51 & 1.58, 3.09 & 1.52, 3.39 & 1.49, 2.79 & 1.51, 3.54 & 1.31 and 3.09 & 1.43, respectively.

However, low level of importance was reported for *Using Skype for instructional or academic purposes* and *Utilizing yahoo messenger in instruction delivery* with Mean & S.D scores of 2.44 & 1.54 and 2.49 & 1.55, respectively.

5.2. Research Question 1

What is the level of TVET educators' capability in integrating different e-learning technologies into curriculum delivery/implementation at higher education level?

Table 2 Competencies/capabilities of TVET educators to utilize the studied e-learning technologies for TVET curriculum delivery at higher education level

Level of Skill or Competency	F (%)	N	Mean	Std. Dev.	Decision
Use of Projectors and Power point Presentation	74(79.6)	93	3.5885	1.27525	High
Utilizing Videos	82(88.2)	93	3.7614	1.18773	High
Effective Operation of Laptops/Tablets	78(83.9)	93	3.6289	1.25459	High
Creating Instructional Power Point	79(85)	93	3.6860	1.24435	High
Using Skype for Instructional or academic Purposes	50(53.8)	93	2.8374	1.90534	Medium
Utilizing Yahoo Messenger in instruction delivery	71(76.3)	93	3.5738	1.28874	High
Effective Operation and use of Computer System	78(83.9)	93	3.6289	1.25459	High
Using smart (electronic) Board to deliver instruction	29(31.2)	93	1.9603	1.43819	Low
Using e-mail in project supervision	79(85)	93	3.6860	1.24435	High
Employing Google scholar and Other engines...	75(80.6)	93	3.5977	1.28451	High
Using Online Networking sites...	79(85)	93	3.6860	1.24435	High
Utilizing Learning Objects (LOs)	78(83.9)	93	3.6289	1.25459	High
Creating/delivering web-based instruction	82(88.2)	93	3.7614	1.18773	High
Using of MS Word for instructional Purpose	78(83.9)	93	3.6289	1.25459	High
Effective use of iPod and apps	50(53.8)	93	2.8374	1.90534	Medium

The Table 2 shows TVET educators' competence/capabilities in using e-learning technologies. Actual numbers and percentages for responses to each statement were also shown. The table revealed that more than 75% of the inquired TVET educators were highly competent users to the use of e-learning technologies with average mean score greater than 3.5 as shown in the table such as: Use of Projectors and Power point Presentation (79.6%), Utilizing Videos (88.2%), Effective Operation of Laptops/Tablets (83.9%), Creating Instructional Power Point (85%), Utilizing Yahoo Messenger in instruction delivery (76.3%), Effective Operation and use of Computer System (83.9%), Using e-mail in project supervision (85%), Employing Google scholar and Other engines... (80.6%), Using Online networking sites... (85%), Utilizing Learning Objects (83.9%), Creating/delivering web-based instruction (88.2%), and Using of MS Word for instructional Purpose (83.9%).

However, results from the table 2 revealed that 53.8% of the enquired TVET educators reported medium level of expertise or skills in using both the *Skype and the IPod and Apps for instructional or academic Purposes* with average mean score of 2.83. In addition to this, the study reported a low level of expertise or competence by the TVET educators in the *use of smart (electronic) Board to deliver instruction* (31.2%) with average Mean score of 1.96 as shown in the Table 2.

5.3. Research Question 2

Is there any difference in the capability level towards the utilization of e-learning technologies between the of the male and female TVET educators at higher education level?

The null hypothesis (H$_0$) designed for the research was used to answer the research question 2.

H$_0$2: *There is no significant difference between the competence of male and female TVET educators on the use of e-learning technologies in higher education institutes.*

The result of the independent t-test that compares the competencies or level of expertise on the use of e-learning technologies between the mean values of the female TVET educators and those of the male TVET educators is shown in Table 3. The results showed that Female TVET educators obtained a lower mean attitudinal value of 15.08 and a

standard deviation of 1.26, while the Male counterpart had a higher mean value of 17.06 and a standard deviation of 1.43.

Table 3 Means, Standard Deviations, and t-test comparison of Male and Female TVET educators' Competence / expertise level on the use of e-learning technologies in higher levels of education

Variables	N	Mean	Std. Dev	T-cal	T-tab	Remark
Female	26	15.08	1.26			
Male	67	17.06	1.43	12.702**	1.960	Significant

**Significant; P = 0.05; df = 308

The t-value was found to be statistically significant since the t-calculated (12.702) was greater that t-tabulated (1.960) at 0.05 level of significant. In view of this, the null hypothesis which states that there is no significant difference between the competencies of male and female TVET educators towards the use of e-learning technologies was rejected.Thus, there is significant difference between the level of expertise/competence of male and female TVET educators on the use of e-learning technologies.

6. Discussion and Findings

Before evaluating the level of TVET educators' level of expertise/competencies in the use of the studied e-learning technologies, the level of importance/relevance of integrating the e-learning technologies into TVET curriculum delivery in higher education institutes was first studied and analyzed as shown in Table 1. This was investigated to be able to evaluate the significance of the studied e-learning technologies in teaching/learning of TVET courses before evaluating the TVET educators' level of expertise/competencies in using the e-learning technologies for their teaching.

Analysis of TVET educators' responses to the question: "How importance/significant are the studied e-learning technologies for the teaching and learning of TVET courses at higher education level?" shows that TVET educators (over 80%) attributed high level importance to the use of all the studied e-learning technologies (with exemption of: Using Skype for instructional or academic purposes and Utilizing yahoo messenger in instruction delivery).This finding conforms to the opinions of majority of the side line interviews conducted to validate the findings of the study. Majority of the interviewee opined that successful adoption and effective utilization of e-learning technologies can significantly improve the teaching and learning of TVET courses at higher level of education.

Analysis of TVET educators' responses that were used to answer the Research Question 1 revealed that over 75% of the enquired TVET educators are confident of having the required level of expertise to utilize the studied e-learning technologies. However, statistics obtained from Table 2 showed that among all the studied technologies it was only the smart (electronic) board that the enquired TVET educators (31.2%) indicated a low level of expertise to use.

Finally, the result of the independent t-test that compares the level of expertise/competence on the use of e-learning technologies between the mean values of the female TVET educators and those of the male TVET educators is shown in Table 3.Analysis of the results revealed significant gender difference in TVET educators' competence on the use of e-learning technologies. Interpretation of mean scores obtained from the table suggests that male TVET educators have more skilful and more competent in the use of e-learning technologies for academic purposes than the female TVET educators. This result is in agreement with the previous study conducted by Derbyshire (2003) who found male to outperform their female counterpart in the use of digital technologies. However, the result completely contradicts the findings of [4] who found female teachers to be more competent than their male counterparts in the use of digital technologies for their teaching business.

Recommendations

The following recommendations are made:

- Prioritization and optimal investment in science and technology, research and development (R & D), and education to promote and enhance technological competencies. In this wise, higher education institutes need to be reengineered and re-branded to fast track technological knowledge, acquisition, innovation and practice.

- More customized e-learning technologies for the teaching and learning of TVET courses should be made available in higher education institutes, most especially in the developing nations and TVET educators be professionally trained on how to use them for their core business of teaching.
- A deliberate robust and dynamic policy and programme about e-learning should be upgraded by the concerned agencies to update both academic and non-academic staff of their respective institutions and bridge the gender technology usage gap in all the institutions.

7. Conclusion

The results from this study provided evidence that apart from the general willingness of TVET educators to use the technologies for their core business of teaching TVET programmes, the enquired TVET educators in this research have the full capacities to adopt/implement important e-learning technologies that can improve the delivery/implementation of the TVET curriculum at higher education level. The study also shows that simply providing access to e-learning technologies in higher education institutes is not enough to radically change the teaching and learning of the TVET programmes for the better. A clear picture of what TVET education should be seeking to achieve is the need for TVET educators to be competent and skilful enough to handle and utilize modern e-learning technologies to their full potential for their core business of teaching TVET programmes.

Gender had significance influence on the competence/expertise of TVET educators towards the use of e-learning technologies. TVET education managers, Education policy makers, Curriculum planners need to note the findings of this study and how the teacher educators' competencies to use e-learning technologies relate to quality teaching and learning of TVET programmes in higher education institutes. The findings underscore the need for TVET educators to be professionally trained on how to use modern e-learning technologies for their core business of teaching.

Compliance with ethical standards

Disclosure of conflict of interest

There was no conflict of interest recorded from authors in this study.

Statement of informed consent

No statement of informed consent obtained from any individual in this study.

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