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ASSESSEMENT OF LEVEL OF TECHNOLOGICAL LITERACY POSSESSED BY VOCATIONAL AND TECHNICAL EDUCATION STUDENTS IN TERTIARY INSTITUTIONS

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ABSTRACT

The extent to which people can take full advantage of the benefit of technology as well as to recognize, address or even avoid some of its pitfall largely depend on their level of technological literacy. The extent to which vocational and technical education (VTE) students in Delta State sufficiently possess the knowledge of technology is not known. This situation necessitated the assessment of the level of technological literacy possessed by VTE students in tertiary institutions in Delta State. The purpose of the study was to assess the level of technological literacy possessed by vocational technical education (VTE) students in tertiary institutions in Delta state. Four research questions guided the study. The population for the study comprised 775 final year VTE students of Delta State University (DELSU), Abraka and Federal College of Education (Technical), Asaba. The population is manageable; as a result, the entire population. A Thirty-five (35) item questionnaire structured on a five-point rating scale was the instrument used for data collection. The questionnaire elicited information from VTE students on four components of technology literacy. Seven hundred and seventy-five (775) copies of the questionnaire were administered on the respondents but 702 copies of the questionnaire were completed and returned. The face validity of the instrument was carried out by three experts. A reliability test of the instrument was also conducted using Cronbach alpha reliability co-efficient method. Cronbach alpha reliability co-efficient obtained for the four clusters were 0.80, 0.82, 0.85, 0.89 respectively and overall cronbach alpha reliability co-efficient of 0.84 was obtained. Data collected were subjected to analysis using mean, and standard deviation and Findings showed that VTE students in tertiary institutions in

Delta State possess high level knowledge of: Nature of technology, technological system, impact of technology on society and technological experiences. Based on the findings of the study, it was recommended among others that Government and stakeholders in education should co-operate in providing tertiary institutions with suitable technological systems, equipment, infrastructural facilities and packages that will ensure that VTE students are trained with modern application packages to enable them embrace new technology.

Introduction

At a time when nearly every aspect of society has beenimpacted by rapid changes in technology, it is not surprising thatthere is growing support for technology education andtechnology integration in schools in Nigeria. Technology is any modification made to the natural world to meet human needs or wants. Technology includes not only tangible, physical products, but also the processes and knowledge needed to operate and create these products. Included as part of technology are the facilities and expertise needed in the design, manufacture, operation, and repair of technological devices and systems(Gamire& Pearson 2006). According to Gallup (2005), individualsuse anddepend on technology in their daily lives, and needs, and the demands for technology keep on rising.

The development of technology forges ahead at such a tremendous pace that new products, services and tools are constantly emerging. Given technology's pervasive influence and our dependence upon technology, informed citizens should possess an understanding of technology, how it is developed, how it works, how it affects society, and how society determines the path of technological developments. Collier-Reed(2008) asserted that for a person to be considered technologically literate, such a person must understand the nature of technology, have hands-on capability and capacity to interact with technological artefacts, and be able to think critically about issues related to technology.According to Donna (2002), literacy is more than knowledge andskills; it is the disposition towards life-long learning and global awareness.Dick and Jane (2005) maintained that the contemporary world "literacy" now comes to mean more than just the ability to read, write and numerate. It involves, at all levels, the

ability to use, manage and understand technology.

The International Technology Education Association (ITEA, 2007) defined technological literacy as the ability to use, manage, assess and understand technology. The ITEA stated that technological literacy includes knowledge and skills in how to use, manage and understand technology and the benefits and risks of current and future technology. It comprises four components namely: the nature of technology, technological system, human ingenuity and the impact of technology in the society. A person cannot have technological capability without some knowledge, and thoughtful decision-making cannot occur without an understanding of some basic features of technology. The capability dimension too, must be informed at some level by knowledge. Knowledge is familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills acquired through experience or education by perceiving, discovering, or learning. Knowledge can be theoretical or practical understanding of a subject. It can be explicit (as with practical skill or expertise) or implicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic. Therefore, it is important that vocational and technical education (VTE) students should have both practical and theoretical knowledge of technology. It is also necessary for VTE students to update and upgrade their technological literacy. Updating their technological literacy will assist the technicians and technologists to understand the concepts and apply them correctly in all situations so that they can cope with the modern and fast changing technological society.

Vocational and Technical Education (VTE) prepares individual for specific trades, crafts and careers at various levels in careers such as technical education, business education, fine and applied art education, agricultural science, among others. It could be at the secondary, post-secondary level, further education, and higher education level (for example, University, Polytechnics, College of Education). According to Adeleye and Abiola (2013) vocational and technical education is an integral part of general education that is meant to prepare a person in the practical aspect of a chosen career. In this same view, Uwaifo (2009) posited that technical education is the training of technically

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oriented personnel who are to be the initiators, facilitators, and implementers of technological development of a nation . Uwaifo opined that this training of its citizens on the need to be technologically literate, would lead to self reliance and sustainability.

It is, therefore, of paramount importance for VTE students, teachers and graduates to adapt themselves to the emerging and ever changing technology and to acquire knowledge and skill in order to cope with the impending changes. The technological literacy that students possess before and on graduation from VTE programmes may well be the key factor in determining the extent they are equipped with the ability to adapt to the future technological society. However, present realities reveal that technological choices influence people's health and economic well-being. Moreover, the types of jobs and recreation facilities available in today's world, as well as our means of self-expression, are also influenced by technology (Young, et al, 2002). Therefore, to become better stewards of technological changes, VTE student must take full advantage of the benefits of technology, as well as recognize, address, or even avoid some of its pitfalls. Regrettably Okonta (2011) observed that VTE students in higher institutions in Delta State are not able to take full advantage of the benefits of technology, or to even avoid some of its pitfall. If this status quo is maintained, it may lead to making wrong technological choice, poor application of technological product and services, unemployment and all sorts of concerns that are capable of causing serious threat to lives and the society.

However, Okonta further stated that the extent to which people can take full advantage of the benefits of technology as well as to recognise, address or even avoid some of its pitfalls largely depends on their level of technological literacy. As it stance now, the level to which VTE students in Delta State sufficiently possess the knowledge of technology is not clearly known. Consequently, this may result to inadequate planning for improved method and development of instructions/practices that will enhance the technological literacy skills of VTE students in today's world. This situation is not acceptable and necessitates the assessment of the level of technological literacy possessed by VTE students in tertiary institutions in Delta State. The problem of this study therefore is that, the level to which VTE students in

tertiary institution in delta state possess the knowledge of technology is not know, this may hinder stakeholders in VTE from adequately planning for improved method of acquisition of technology knowledge that will enable VTE students take full advantage of the benefit of technology as well as recognize, address or even avoid some of its pitfalls .The purpose of the study was to assess the level of technological literacy possessed by VTE students in tertiary institutions in Delta State.

Research Questions

1. What level of knowledge of the nature of technology do VTE students in Delta State possess?
2. What level of knowledge of technological systems do VTE students in Delta State possess?
3. What level of knowledge of the impact of technology on society do VTE students in Delta State possess?
4. What level of technological experiences do VTE students in Delta States possess?

METHOD

The design adopted for the study was a descriptive survey research design. The study was conducted in Delta State, Nigeria. Specifically, it was conducted in Delta State University (DELSU) Abraka and Federal College of Education (Technical) Asaba. The population of the study comprises all the 775-final year VTE students of Delta State University (DELSU) Abraka, and Federal College of Education (Technical) Asaba in the 2015/2016 academic session. The population is manageable; as a result, the entire population as proposed for the study was used. The instrument for data collection was a structured questionnaire titled VTE student's technological literacy questionnaire (VTESTLQ).the instrument was face validated by three experts, two from the Department of Vocational Education, Nnamdi Azikiwe University, Awka and the other from the Measurement and Evaluation unit of the Educational Foundation Department, Federal College of Education (Technical), Asaba and thereafter tested for reliability coefficient using Cronbach Alpha method and Cronbach Alpha reliability co-efficient obtained for each cluster was 0.80, 0.82, 0.85, 0.89 and overall Cronbach Alpha reliability co-efficient of 0.84 and this according to Nworgu (2015) suggest a high reliability. The instrument was administered and collected by the

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researcher directly. Seven hundred and seventy-five (775) copies of the questionnaire were distributed to the respondents. Out of this, 702 copies of correctly filled questionnaire were returned which represents 91 percent return rate and this was used for the data analysis. The data collected was analyzed using arithmetic mean, and standard deviation

Result

The results of study were presented based on the research question and corresponding hypotheses as follows

Research Question 1

What level of knowledge of the nature of technology do VTE students in Delta State possess?

Data collected in respect of this research question are presented in Table 1.

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Table 1
Mean Ratingand Standard Deviation of the Respondents on Level of Knowledge of the Nature of Technology
N=702

S/N	Knowledge of nature of technology	X	SD	Decision
1	Permits human beings to apply the knowledge and skills acquired from other disciplines for innovative activities.	**4.25**	**0.6 9**	**HL**
2	Enhances personal skill in use of tools to observe and measure things.	**4.43**	**0.81**	**HL**
3	Explains how scientific research could contribute to improved standard of living of the people.	**4.04**	**0.85**	**HL**
4	Strengthens human capacity to solve human and environment problems.	**4.22**	**0.76**	**HL**
5	Enhances skill in use of tools to create things.	**3.99**	**0.87**	**HL**
6	Contracts the increasing complexities of applied sciences with their ease of use	**3.25**	**0.73**	**ML**
7	Reflects the values and culture of society.	**4.23**	**0.80**	**HL**
8	is the result of human creativity or innovation	**3.24**	**1.16**	**ML**
	Cluster Mean	**3.96**		**HL**

SD=Standard Deviation, HL=High Level, ML=Moderate Level, LL=Low Level.

The overall opinion of the respondents (students) showed that they possess high level of knowledge of the nature of technology as revealed by the cluster means of 3.96. The standard deviation of the eight (8) items ranged between 0.69 and 1.16. This implied that all the respondents were close in their opinions.

Research Question 2
What level of knowledge of technological systems do VTE students in Delta State possess?

Data collected in respect of research question 2 are presented in Table 2

Table 2: Mean Ratingand Standard Deviation of the Respondents on Level of Knowledge of Technological System
N=702

S/N	Aspect of knowledge of technological systems	X	SD	Decision
	I have ability to…			
9	Identify parts of a machine system used in technology education workshop.	**4.09**	**1.29**	**HL**
10	explain the operational principle of the part of a machine system used in technology education workshop	**4.25**	**1.27**	**HL**
11	Identify potential sources of failure in a system (such as defective parts and maintenance needs)	**2.29**	**1.39**	**LL**
12	Explain how development of new tools, materials and processes are necessary to maintain and improve productivity and product quality.	**3.99**	**1.11**	**HL**
13	Follow a set of instructions to produce a product using appropriate tools and materials.	**4.23**	**0.71**	**HL**
14	Explain that output from one system may be input to another system.	**4.00**	**0.86**	**HL**
15	Explain the functions of the common element of input in technological systems	**3.24**	**1.17**	**ML**
16	Explain the functions of the common element of process in technological systems	**4.43**	**0.80**	**HL**
17	Explain the functions of the common element of output in technological systems	**3.44**	**0.97**	**ML**

18	Explain the functions of the common element of feedback in technological systems	**2.79**	**0.88**	**ML**
	Cluster Mean	**3.68**		**HL**

SD=Standard Deviation, HL=High Level, ML=Moderate Level, LL=Low Level.

The overall opinion of the respondents (students) shows that they possess high level of knowledge of technological system as revealed by the cluster means of 3.68. The standard deviation ranges from 0.71 to 1.39, showed that the respondents are relatively close in their responses.

Research Question 3

What level of knowledge of the impact of technology on society do VTE students in Delta State possess?
Data collected in respect of research question 3 are presented in Table 3.

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Table 3
Mean Rating and Standard Deviation of the Respondents on Level of Knowledge of the Effects of Technology on Society.

N = 702

S/No	Knowledge of impact of technology on the society	X	SD	Decision
	Ability to…			
19	Explain how existing technologies make life and work easier	3.99	0.88	HL
20	Assess the impact of new and improved products and services on the quality of life of the people.	3.25	1.16	ML
21	Identify the advantages and disadvantages of given technologies.	4.23	0.74	HL
22	Explain the importance of effective decisions on the direct and indirect effect of technology for the future.	3.56	0.82	HL
23	Evaluate the relative appropriateness of given technology by comparing the risks with the benefits.	4.26	1.27	HL
24	Explain why a given technology may be acceptable or unacceptable under certain circumstances	2.44	1.59	LL
25	Explain why people must understand how a new technology might affect human or society.	3.35	0.89	ML
26	Explain that all technologies entail risks, some of which can only be anticipated.	3.51	1.40	HL
27	Understand that technology results in both planned and unplanned consequences.	3.11	0.92	ML
	Cluster Mean	**3.52**		**HL**

SD=Standard Deviation, HL=High Level, ML=Moderate Level, LL=Low Level.

The analysis presented in Table 3 show that the respondents have high level knowledge of the effects of technology on society on Items 19, 21 22,23,and 26 with mean ratings of 3.99, 4.23,3.56,4.26 and 3.51 respectively. The overall opinions of the respondents however, show that they possess high level of knowledge of the effects of technology on society as revealed by the cluster means of 3.52. The standard deviation ranges between 0.74 and 1.59. This shows the non divergent opinions of the respondents

Research Question 4

What level of technological experiences do VTE students in Delta States possess? Data collected in respect of this research question are presented in Table 4.

Table 4
Mean Ratingand Standard Deviation of the Respondents on Level of Technological Experiences.
N=702

S/No	Technological experiences	X	SD	Decision
28	Selecting materials and other resources for a technological design as well as develop practical solutions.	3.84	1.07	HL
29	Explaining the working principles of various machine systems and equipment in accordance with their design requirements.	4.14	1.15	HL
30	Interpreting technicians hand books which provide ready source of solutions to general problems.	4.40	1.14	HL
31	Defining problems and devise their solutions.	3.64	1.29	HL
32	Using tools and materials to design, develop and improve product quality	2.93	0.69	ML
33	Interpreting current symbols and conventions for a given project or work.	3.79	0.97	HL
34	Explaining how changing the physical characteristics of a material can increase its usefulness.	2.72	1.10	ML
35	Using tools and materials to design and develop products that satisfy human needs.	3.48	1.74	ML
	Cluster Mean	**3.62**		**HL**

SD=Standard Deviation, HL=High Level, ML=Moderate Level, LL=Low Level.

Analysis in Table 4 show that the respondents have high level of technological experiences on five items with means of 3.84, 4.14, 4.40, 3.64 and 3.79 respectively The overall opinion of the respondents however, shows that they possess high level of

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technological experiences as revealed by the mean of means of 3.62. The range of standard deviation scores between 0.69 and 1.74 indicates that the respondents are not too far from their opinions

Discussion

The Findings in respect to research question 1 of this study reveal that VTE students in tertiary institution in Delta state possess high level knowledge of the nature of technology. The cluster mean of 3.96, thus, showed that the students possess a high level of knowledge of the nature of technology.This is in line with the finding of Nebo(2010) that technical college students in Anambra and Enugu states possess high level knowledge of nature of technology.

The result of the analysis presented in Table 2 showed that the students possess high knowledge in six out of the ten items describing the knowledge of technological systems.VTE student possess high knowledge to identification andexplain the operational principle ofparts of a machine system used in technology education workshop. The findings also reveal that the students possess high level of knowledge to the fact that development of new tools,materials and processes are necessary to maintain and improve productivity and product quality and also that output from one system may be input to another system.Howeverthe students showed moderate level of knowledge in the explanation of the functions of the common element of input,outputand feedback in technological systems. The student's cluster means rating of 3.68 indicated that the students possess high level of knowledge of technological systems.

The result of the analysis presented in Table 3 reveals that VTE students possess high level knowledge in their ability to explain how existing technologies make life and work easier, assess the impact of new and improved products and services on the quality of life of the people. Findings also show that VTE students in tertiary institution in Delta State possess high level knowledge to identify the advantages and disadvantages of given technologies, explain the importance of effective decisions on the direct and indirect effect of technology for the future, evaluate the relative appropriateness of given technology by comparing the risks with the benefits.

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The student's cluster mean rating of 3.50 represents high level knowledge of the impact of technology on society. These are in agreement with the findings of Nebo(2010) who stated that technical education students in technical colleges in Anambra and Enugu states possess high knowledge of the effect of technology on the society. FurthermoreOgbimi (1994) agreed with thisassertion by stating that the acquisition of technology primarily involved the acquisition of fundamental theoretical and practical skills to an appreciable level and that combining them to facilitate independent thinking by the person acquiring it and by extension to the society.

The result of the analysis presented in Table 4 indicates that therespondents cluster mean ratings portray that VTE students in tertiary institution in Delta State possess high level of technological experience. They have the ability toselect materials and other resources for a technological design as well as develop practical solutions. VTE students in tertiary institution in Delta State can explain the working principles of various machine systems and equipment in accordance with their design requirements, interpret technicians hand books which provide ready source of solutions to general problems, define problems and devise their solutions.Also they can interpret current symbols and conventions for a given project or work.The students mean ratings on the other three items under technological experiences ranges between 2.72 and 3.48 thus indicating moderate level of experience.

Conclusion

Based on the results of the findings, it has been confirmed that technological literacy level of VTE students in tertiary institution in Delta State is high in nature of technology, technological systems and effects of technology on society, and technological experiences. The fact that the students did not possess the individual abilities to the same degree, will guide the instructors in selecting materials, experiences and task (theoretical or practical) for teaching the students. Since the quality of VTE product depends on the adequacy of funding, equipment, staffing, infrastructural facilities, healthy school-industry interaction, restructuring of the curriculum and the encouragement of VTE institutions to make judicious use of the existing materials in problem solving situations, there is then the need

to equip VTE programme in tertiary institutions adequately with human, material resources and facilities. Such programmes must be sensitive to the needs of the students.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. Government and stakeholders in education should co-operate and collaborate in providing tertiary institutions with suitable, adequate and up-to-date technological systems, equipment, infrastructural facilities and packages that will ensure that VTE students are trained with modern application packages as to enable them embrace new technology as they emerge.
2. Vocational and technical education planners and administrators should review the curriculum components periodically to ensure that courses are kept abreast with changes in technology. The curriculum content should be at pace with current nature of industrial practice in the country. In doing this, industrial personnel should be co-opted in curriculum development because it is through them that modern skills and techniques of doing things will be known.

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