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Effects of accessibility and adequacy of technical vocational education and training equipment on acquisition of employable skills in Uganda. A case of Uganda Technical College - Elgon

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ABSTRACT

The Government of Uganda has continued to establish and equip public Technical Vocational Education and Training (TVET) Institutions in the country. However, despite the initiatives, learners have continued to join the industry claimed to have inadequate employable skills. This pauses a question whether the equipment utilized are adequate, accessed by learners to acquire employable skills. This paper therefore examined the access and adequacy of TVET equipment in Technical Colleges. A descriptive survey design utilizing quantitative and qualitative approach of research was conducted, a sample size of 100 learners and 5 instructors were selected. A simple random sampling technique to choose learners responded the questionnaires and purposive selection of instructors for focus group discussions. Statistical Package for the Social Sciences was used to run descriptive analyses, ordinal regressions and frequency distribution. Findings on adequacy show that 77% of the learners are availed equipment not relevant to their programme and spend little time practicing on the equipment. In conclusion, TVET equipment were inadequate with limited time spent on practicum and recommended that Government institutions should undergo into memorandum of understanding with the industry to enable learners adequately access practical experience on modern equipment and relevant to their training.

Keywords: Technical Vocation Education and Training, Access to education, Employable skills

Introduction

Technical Vocational Education and Training (TVET) is key in the development of occupation-specific and generic skills needed for social-economic and industrial development of nations. The current unemployment trends in the country require robust interventions and practices to deal with problems broadly and sustainably. The quality of education and Training given to youths depends greatly on the ability of institutions to adjust their educational content to the changing skill requirements of the nation. Mayindo, (1995), stated that educational institutions are expected to provide knowledge and training that satisfies the human resource demand of the nation's economy.

Uganda Technical College Elgon (UTC Elgon) is a Government Tertiary Institution, located in Eastern Uganda, providing technical education training at Diploma and Certificate level to the

community from North-eastern and Eastern, in addition to the population from the rest of Uganda and in the East and Central African Region. It is about 14 Km on Mbale – Budadiri road, at the foot of Mt. Elgon. The college started its operation in 1931 as an artisan-training centre to train World War I veterans in technical and vocational skills. In 1974 it was elevated to a technical institute and Technical College in 1984. Some of the programmes offered at Elgon College include: National Diploma in Water Engineering (NDWE); National Diploma in Electrical Engineering (NDEE); National Diploma in Civil Engineering (NDCE); National Higher Diploma in Civil Engineering (NHDCE); National Diploma in Mechanical Engineering (NDME); National Diploma in Refrigeration and Air Conditioning (NDRA); National Diploma in Architecture (NDA); National Diploma in Refrigeration and Air Conditioning Engineering (NDRAE); National Diploma in ICT; and National Diploma in Water and Sanitation Engineering (NDWSE).

Technical Vocational Education and Training (TVET) concerns with occupational, hands on tasks and processes. Envisioning empirical view of determining the needed education policy reforms regarding employable skills especially in TVET; optimize the utilization of available TVET equipment, at the same time increase the number of trainees and associated opportunities for skills acquisition. These will ultimately achieve the intent of equipping youth with the technical and professional skills required for socio-economic and industrial transformation in the economy and offer employment for teeming unemployed youth. The study analyzed the differential effect of utilization of TVET equipment on acquisition of TVET employable skills by TVET learners in Uganda Technical Colleges.

Statement of the problem.

Access and adequacy of Technical Vocational Education and Training equipment in Technical Colleges is critical for learners' acquisition of employable skills. MOES, (2019) government made efforts towards improving TVET sector in Uganda. NDPIII, (2020) stated under the human capcity development programme that in 2017/18 propotion of labour force transiting into decent employment was at 34.5%, The TVET graduates transiting into the world of work increased from 34,380 in 2012 to 95,841 in 2018. This was partly due to subtantial progress made in rehabilitating, expanding, staffing and equiping institutions. Although attempts are made to change the employability status, employability skills gaps persits. This necessitated the study which investigated the accessibility and adequacy of TVET equipment in training of learners in Uganda Technical Colleges in Uganda.

Objectives and Hypotheses

Objectives

Objectives of this study is to investigate the effects of accessibility and adequacy of TVET equipment on learners 'acquisition of employable skills by learners in Technical Colleges.

- To investigate the effect of learners' access to TVET equipment on acquisition of employable skills.
- To investigate the adequacy of TVET equipment on learners' acquisition of employable skills.

Hypotheses

There is no statistical significant difference between the mean responses of participants on the effect of; (1) learners'accessibility to TVET equipment on acquisition of employable skills; and (2) adequacy of TVET equipment on learners' acquisition of employable skills.

Literature Review

Technical, Vocational Education and Training (TVET) is found to be Technology, Engineering and world of work-based training aimed at fostering vocational abilities required for the profession, training practical and creative technical experts. Previously, authors have written on the availability and utilization of instructional materials including training equipment both in teaching and quality of learning. Rukayyatu, (2021), defined Instructional material as the human and non-human materials and facilities that can be used to ease, encourage, stimulate, and promote teaching and learning, noted that it is key to success of every technical oriented trade or subject. For example students of TVET in technical schools and colleges need to acquire knowledge and skills, instructional material and equipment resources need to be adequately available and utilized effectively in the teaching-learning process. UNICEF, (2000) defined Quality of education as outcomes that encompass knowledge, skills and attitudes, and are linked to national goals for education and positive participation in society.

Report by the Ministry of Education and Sports, MOES, (2017), stated that whereas there are some progress made towards Skilling Uganda labour force, the economy still faces substantial skills gap in key sectors of the economy. The report indicated that over the last 7 years, progress has been made mainly in formal areas of Business Technical Vocational Education and Training registering a 67.9% increase in enrolment from 34,380 in 2013 to 95,841 in 2019, of which 59,877 (62.5%) are male and 35,964 (37.5%) are female (MOES, Education and Sports Sector Analysis, 2019).

Accessibility to TVET equipment

Kajuru (2022) stated that Instructional materials help students to improve in their learning procedures. Skills are developed by instructional materials which help students range of experience, achieving their learning targets, and stimulate their desire to learn. Ogbu (2015) argued that instructional materials develop students' ideas through the formation of events and objectives which improve the students' continuity of thought. It facilitates, stimulates and assist students to actively have interest in the subject, improves emotional development of students by providing them with the required knowledge, and delivers an understanding of the working models presented by the trainers.

Mayindo, (1995), the quality of education and Training given to youths depends greatly on the ability of institutions to adjust their educational content to changing skill requirements of the nation. In other words, educational institutions are expected to provide knowledge and training that satisfies the human resource demand of nation's economy.

UKessays (2017) stated that Uganda Vocational Curriculum is represented in an overlapping three-tier system including level three offered through Technical Colleges and the Uganda Polytechnics Institutes courses of two-year leading to the award of ordinary diplomas in Civil, Mechanical and Electrical Engineering, among others. The training of this category require well-equipped workshops, continuous conduct of Industrial training and apprenticeships as an integral part of all the courses in technical/vocational education. In Uganda learners spend a minimum of three months each year on job placement, while doing the practical trainings. During that particular time, students are supervised by the industry and are normally visited by their instructors and lecturers to assess the progress in their training practicum programs.

Adequacy of TVET equipment

Ogbu (2015) revealed that availability and adequacy of instructional facilities is holistic term which is directed towards education as an entity. Adequacy of instructional facilities is the process of using procured and accessible facilities, tools, equipment and appliances to make teaching and learning processes easier, interesting and rewarding. The study found out that most available physical facilities are workshops, libraries and classrooms. More than 90% of the technical colleges lacked physical facilities and few instructional materials available for teaching Basic Electricity such as capacitors, radios, computers, alternators, transformers. Ogbu (2015), notes that when instructional materials and facilities are used in teaching and learning, the academic performance of the students improves. Inadequate instructional materials and facilities reduce the academic performance of students and hinder their participation and practical skills acquisition.

Mbadiwe (2013), investigated the availability of instructional material to lecturers and their effective delivery in tertiary institutions in Abia State. The study revealed that the available instructional materials for teachers who teach science education were not enough to meet the target of effective teaching and learning.

Methodology

The study adopted a descriptive survey design which took quantitative and qualitative approach of research. This is because the determinants were assessed by collecting data from all the respondents at the same time. The survey was conducted at Uganda Technical College Elgon found in the Eastern region in Uganda, The study sample size was 100 learners and 5 instructors selected from five different programmes (Electrical, Mechanical, Civil, Water, Refrigeration and Air conditioning Engineering). The study utilized a simple random sampling technique to choose learners responded the questionnaires and purposive for the instructors that participated in the focus group discussions. Questionnaire method was used to collect data from learners this aided the gathering and group discussion conducted to obtain key information for the instructors. The questionnaire had two sections, Question 1 is meant to collect data needed for research question one requiring to investigate the effect of accessibility to TVET equipment on learners' acquisition of employable skills. Question 2 is meant to collect data needed for research question two requiring to investigate the effect of adequate TVET equipment on learners' acquisition of employable skills.

Statistical Package for the Social Sciences (SPSS) was employed to run descriptive analyses, ordinal regressions, and frequency distribution to assess the behaviors of key variables, to identify the relationship between the variables, test the hypotheses. The analyses made on acquisition of TVET employable skills per programme/courses measured against; accessibility to TVET equipment and adequacy of TVET training equipment for acquisition of employable skills by; Ordinal regression used to predict an ordinal dependent variable with the given independent variables.

Validity of the outcome, a team of knowledgeable staff were selected to collect the data and were directly supervised by the researcher, instruments and tools quality assured to ensure results accurately measure the outcomes designed. Cronbach Alpha method was adopted where 5 questionnaires were tested on 5 learners from each programme, data entered in SPSS for analysis. Reliability values for the questionnaire were considered with the use of Cronbach Alpha method.

Ordinal regression model

Walker and Duncan (1967) referred the ordinal logistic regression model to as a constrained cumulative logit model. Ordinal outcome on accessibility and adequacy of TVET equipment were analysed by the logistic regression model, (A & Adepoju, 2010). This method was used to model the relationship between response outcome variable employability skills and the set of explananatory variavles accessibility and availability of TVET equipment.

$$\gamma_j(\mathrm{x}) = \frac{e^{(\alpha_j+\beta \mathrm{x})}}{1 + e^{(\alpha_j+\beta \mathrm{x})}} \quad \text{………………………………………………………….. (1)}$$

The model is fit through the procedure of maximum likelihood estimation. Unknown parameters estimated by means of maximum likelihood;

(α_j) Represents a separate intercept or threshold for each cumulative probability.

(β) Regression coefficient.

Goodness of Fit

$$\chi 2 = \sum_{i=1}^{k}(O - E)2/E \text{……………………………………………………………(2)}$$

O_i = *Observed frequency* $_i$

E_i = *expected frequency* $_i$

Results and Discussion

The results of the study are presented in line with the research questions. Ratings, correlation and ordinal regression to generate chi-square test were used to answer the questions including test the hypotheses at 0.05 level of significance. The study involved 105 respondents of which 100 learners and 5 instructors. These were grouped into three age groups ranging from (18-24) = 62 respondents and were majority. The bigger number under this category of students is attributed to the fact that most them join technical vocational education and training diploma programmes below 18 years, category two fall between 25 and 34 were 40; and (35-44) = 3 respondents. The study considered both genders, however, it is noted that Male: 94(89.5%), and Female: 11(10.5%). This shows that female learners were fewer in these Technical Colleges compared to their Male counterparts.

Table 1. Respondents by (Age - Gender).

	Age Group	Male	Female	Total
Age	(18-24)	52	10	62
	(25-34)	40	0	40
	(35-44)	2	1	3
Total		**94**	**11**	**105**
Percentage		**89.50%**	**10.50%**	**100.00%**

Uganda Technical College Elgon offers a number of programmes which include: National Diploma in Water Engineering (NDWE); National Diploma in Electrical Engineering (NDEE); National Diploma in Civil Engineering (NDCE); National Higher Diploma in Civil Engineering (NHDCE); National Diploma in Mechanical Engineering (NDME); National Diploma in Refrigeration and Air Conditioning (NDRA); National Diploma in Architecture (NDA); National Diploma in Refrigeration and Air Conditioning Engineering (NDRAE); National Diploma in ICT; and National Diploma in Water and Sanitation Engineering (NDWSE). This study considered respondents from 5 programmes.

Table 2. Course/programmes assessed.

Table 2. programme assessed, shows participants per programme who participated in the study.

Programmes	Frequency	Percent	Cumulative Percent
Civil Engineering	2	1.9%	1.9%
Mechanical Engineering	40	38.1%	40.0%
Water Engineering	27	25.7%	65.7%
Electrical Engineering	29	27.6%	93.3%
Refrigeration and Air Conditioning	7	6.7%	100.0%
Total	**105**	**100.0%**	

Table 3. Respondents by (Gender - Course).

Table below shows respondents by gender, where a total of 11 were female and 94 where male.

	Civil Engineering	Mechanical Engineering	Water Engineering	Electrical Engineering	Refrigeration and Air Conditioning	Total
Male	1	39	21	28	5	94
Female	1	1	6	1	2	11
Total	**2**	**40**	**27**	**29**	**7**	**105**

Research objective 1: effects of access to TVET equipment on acquisition of employable skills.
The study sought to establish from the interview guides, questionnaires on the factors affecting acquisition of employable skills. It was observed that all the five programmes assessed had equipped workshops. It was also noted that whereas the workshops were equipped and utilized, running and maintenance costs of the existing equipment were found unbearable. All the five programme/courses assessed Civil, Mechanical, Water, Electrical and Refrigeration Engineering had equipped workshops.

Frequency distribution Table 4. indicate that 91 (87%) out of 105 respondents agree that the UTC Elgon has workshops for practicum lessons and that over 81% do not need transport to access the workshops, about 69 (66%) are utilized but learners and 23 (22%) disagreed, 74 (70%) agreed that workshop accommodate recommended 20-50 learners at a time. However, when inquired whether the learners were allowed to access the workshops at any time, the result show that 70 (63%) disagreed on the time given to access training on equipment.

The accessibility to TVET training equipment has been measured with an ordered five-point likert scale this is illustrated in the table 4 below.

Table 4. Assessing respondents on Access to TVET Training equipment.

(Questions)	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
UTC Elgon have workshops for practicum lessons.	47	44	5	7	2
I need transport to access the college training workshops.	8	5	6	43	42
The college workshop is used by learners.	30	39	11	18	5
The college has a well laid out timetable for workshop sessions.	16	24	7	33	23
Am allowed to access the college workshops.	24	42	7	15	13
The workshop can accommodate 20-50 learners at a time.	39	35	8	15	7
I attend the workshops in shift.	15	33	7	30	16
The workshop is under lock to learners occasionally.	22	38	11	26	8
The shift I attend is convenient for me.	19	34	8	29	13
I spend a recommendable time training on machines and equipment in the workshop.	7	21	6	37	33

Model fitting information compares the model without explanatory variables (baseline or Intercept Only model) against the model with explanatory variables (Final model). Results show significant relationship and more improved. The significant chi-square statistic ($P<0.05$) indicates the model is gives better predictions.

Goodness of fit, tests whether the observed data are consistent with the fitting model. The results suggest that the model fit very well ($P_{Value}=0.19>0.05$). Therefore we reject the H_o that access to TVET training equipment has no effect on gaining employable skills and accept the H_o that there is significant evidence access to TVET training equipment affect acquisition of employable skills.

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	240.49			
Final	176.698	63.792	40	0.01

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	342.004	320	0.19
Deviance	173.926	320	1

Research objective 2: effects of adequacy of TVET equipment on acquiring employable skills.
All the five programme/courses assessed including; Civil Engineering, Mechanical Engineering, Water Engineering, Electrical Engineering and Refrigeration and Air conditioning Engineering show that workshops were adequately equipped. The frequency distribution Table. 5 on adequacy of TVET Training equipment, findings revealed that 60% of the learners indicated that they were well equipped, 23% of the learners were availed with relevant equipment, 64 (61%) revealed that the equipment were not adequate. Details of inadequacy of equipment were not exploited in depth to show the forms of inadequacy.

The adequacy of TVET training equipment has been measured with an ordered five-point likert scale this is illustrated in the table 4 below.

Table.5 Assessing Respondents on Adequacy of TVET Training equipment.

(Questions).	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
The workshop I attend is well-equipped with the required training equipment.	21	42	5	26	11
The equipment in the workshop is relevant to my course/programme.	1	23	55	6	9
There is modern equipment in the workshop.	19	37	15	12	17
I have trained on better equipment in other workshops outside the college.	34	36	9	18	8
Time I spend training on machines and equipment is adequate.	8	24	8	30	34

The study observed a number of equipment and tools for various programmes, some of these equipment include; Civil engineering workshop was equipped with concrete mixer, poker vibrator, theodolite/dumpy level among others. Mechanical engineering was equipped with 1 petrol engine, 2 diesel engines, timing pulley, engine stand, socket and rachet set, torque wrench, valve seal removal, valve spring compressor, strp wrench, adjustable oil filter wrench, jack stand, screw drives, lifting equipment, trolley jack, dial gauge, compressor machine, automatic gear box, adjustable wrench, tool box with assorted equipment, spanners, tyre lever, four way rim, among others. Electrical engineering had wiring bords, cooker control unit, solar panels, meters, battery, transformer, charge controller, inverter, motors, manual and automatic transfer switches, motor starters with timers, push button switches, magnetic contractors, signal lamps, overload relays and circuit breakers, switch gears, drilling machines, earth and lightening materials, among others.

Model fitting information, compares the model without explanatory variables (baseline or Intercept Only model) against the model with explanatory variables (Final model). Results show insignificant relationship and does not fit to the data. The significant chi-square statistic (P>0.05) indicate the model does not gives predictions.

Goodness of fit, confirms whether the observed data are consistent with the fitting model. Results suggest that the model does not fit very well (P_{Value}=0.00<0.05). Therefore, we accept the H_o that adequacy of TVET training equipment has effect on gaining employable skills and reject the H_o that there is no significant evidence to show that adequacy of TVET training equipment affect acquisition of employable skills.

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	250.956			
Final	226.208	24.748	20	0.21

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	508.716	320	0
Deviance	217.654	320	1

Limitations

It is observed that a number of respondents gave neutral as a response which could have affected the results to agree or not to agree, for instance when asked the respondents on whether equipment in the workshop are relevant to my course/programme, 55 (53%) did not agree nor disagree. This confirms with the limitation on social acceptability where respondents selected the responses from the Likert scale they believed to be most socially acceptable. This reduced honesty and that the reactions were not entirely representative of the study and in particular to the question raised.

These questions are clearly leading respondents which in away give positive feedback. Questions give 5 options from which the respondent select one by restricting them not explore out of the box, and by not digging dipper into specific areas. Close ended questions may not sufficiently give a conclusion on the findings, requiring qualitative interpretation to have a more reliable findings of the study.

Conclusion and Recommendation

Conclusion

TVET colleges have equipped workshops, and these workshops can accommodate a about (20-50) learners at a time. However, little time was given to learners for practice on the machines and equipment available in workshops. This confirms accessibility to TVET equipment but with limited time spent practicing, hence frustrating the acquisition of employable skills. The workshops were equipped for the use of the students. However the equipment were not made available for the students to use. These findings are in-line with study of Rukayyatu, (2021) who noted the TVET in technical schools and colleges need to be adequately availed with equipment and utilized effectively in the teaching - learning process. Ogbu (2015), noted that when instructional materials and facilities are used in teaching and learning, the academic performance of the learners will improve.

Recommendations

Based on the findings of the study, the following recommendations were made. The study recommended that Uganda Technical Colleges should go into a memorandum of understanding with the industry (world of work) to enable learners' access up-to-date machines and equipment relevant to their disciplines/training. This is important especially with ever-changing societal needs and technological advancement. Secondly, to put in place mechanisms aimed at reducing running and maintenance costs of machinery and training equipment in order to increase the length of time spent during practicum lessons by learners.

References

A, A. K., & Adepoju, A. A. (2010). Ordinal Logistic Regression Model: An Application to Pregnancy Outcomes. *Journal of Mathematics and Statistics*, pg 279 - 285.

Ayonmike, C. S. (2014, October). Training the Trainers in TVET and Training Institutions in Africa: A tool for producing competent Graduate. T*he Cradle Knowledge Africa Journal and Social Science Research*., 2(1), 9-14.

G, R. (2021). Importance of Instructional Material for Teaching and Learning of TVET in Nigeria Technical Schools and Colleges. I*nternational Journal of Education and Evaluation*,., Pg 141.

Jeanette Colby, M. W. (2000). *Defining Quality in Education. The International Working Group on Education Florence, Italy June 2000* (pp. pp1-pp121). Italy: UNICEF.

Kajuru, J. Y. (2022, June). Impact of Instructional Materials in Teachning and Learning Mathematics: A case study of Demonstration Secondary School, ABU Zaria. *Journal of Science Technology and Education* 10(2), June 2022., pp 111 -116.

Mbadiwe, H. (2013). Availability and utilization of instructional materials in teaching and learning of library education in tertiary institutions in Abia state. *Wudpecker Journal of Education Research* Vol 2 (8), pp.111 - 120, pp.111 - 120.

MOES. (2017). *Policy Issues paper on Governement White paper on Education (1992)*. Kampala: Uganda Government.

MOES. (2019). *Education and Sports Sector Analysis*. Kampala: Government of Uganda.

Ogbu, E. (2015). Influences of Inadequate Instructional Materials and Facilities in Teaching and Learning of Electrical/Electronics Technology Education Courses. *Journal of Education and Practice* Vol. 6 No.33, 2015, pp39 - pp45.

Ogbu, J. E. (2015). Availability and Utilization of Instructional facilities for the Teachning of Basic Electricity in Ebonyi State Technical Colleges. *Development Country Studies*., Vol 5(21), pp162- pp168.

Patterson, F. (2016). Great minds dont think alike: person - level predictors of innovation in the workplace. In Reisman, *Creativity in Arts, Science and Technology.* Knowledge, Innovation and Enterprise Conference Publications.

Raphaelle M, F. N. (2014). *Education Sector Analysis Methodological Guidelines; sub-sector specific analysis* - Volume 2. Global partnership for Education.

Rukayyatu, G. (2021). Importance of Instructional Material for Teaching and Learning of TVET in Nigerian Technical Schools and Colleges. *International Journal of Education and Evalutation*, 141.

Sokoya, K. (2014). *Measuring Quality in Graduate Education: A Balanced Scorecard Approach*. Middle Tennessee State University: Maxine Smith Fellow.

Trochim, W. M. (2018). *Navigating the Knowledge Base Foundations*. Conjoint.ly.

UKessays. (2017, May 16). *An investigative study of factors affecting enrolment and completion rates in institutions of higher learning (BTVET) in Uganda*. BTVET in Uganda.

UNESCO. (1993). *Education for All: Status and Trends. UNESCO Education for All Forum Secretariat*. Retrieved September 6, 1993