



*Special Issue – First International Conference on Digital Transformation, 16 – 17, September 2021, Dar es Salaam, TANZANIA*

## **Digital Skills and Self-employment among Graduates of Technical Higher Education Institutions in Tanzania**

**Charles Raphael\***

Arusha Technical College, P.O. Box 296, Arusha, Tanzania

\*Corresponding Author Email: [crn201412@yahoo.com](mailto:crn201412@yahoo.com)

### **ABSTRACT**

Digital skills are the driving forces for innovative, inclusive and sustainable growth through innovations and digitalization which in turn stimulate job creation, alleviate poverty, reducing inequality, facilitating the delivery of goods and services. However, large number of graduates is shown to be weak in digital skills in the industry hence affect their employability including self-employment. Recently, the Technical Higher Education Institutions (THEIs) took some initiatives to instill the digital skills to their respective students. This study therefore assessed the level of competence of digital skills among graduates following the initiatives taken by the THEIs and their influence on self-employment. It specifically identified the digital skills and ranking the digital skills acquired by the graduates when in the THEIs. It likewise established relationship between digital skills and self-employment among the graduates. The data were collected using a questionnaire from 500 graduates sampled through a stratified random sampling technique. The collected data were analyzed using Descriptive Statistics and Chi-square. The findings show that, the surveyed graduates acquired basic digital skills (i.e. creating professional online profiles, word processing, using keyboards and touch-screens, managing privacy settings, emails) to the large extent (53%); intermediate digital skills (i.e. desktop publishing, digital graphic design, digital marketing) to the small extent (52%) and advanced digital skills (i.e. big data, artificial intelligence, digital entrepreneurship, cybersecurity, internet of things, virtual reality) to the very small extent (54%) when in the college/university. Furthermore, intermediate and advanced digital skills were ranked higher as digital skills for self-employment by the graduates. All three digital skills were found positive and significant for self-employment among the graduates in Tanzania. The study recommends that, the colleges, institutes and universities should emphatically inculcate all the digital skills to the students as they are both significant for self-employment of their respective graduates.

### **ARTICLE INFO**

First presented: 16-17  
September, 2021

Submitted: 22 February,  
2022

Revised: 28 April, 2022

Accepted: May 25, 2022

Published: 15 July, 2022

**Key Words:** *Digital skills, self-employment, and graduates.*

## **INTRODUCTION**

Digital skills are the driving forces for innovative, inclusive and sustainable growth through innovations and digitalization which in turn stimulate job creation, alleviate poverty, reducing inequality, facilitating the delivery of goods and services (ILO, 2021). The digital skills meet young people's intrinsic value to a specific occupation and they open doors to acquire extra knowledge, skills and qualifications (ILO, 2021).

Promoting the acquisition of digital skills alongside lifelong learning can help unemployed workers of all ages to take up new occupations in which more jobs are available (ILO, 2021). Digital skills are previously portrayed as essential skills to an unemployed and employed people in the labour market as they are proved to be needed in almost all primary and managerial occupations (Curtarelli *et al.*, 2017; Andrews *et al.*, 2018; Mwakatumbula & Moshi, 2020). The digital skills has thus increasingly attracted the greater interest of non-employed and employed people; and employers in the labour market.

Digital Skills are essential for inordinate opportunities in economic growth and improvements in working conditions of the labour market (Morandini *et al.*, 2020). The digital skills are exceedingly treasured in the modern workplace, digital skills are highly valued and the treasure of the given skills will be more stressed and vital in the future (The UK's Digital Future, 2015). The digital skills are nowadays expanding into all aspects of lives apart from IT area hence should be taught as one of the generic skills with the same importance as other skills like numeracy and literacy (Whitehead, 2014). This means that, digital skills are entering all areas of work including medicine, entertainment, communication, marketing, and education.

The importance of digital skills to the world of work has attracted numerous researchers. For instance, Mwakatumbula & Moshi (2020) stress that building human capital especially in digital skills has become very critical for the Sub-Saharan region to leverage the benefits of the digital economy; and the region is now supposed to analyse the essential digital skills required in the digital labour market towards achieving a digital literate society.

The digital skills meet young people's intrinsic value to a specific occupation and they open door to acquire extra knowledge, skills and qualifications (ILO, 2021). This means that, the young people are generally more suitable to learn, use and develop new technologies; however, their inequalities in their uptake instigated differences in the level of education, gender, geographical location, and accessibility to the indispensable infrastructure. The importance of digital skills has never been so evident, nor so urgent as it moves the people to a virtual environment and support economic continuity, education and interpersonal contact. However, the given people lack access to digital networks and skills (International Telecommunication Union [ITU], 2020).

Integration of digital skills training into the core curriculum of formal education courses for all learners, irrespective of their specialization, is essential (African Union [AU], 2020). The THEIs in Europe are shown to address general digital literacy and study-field-specific skills but not fully embedded in the compulsory learning and are often provided for only in certain disciplines and courses, or on a voluntary basis (Gaebel *et al.* 2021)

Tanzania is well-placed to take advantage of this digital transformation as she has approximately 27 million internet users which is 45% of the population; and mobile phones continuous entry into the digital

economy and internet accessibility (Digital Opportunity Trust [DOT], 2020). The United Republic of Tanzania has various digital and related-technologies desktop computers, smart phones, laptops, printers, photocopiers, projectors and televisions available in both public and private institutions (Manyengo, 2021).

Specifically, the THEIs in Tanzania likewise offer general digital skills and study-field-specific skills for only in certain disciplines and courses, or on a voluntary basis (Gaebel *et al.* 2021). This means that, the given institutions took some initiatives to instill the digital skills to their respective students. Regardless of the Tanzania and THEIs' potentialities very little is done about the competence of digital skills on the graduates from THEIs. This study therefore assessed assessing the influence of digital skills on self-employment among graduates of THEIs in Tanzania by specifically:

- i. identifying the digital skills acquired by the graduates when in the THEIs before graduation.
- ii. ranking of the digital skills acquired by the graduates in relation to self-employment.
- iii. establishing relationship between digital skills and self-employment among the graduates

Apart from the above introduction, this study is organized in sections such as methodology, findings, conclusions, recommendations, acknowledgements and references.

## METHOD AND MATERIAL

This study used quantitative approach due to the nature of the main objective with causal-effect relationship i.e., assessing the influence of digital skills on self-employment among graduates of THEIs in Tanzania. The objective demanded the study to be approached quantitatively with support

from quantitative data. The approach likewise facilitated the establishment of relationship between variables of the study i.e., digital skills and self-employment.

This study applied cross-sectional survey (descriptive/explanatory) as it facilitated studying individual graduate as a unit of analysis. It assisted in covering large geographical area while measuring the individual graduate's views, attitudes and characteristics; and it produced the easy way of analyzing the information from the surveyed graduates regarding digital skills and self-employment. The given reasons of using cross-sectional survey (descriptive/explanatory) are previously supported by both Isaga (2012) and Thomas (2010). The "what" questions of this research demanded the use of survey design as supported in the past by both Yin (2003) and Saunders (2011).

The area of this study were four cities: Mbeya, Dar es Salaam, Mwanza, and Arusha in Tanzania. The cities are big cities in Tanzania which absorb many graduates. They have numerous zonal headquarters of private and government sectors. They are occupied with businesses and other entrepreneurial enterprises compared to other cities in Tanzania. They have more higher learning institutions (HLIs).

This study employed stratified simple random sampling technique in sampling 500 THEIs' graduates. The 650 questionnaires were distributed to THEIs' graduates of which 500 questionnaires were responded, and they provide useful data for the analysis. The response rate was 77%.

The techniques of obtaining sample size include using population as whole in small population, using formula when having define population, nature data analysis meaning meeting assumption of the model used for data analysis and saturation point particularly in qualitative study (Israel, 2003). Therefore, the sample size of this

study was calculated using the nature of data analysis i.e., Multiple Linear Regression (MLR). The sample size required for MLR was calculated with the formula “ $N > 50 + 8m$  (where  $m =$  number of independent variables” by Tabachnick and Fidell (2001, p. 117). The calculation indicated that, this study could not violate the sample size assumption i.e.,  $N > 50 + 8(3) = 74$ . Note that,

this study has three (3) independent variables and 500 respondents which is more than 74 obtained as the minimum sample size for using MLR. The sample size was 500 respondents far bigger than minimum 74 respondents. Table 1 shows the distribution of obtained sample size as far as the surveyed cities are concerned.

**Table 1:** Sample Size

Surveyed Cities	Sample Size	Percentage
Mbeya	130	26.0
Dar es Salaam	140	28.0
Mwanza	115	23.0
Arusha	115	23.0
<b>Total</b>	<b>500</b>	<b>100.0</b>

This study applied Descriptive Statistics and Multiple Linear Regression (MLR) in analyzing the collected data. The MLR tested relationship between digital skills and self-employment among the THEIs’ graduates. The model was used because of having more than one independent variable and one continuous dependent variable. The

independent variables were digital skills while continuous dependent variable was self-employment. Specifically, the digital skills included basic, intermediate and advanced skills.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:  $Y$  is the criterion for self-employment,  $\alpha$  is a constant (intercept),  $\beta_1, \beta_2, \beta_3$  are regression coefficients, and  $X_1, X_2, X_3$  are predictors of skill level (basic, intermediate and advanced skills).

Besides, the intermediate/moderate digital skills were categorical variables measured using three items such as desktop publishing, digital graphic design, and digital marketing Braun *et al.*, 2020; ITU, 2020; Morandini *et al.*, 2020).

The independent variable of this study was digital skills while the dependent variable was self-employment. The digital skills included basic, intermediate and advanced skills. The digital basic skills were categorical variable measured using six items such as creating professional online profiles, word processing and/or spreadsheet software, using keyboards and touch-screens, managing privacy settings, using internet, and using emails (Braun *et al.*, 2020; ITU, 2020; Morandini *et al.*, 2020).

On the other hand, the advanced digital skills were categorical variables measured using six items such as big data, artificial intelligence, digital entrepreneurship, cybersecurity, internet of things (IoT), virtual reality (Braun *et al.*, 2020; ITU, 2020; Morandini *et al.*, 2020).

The 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly agree) was used to measure the statement items of digital skills in the surveyed cities. Self-employment is one of the types of employment which graduates engage in after graduation. This paper adapts the

measurement indicators of self-employment used by Zwan *et al.* (2013). These scholars differentiated three kinds of individuals: self-employed, paid-employed and non-employed ones. The self-employed individuals are the graduates who are in the category of being shops owners, owner-managers of companies, professionals (e.g., lawyers, accountants, medical practitioners, architects, engineers, quantity surveyors, and laboratory technicians). The graduates in paid employment include white-collar workers and blue-collar workers. On the other hand, non-employed graduates are individuals without professional activity who could be seeking a job, or looking after the home. The value of 0 is assigned to non-employed graduates, 1 to self-employed graduates and 2 to employed graduates.

## FINDINGS

This section presents the results' discussions attained after doing data analysis using methods such as Descriptive Statistics and MLR. It comprises of Descriptive Results on Personal Information of Surveyed Graduates, Digital Skills Acquired when in the THEIs, and Ranking of Acquired Digital Skills for Self-Employment and influence of Digital Skills on Self-employment.

### Descriptive Results on Personal Information of Surveyed Graduates

Both sexes of THEIs' graduates were surveyed. In so doing, 60% were male graduates while 40% were female graduates (Table 2). Concerning the variable age, the range of ages is from 21 to 40 and above years. The results of surveyed THEIs'

graduates demonstrate that, 19% of the graduates had the age between 21-24 years, 30% between 25-29 years, 37% between 30-34 years, 10% between 35-39 years and 4% of the graduates had 40 years and above (Table 2).

Marital status was one of the personal information explored among the surveyed THEIs' graduates in this study. The results show that, 59% of the surveyed THEIs' graduates were single, 30% married, 6% divorced and 5% widow (Table 2).

Since the area of this study was big four cities in Tanzania, the THEIs' graduates were asked to identify the particular city they were living and working in. In so doing, 24% of the graduates lived/worked in Arusha, 28% lived in Dar es Salaam, 25% lived Mbeya and 23% lived in Mwanza.

Furthermore, the results in Table 2 display that, 25% of the surveyed THEIs' graduates had no employment, 44% had self-employment and 31% had paid employment. The lowest education level considered in this study is the Ordinary Diploma level while the highest level is Postgraduate in either science or engineering. The results in Table 2 established that, 40% of the surveyed graduates had an Ordinary Diploma level, 50% had bachelor degree, and 10% had postgraduate level.

Identifying particular graduate for his/her year of graduation was very paramount. The results display that, 25% graduated in 2015/2016, 28% graduated in 2016/2017, 24% graduated in 2017/2018, 12% graduated in 2018/2019 and 11% graduated in 2019/2020.

**Table 2:** Descriptive results on personal information of surveyed graduates

Personal Information	Scale	Frequency	Percent
Sex	1. Male	300	60.0
	2. Female	200	40.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>
	1. 21-24 years	095	19.0

Age	2. 25-29 years	150	30.0
	3. 30-34 years	185	37.0
	4. 35-39 years	050	10.0
	5. 40 and above years	020	4.0
	<b>Total</b>	<b>350</b>	<b>100.0</b>
Marital Status	1. Single	295	59.0
	2. Married	150	30.0
	3. Divorced	030	06.0
	4. Widow	025	05.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>
Residential Area	1. Arusha	120	24.0
	2. Dar es Salaam	140	28.0
	3. Mbeya	125	25.0
	4. Mwanza	115	23.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>
Employment Status	1. No employment	125	25.0
	2. Self-employment	220	44.0
	3. Paid employment	155	31.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>
Education Level	1. Ordinary Diploma	160	32.0
	2. Bachelor Degree	180	36.0
	3. Postgraduate	085	17.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>
Year of Graduation	1. 2015/2016	125	25.0
	2. 2016/2017	140	28.0
	3. 2017/2018	120	24.0
	4. 2018/2019	060	12.0
	5. 2019/2020	055	11.0
	<b>Total</b>	<b>500</b>	<b>100.0</b>

### **Digital Skills Acquired by the Surveyed Graduates when in the THEIs**

This section specifically identifies the digital skills acquired by the surveyed graduates when in the THEIs. It addresses the extent in which digital skills such as basic, intermediate and advanced digital skills were acquired by the graduates when pursuing their academic programmes at the THEIs.

The results in Table 3 indicate that, the basic digital skills are acquired by the THEIs' graduates in very small extent by 12%, in small extent by 8%, in large extent by 53%, in very large extent by 21% and 6% of the

respondents were neutral in acquisition of the basic digital skills.

Furthermore, the surveyed graduates acquired Digital Intermediate Skills in very small extent by 31%, in small extent by 52%, in large extent by 5%, in very large extent by 2% and 5% of the graduates were neutral on the acquisition of Digital Intermediate Skills when in the THEIs (Table 3).

Moreover, the surveyed graduates acquired Advanced Digital Skills in very small extent by 54%, in small extent by 27%, in large extent by 8%, and in very large extent by 6% and 5% of the graduates were neutral on

the acquisition of Advanced Digital Skills when in the THEIs (Table 3).

**Table 3:** Digital Skills Acquired when in the THEIs

Scale	Basic Skills		Intermediate Skills		Advanced Skills	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Very Small Extent	60	12.0	155	31.0	270	54.0
Small Extent	40	8.0	260	52.0	135	27.0
Neutral	30	6.0	25	5.0	25	5.0
Large Extent	265	53.0	50	10.0	40	8.0
Very Large Extent	105	21.0	10	2.0	30	6.0
<b>Total</b>	500	100.0	500	100.0	350	100.0

**Ranking of Digital Skills for Self-employment**

This section deals with the ranking of the digital skills acquired by the surveyed graduates when in the THEIs. This implies that, which digital skills is sought by the graduates to be the most important in influencing self-employment among the three i.e., basic, intermediate and advanced digital skills. The results regarding ranking for the digital skills in influencing self-employment is presented in Table 4.

It was noted that, the surveyed graduates ranked thirdly/lowly by 12%,

secondly/moderately by 47% and firstly/highly by 31% Basic Digital Skills in influencing self-employment.

In addition, the surveyed graduates ranked thirdly/lowly by 11%, secondly/moderately by 34% and firstly/highly by 55% Intermediate Digital Skills in influencing self-employment.

Likewise, the surveyed graduates ranked thirdly by 29%, secondly by 23% and firstly 43% Advanced Digital Skills in influencing self-employment.

**Table 4:** Ranking digital skills for self-employment

Scale	Basic Digital Skills		Intermediate Digital Skills		Advanced Digital Skills	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Third/Low	177	12.0	37	11.0	150	29.0
Second/Moderate	130	47.0	120	34.0	97	23.0
First/High	43	31.0	193	55.0	103	43.0
<b>Total</b>	350	100.0	350	100.0	350	100.0

**Influence of Digital Skills on Self-employment**

A Multiple Linear Regression was performed to predict self-employment based on digital skills among THEIs’ graduates in Tanzania. Preliminarily, some underpinning analyses i.e., Descriptive Statistics were done in avoiding violation of the MLR

assumptions. The assumptions addressed were sample size, independence of residuals/relations, outliers, multicollinearity, normality, linearity and Homoscedasticity.

The study at hand used Adjusted R Square in assessing how much of the variance in self-employment (dependent variable) was

explained by the model with the digital skills (independent variable). The value obtained was 0.410 which means the model explained 41% of the variance in self-employment (see Table 3).

In testing how well the regression model fitted the data, it was found that the computed F statistics was 33.132 with an

observed significance level of 0.000. The models reached the statistical significance which was  $p < 0.01$  (see Table 3). It was expected that, the digital skills had positive relationship with self-employment of the surveyed THEIs' graduates in Tanzania. The summary of regression analysis run portrays the results in Table 3.

**Table 3:** Summary of regression results

	<b>B</b>	<b>t</b>	<b>Sig.</b>
<b>Constant</b>	.101	2.195	.029
Basic Digital Skills	.560	12.897	< .001
Intermediate Digital Skills	.079	2.319	.021
Advanced Digital Skills	.076	2.212	.028
Multiple R		.642 <sup>a</sup>	
R Square		.413	
Adjusted R		.410	
ANOVA (F, SIG.)		33.132 (< .001)	

The results indicate that, business Basic Digital Skills had a statistically significant and positive relationship with self-employment (Beta = .101,  $t = 2.195$ ,  $p < 0.001$ ). These results imply that, the more the surveyed graduates acquire basic digital skills, the more they get self-employed.

Furthermore, intermediate digital skills had a statistically significant and positive relationship with the self-employment among the surveyed graduates in Tanzania (Beta = .079,  $t = 2.319$ ,  $p < 0.05$ ). These results may suggest that, the more the THEIs graduates acquire intermediate digital skills, the more they get self-employed.

Likewise, advanced skills had significant relationship with self-employment among THEIs' graduates in Tanzania (Beta = 0.076,  $t = 2.212$ ,  $p > 0.05$ ). These results entail that, the more the THEIs' graduates acquire advanced digital skills, the more they get self-employed.

## **CONCLUSION AND RECOMMENDATIONS**

This study assessed the influence of digital skills on self-employment among the THEIs' graduates in Tanzania. It is concluded that digital skills (*i.e., basic, intermediate and advanced*) had positive and significant relationship with self-employment among the THEIs' graduates in Tanzania. Regardless of such positive relationship, graduates acquired digital skills to the small extent when in the THEIs.

This study has been able to contribute theoretically, methodologically and practically to the body of literature. The study has confirmed the statistical relationship between digital skills and self-employment. Additionally, this study becomes important in policy making regarding solving the problem of unemployment in Tanzania and the world at large. The successful self-employment is now shown being contributed by possessing the digital skills presented in this study. This study now proves the inadequate digital skills among the self-employed people particularly the THEIs' graduates hence calling for the governments, NGOs, and



other stakeholders to take initiatives and measures in training them accordingly. The mentioned stakeholders can now work for digital education programmes which in turn help the given THEIs' graduates to acquire digital skills for successful self-employment in Tanzania. The study findings likewise remind the THEIs' institutions not to concentrate only to technical skills but also on digital skills when preparing students for employment after graduation.

## ACKNOWLEDGEMENTS

The author profoundly appreciates all the people who have successfully contributed in ensuring this paper manuscript is in place. Their contributions are acknowledged however their names cannot be able to be mentioned.

## REFERENCES

- Andrews, D., Nicoletti, G. & Timiliotis, C. (2018). Digital technology diffusion: A matter of capabilities, incentives or both? OECD Economics Department Working Papers, No. 1476, OECD Publishing. doi: 10.1787/7c542c16-en.
- AU. (2020). The Digital Transformation Strategy for Africa (2020-2030). Addis Ababa, Ethiopia, available on [www.au.int](http://www.au.int)
- Braun, A., März, A., Mertens, F. & Nisser, A. (2020). Rethinking education in the Digital Age. The Directorate-General for Parliamentary Research Services (EPRS) of the Secretariat of the European Parliament.
- Curtarelli, M., Gualtieri, V., Jannati, M. & Donlevy, V. (2017). ICT for work: Digital skills in the workplace. *Publications Office of the European Union*. <https://ec.europa.eu/digital-single-market/en/news/ict-work-digital-skills-workplace> [Accessed 21st June 2022].
- DOT (2021). Digital Skills for Youth Employment and Entrepreneurship: Insights from the Tanzania Youth Digital Summit 2021.
- Gaebel, M., Zhang, T., Stoeber, H. & Morrisroe, A. (2021). Digitally enhanced learning and teaching in European higher education institutions. European University Association.
- ILO (2021). *Global framework on core skills for life and work in the 21st century*. CH-1211 Geneva 22, Switzerland.
- Isaga, N. (2012). Entrepreneurship and the growth of SMEs in the furniture industry in Tanzania
- ITU (2020). Digital Skills Insights. The Capacity and Digital Skills Development Division (CSD) within the Digital Knowledge Hub Department of the Telecommunication Development Bureau of ITU.
- Israel, D. G. (2003). Determining Sample Size. *A Series of Agricultural Education and Communication Department*, University of Florida.
- ITU (2020). Digital Skills Insights. *Development Sector ITU Publications*, CH-1211 Geneva, Switzerland.
- Manyengo, P. R. (2021). Digitalization in teaching and education in the United Republic of Tanzania Digitalization, the future of work and the teaching profession project. *Background Report*, International Labour Office, Geneva.
- Morandini, M.C., Thum-Thysen, A. & Vandeplas, A. (2020). Facing the Digital Transformation: Are Digital Skills Enough? *European Economy Economic Briefs*.
- Mwakatumbula, H. & Moshi, G. (2020). Digital Skills for Gig Workers in Digital Platforms. *Digital Skills Insight*, 48-58.
- Saunders, M.N. (2011). *Research Methods for Business Students* (3rd Ed.). Pearson, Education India.
- Tabachnick, B.G. & Fidell, L.S. (2001). Principal Components and Factor Analysis. *Using multivariate statistics*, 4, 582-633.
- Thomas, K. (2010). Can Quality of Work Life Affect Work Performance among Government Agriculture Extension Officers? A case from Malaysia.

- UK Parliament, Select Committee on Digital Skills Report, Make or Break: The UK's Digital Future, 2015.
- Whitehead, F. (2014). Digital technology in NGOs: does your manager get it? <https://www.theguardian.com/global-development-professionals-network/2014/aug/08/digital-jobs-ngo-development-structure> [Accessed 21st June 2022].
- Young people need to hone their digital skills for future proof careers. The Guardian, 12 August 2014.
- Zwan, P.V., Zuurhout, P. & Hessels, J. (2013). Entrepreneurship Education and Self-employment. The Role of Perceived Barriers. *Scientific Analysis of Entrepreneurship and SMEs*, EIM Research Reports.