



Factors influencing entrepreneurial competencies acquisition among technical institution graduates in Tanzania

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Abstract

Despite the concerted efforts to integrate entrepreneurship courses into the mainstream education system, the perceived lack of entrepreneurial competencies among university graduates remains one of the obstacles hindering their potential to venture into business start-ups. This paper assesses factors influencing the acquisition of entrepreneurial competencies among technical institution graduates. Using a cross-sectional survey design, the study adopts a Human Capital Theory as a theoretical lens and uses a self-administered questionnaire to collect data from 391 technical institution graduates who graduated between 2012 and 2017 from technical colleges and universities in Dar es Salaam. The collected data were analyzed using descriptive statistics and the Ordinal Logistic Regression Model. The findings show that exposure to entrepreneurship courses had a significant positive effect on entrepreneurial competencies acquisition among technical institution graduates. The acquired entrepreneurial competencies correspond with the number of entrepreneurship courses studied. Specifically, graduates who studied at least one entrepreneurship course were ten times more likely to acquire requisite entrepreneurial competencies than those who didn't. Beyond formal entrepreneurship education, informal entrepreneurship exposure through life experience in age, previous employment, and parental role modeling in self-employment and education level had a significant effect on technical institution graduates' entrepreneurial competencies acquisition. The paper concludes that entrepreneurship education is an effective intervention for enhancing the acquisition of requisite entrepreneurial knowledge, skills, and attitudes critical for technical institution graduates to venture into business start-ups. However, it should be complemented with lifecycle experiences through age, employment, and parental role modelling in self-employment and education levels. The findings suggest some policy and practical implications for improving the quality and relevance of entrepreneurship education in higher learning institutions, particularly those with applied sciences, engineering, and technology specialties.

Keywords: Entrepreneurial Competencies Acquisition, Technical Institutions Graduates

1.0 Introduction

Unemployment is one of the global challenges troubling policymakers, academics, parents, and university graduates. Available statistics indicate that by 2030, sub-Saharan Africa is expected to supply 38% of the worldwide labour force, and between 2017 and 2030, the supply will increase by 198 million across ages (ILO, 2018). Similarly, the unemployment challenge in sub-Saharan Africa will be 88%, far



higher compared to that of Latin America (79%), Europe (71%), Middle East and North Africa (70%), North America (64%), and Asia (62%) (ILO, 2018). In this context, policymakers are considering entrepreneurship education as one of the strategic tools for hastening business start-ups to minimize unemployment challenges (Valerio *et al.*, 2014). This is reflected in the ongoing concerted government efforts to integrate entrepreneurship courses into the mainstream education system to equip students with entrepreneurial competencies to convert ideas into livelihood opportunities and cope with the growing global unemployment challenges (Perez *et al.*, 2022; Nzilano *et al.*, 2022; Lackéus, 2020).

Besides advocating the integration of entrepreneurship courses in the mainstream education system, the context under which graduates acquire and nurture entrepreneurial competencies remains a mix of trickery and frustration (Fayolle and Gailly, 2015). The perceived lack of entrepreneurial competencies is one of the obstacles for business start-ups among youths aged 18-30, who mostly depend on education as the main strategy of entrepreneurial competencies acquisition (OECD, 2018). In sub-Saharan Africa, the percentage of afro-entrepreneurs with confidence in their entrepreneurial competencies to successfully start and manage the day-to-day operations of business ventures is considerably low. For example, only 22% of entrepreneurs in Tanzania possess requisite entrepreneurial competencies. The percentage of entrepreneurs in other countries and their respective percentages in brackets include Kenya (23%), Ethiopia (19%), Ghana and Nigeria (14%), and South Africa (9%) (Omidyar Network, 2013). This raises several concerns about the efficacy of entrepreneurship courses in facilitating learners' entrepreneurial competencies acquisition (Chen *et al.*, 2022; Hahn *et al.*, 2017).

Understanding the dynamics shaping entrepreneurial competencies acquisition raises queries about how graduates acquire entrepreneurial competencies and whether such competencies are the result of individual or contextual factors (Rasmussen *et al.*, 2015). By implication, although many graduates acquire entrepreneurial competencies from formal entrepreneurship courses, some acquire them through entrepreneurial life-cycle experiences (Krieger *et al.*, 2022; Tittel and Terzidis, 2020). Despite the perceived roles of individual and contextual factors in entrepreneurial competencies acquisition (Rasmussen *et al.*, 2015), the extent of their influence has largely received limited attention in extant literature. In particular, it is unclear whether formal entrepreneurship and informal interventions concurrently facilitate entrepreneurial competencies acquisition among learners. In this context, further analysis is needed to ascertain the effectiveness of formal and informal entrepreneurship interventions on entrepreneurial competencies acquisition among university graduates. This view corresponds with Mateo *et al.* (2012) who underscore the importance of socio-cultural environments such as schools, homes, and social situations and work in shaping learners' entrepreneurial competencies acquisition.

To effectively foster entrepreneurial competencies acquisition, it is critical to consider both formal and informal educational approaches. The myriad mechanisms under which university graduates can acquire and nurture entrepreneurial competencies justify the rationale for further analysis to ascertain the roles of formal entrepreneurship education alongside contextual and personal factors in facilitating graduates' entrepreneurial competencies acquisition. This corresponds with the growing policymakers' interest in integrating entrepreneurship courses into the mainstream education system alongside scholarly evaluation of their associated outcomes (Krieger *et al.*, 2022; Perez *et al.*, 2022; Hahn *et al.*, 2017). The learning outcomes of entrepreneurship education regularly manifest through entrepreneurial competencies acquisition, entrepreneurial attitudes, entrepreneurial knowledge and skills, entrepreneurial motivations, entrepreneurial intentions, and business start-ups (Othman and Othman, 2019). Among these outcomes, entrepreneurial competencies play critical roles as they counterbalance the perceived barriers to business start-ups, enhance the intentions to venture into

business start-ups, and contribute to socio-economic growth.

Entrepreneurial competencies are critical in facilitating graduates' intentions to venture into business start-ups. For example, Nzilano *et al.* (2022) reported that entrepreneurial competencies positively influenced attitudes toward business start-ups and perceived behavioural control as significant predictors of business start-up intentions among graduates of technical universities in Tanzania. Besides, the perceived role of the learning outcomes of entrepreneurship education, entrepreneurial competencies are inadequately explored as one of the learning outcomes of entrepreneurship education unlike entrepreneurial intentions, the most extensively studied aspect (Nabi *et al.*, 2017). Even though there have been concerted efforts to integrate entrepreneurship courses into the mainstream education system, empirical studies assessing their effectiveness in equipping students with entrepreneurial competencies largely focused on the influence of entrepreneurship education on university graduates' entrepreneurial tendencies (Mangasini, 2015), entrepreneurial behaviours (Nyello *et al.*, 2015), entrepreneurial intentions (Nade, 2021), and entrepreneurship development (Rwamtoga, 2011). Some examined the teaching contexts, students' profiles, expectations, and outcomes of entrepreneurship education (Mwasalwiba, 2012), and the status of entrepreneurship education in higher educational schools (Fulgence, 2015).

Although the acquisition of entrepreneurial competencies can be influenced by educational content and entrepreneurship pedagogies (Nzilano *et al.*, 2022), previous empirical studies overlooked the effectiveness of entrepreneurship courses offered in technical universities and colleges with Applied Sciences, Engineering, and Technology (ASET) specialties in facilitating the acquisition of requisite entrepreneurial competencies among graduates. The scarcity of studies leaves the problem unclear, posing several dilemmas as to whether technical institution graduates acquire entrepreneurial competencies through formal or informal interventions, and which interventions are more effective and worth recommending for policy intervention. Consequently, it is critical to consider the broader context of entrepreneurial competencies acquisition. Emphasizing this view, Mwantimwa (2019:19) concludes that *"...the types of entrepreneurial competencies Tanzanian students acquire, how they are acquired, their relevance and barriers faced in doing so remain scant..."* Against this knowledge gap, this paper examines the influence of entrepreneurship education and informal entrepreneurship exposure on entrepreneurial competencies acquisition among technical institution graduates.

The findings could provide valuable insights to the administration of technical universities and colleges and to the policymakers at the ministerial level that could lead to various policy interventions on the current entrepreneurship teaching practices or existing entrepreneurship education policies. In addition, the findings could be useful to curriculum designers in designing and aligning the delivery of entrepreneurship education with experiential pedagogies to enhance graduates' acquisition of theoretical and hands-on entrepreneurial competencies. This study attempts to narrow this knowledge gap by partly addressing the following research questions: (1) Do technical institution graduates exposed to entrepreneurship courses acquire more entrepreneurial competencies than those who did not? (2) How many entrepreneurship courses are sufficient to equip technical institution students with requisite entrepreneurial competencies? (3) Beyond formal entrepreneurship courses, which informal entrepreneurship exposure facilitates the acquisition of entrepreneurial competencies among technical institution graduates?

2.0 Literature Review

2.1 Theoretical review

This study employs Human Capital Theory (HCT) as advocated by Gary Becker in 1964 to examine

factors influencing entrepreneurial competencies acquisition among technical institution graduates in Tanzania. The theory posits that individuals invest in education and training to acquire knowledge and skills that enhance their productivity and employability (Becker, 1964). HCT is particularly relevant in the context of this study in that formal education, such as entrepreneurship courses and informal entrepreneurship exposure through lifelong learning significantly facilitate learners' acquisition of entrepreneurial competencies (Krieger *et al.*, 2022; Marvel, 2016; Becker, 1964). Specifically, informal entrepreneurship exposure such as lifelong learning in age, employment, and business start-up experience, extra-curricular activities, and parental role modeling through employment and education significantly facilitate learners' entrepreneurial competencies acquisition. Broadly, Mets *et al.* (2017) define entrepreneurial competencies as the cognitive, affective, and skill-based abilities that enable individuals to perform entrepreneurial tasks and activities.

Besides the varying components, this study classifies entrepreneurial competencies into three domains, namely (1) cognitive outcomes, depicting entrepreneurship knowledge, such as opportunity identification and risk assessment and management; (2) skill-based outcomes, describing entrepreneurship skills, such as the ability to prepare a business plan, identifying and exploiting business opportunities; and (3) affective outcomes, covering entrepreneurship-related attitudes, behavioural preferences, and volition such as entrepreneurial motivation (Mets *et al.*, 2017; Kozlinska, 2016). In this study, technical institution graduates include individuals who completed a Diploma or Degree programme in Science, Engineering, Technology, Engineering, or Mathematics (STEM). These graduates are equipped with the skills and knowledge to pursue careers in manufacturing, construction, information technology, and healthcare industries. The study assumes that technical institution graduates with adequate requisite human capital can develop a higher ability to identify and exploit business opportunities and to successfully start and operate business ventures (Chen *et al.*, 2022; Kozlinska, 2016; Marvel, 2016).

HCT is relevant for this study since it seeks to evaluate educational outcomes such as entrepreneurial competencies acquired through investment in education and training, on-the-job training, and other lifecycle experiences (Martin *et al.*, 2013; Becker, 1964). In contextualizing human capital in entrepreneurship, a distinction is regularly made between human capital *investments* as inputs covering time, efforts, and money spent in pursuing entrepreneurship courses; the *human capital assets* derived from the investment, such as entrepreneurial knowledge, skills, abilities, and *entrepreneurship outcomes* such as business start-up intentions or actual business start-ups (Marvel, 2016; Martin *et al.*, 2013). Beyond traditional human capital constructs such as knowledge and skills (Becker, 1964), extant entrepreneurship scholars frequently use different constructs. Compared to demographics, which are hardly used as human capital constructs, employment experience (39.9%), education levels (26.6%), and previous entrepreneurship experience (19.8%) are commonly used as human capital constructs for assessing their influence on entrepreneurial competencies acquisition among learners (Marvel, 2016).

2.2 Empirical literature review and hypotheses development

2.2.1 Informal entrepreneurship exposure and entrepreneurial competencies acquisition

Although entrepreneurship courses can be an effective intervention strategy for equipping students with entrepreneurial competencies (Solesvik, 2019), whether and to what extent such courses suffice to equip them with the required entrepreneurial competencies remains debatable (Mueller and Anderson, 2014). Entrepreneurship education intervention cannot be a one-size-fits-all, given that entrepreneurial competencies acquisition may take place through formal and informal learning environments. In this context, Mateo *et al.* (2012) and Man and Lau (2005) underscore the role of informal entrepreneurship exposure through sociocultural environments, such as schools, homes, and

social situations, and work on learners' entrepreneurial competencies acquisition. Similarly, Marvel (2016) emphasizes the importance of demographics as one of the factors facilitating learners' acquisition of entrepreneurial knowledge and skills.

Moreover, Krieger *et al.* (2022) affirmed that graduates whose parents were entrepreneurs, especially those owning business ventures acquired requisite entrepreneurial skill variety compared to those whose parents are private or public servants since they engage them in the day-to-day activities of the business ventures. Similarly, Liu (2020) reported that gender and family business had a significant influence on graduates' enterprising tendency, although age, household income, parents' education, and occupation did not. Umar *et al.* (2019) confirmed that entrepreneurship education had significant influences on graduates' entrepreneurial competencies, while training before and after business start-ups did not. Similar findings were reported by Maresch *et al.* (2016) who found that graduates with business start-up experience acquired more requisite entrepreneurial knowledge and skills than those without such experience. Conversely, Perez and Guevarra (2020) reported that business start-up experience does not account for entrepreneurial competencies acquisition.

In Tanzania, some empirical studies linked informal entrepreneurship exposure with graduates' acquisition of entrepreneurial knowledge, skills, and attitudes. For example, Mangasini (2015) reported that age, parent's education level, birth order, prior employment and business start-up experiences, and parents' employment had a positive and significant influence on graduates' General Enterprising Tendencies (GETs), such as the need for achievements, locus of control, and risk-taking propensities. Another study by Rwamtoga (2011) affirmed that as role models, parents positively influenced over 40% of vocational graduates' desire to pursue entrepreneurial careers. Olomi and Sinyamule (2009) reported that vocational graduates who grew up in entrepreneurial families acquired not only entrepreneurial knowledge, skills, and attitudes but also changed their expectations of what it entails to start and operate business ventures. However, none of these studies focused on graduates with science, engineering, and technology specialties. Given the potential of technical institution graduates to pursue high-tech business start-ups, it is critical to assess the influence of informal entrepreneurship exposure on entrepreneurial competencies acquisition. To this effect, this paper hypothesizes that:

H₀₁: There is no significant difference in graduates' entrepreneurial competencies acquisition based on their social and economic characteristics.

2.2.2 Entrepreneurship courses exposure and entrepreneurial competencies acquisition

The question of whether investment in entrepreneurship education pays off remains hitherto debatable in most existing literature (Nzilano *et al.*, 2022; Kozlinska *et al.*, 2020; Hahn *et al.*, 2017). Although business start-ups are the most desired learning outcome from the policymakers' perspectives (Perez *et al.*, 2022), their emergence depends on individuals possessing requisite entrepreneurial competencies. This justifies the need for a study to assess the influence of entrepreneurship education on entrepreneurial competencies acquisition (Lackéus, 2020; Hahn *et al.*, 2017). This line of research is critical given that entrepreneurial competencies precondition the realization of other learning outcomes including business start-ups. Entrepreneurial competencies equip graduates with the ability not only to identify and exploit business opportunities for business start-ups but also to enhance their intention to venture into business start-ups to contribute to economic growth (Kozlinska *et al.*, 2020). Besides the perceived importance of entrepreneurial competencies as a stepping stone toward the realization of other learning outcomes, over 50% of existing empirical studies focused on entrepreneurial intentions as the outcome of entrepreneurship education (Nabi *et al.*, 2017).

Moreover, besides scholarly interest in assessing the learning outcomes of entrepreneurship education, previous empirical studies have often been critiqued for producing contradicting findings. For example, Solesvik (2019) and Malebana (2016) reported that graduates with exposure to at least one entrepreneurship course acquired more entrepreneurial competencies than those without exposure. Similarly, Kozlinska (2016) confirms that exposure to entrepreneurship courses significantly facilitates entrepreneurial competencies acquisition reflected through cognitive, affective, and skill-based outcomes. In a similar vein, Bosompem *et al.* (2013), Sánchez (2011), and von Graevenitz *et al.* (2010) affirmed that entrepreneurship courses significantly influenced students' self-assessed entrepreneurial skills. Contrary, empirical studies by Malekipour *et al.* (2018) and Seabela and Fatoki (2014) reported that entrepreneurship education did not enhance entrepreneurial competencies acquisition. Specifically, graduates' ability to generate new business ideas, identify business opportunities, craft business plans, and understand sources of finance were below average.

Furthermore, Oosterbeek *et al.* (2010) found that the effects of entrepreneurship education on students' self-assessed entrepreneurial skills were not significantly different from zero and that the point of estimation was even negative. The inconsistencies in findings ranging from positive to negative and no impact call for further empirical analysis. Amidst contradicting findings, Hahn *et al.* (2017) argue that previous studies overlook the effects of additional entrepreneurship courses on entrepreneurial competencies acquisition. Lange *et al.* (2011) confirm that graduates exposed to at least two entrepreneurship courses acquired more entrepreneurial knowledge and skills than those with one course or without exposure. This was supported by Malebana (2016), who underscored that graduates with at least two entrepreneurship course exposures for at least three consecutive years exhibited fairly higher entrepreneurial competencies relative to those without exposure. However, Hahn *et al.* (2017) conclude that additional exposure to entrepreneurship courses significantly enhances entrepreneurial knowledge and skills acquisition only up to a certain threshold, beyond which nothing is further acquired and nurtured.

Besides the limited number of empirical studies exploring the influence of entrepreneurship courses on entrepreneurial competencies in Tanzania, the findings of the few available empirical studies are inconsistent and the debate remains hitherto inconclusive. For example, Mangasini (2015) reported that university graduates who studied at least one entrepreneurship course exhibited higher entrepreneurial propensity and aspirations to become entrepreneurs than those without exposure. Similarly, Shimba (2018) confirmed a moderate effect of entrepreneurship education on graduates' General Enterprising Tendencies (GETs), although their creativity, innovation, and risk-taking abilities scores were below average. Wakkee *et al.* (2017) conclude that many university graduates in Tanzania lack the required entrepreneurial capabilities to tackle real-life challenges despite their exposure to entrepreneurship courses. In this context, this study hypothesizes that the level of entrepreneurship course exposure (without one course, or two or more courses) will significantly influence entrepreneurial competencies acquisition among technical institution graduates. To that effect, this study hypothesizes that:

H₀₂ There is no significant difference in entrepreneurial competencies acquisition among technical institution graduates based on exposure to entrepreneurship courses.

3.0 Methodology

3.1 Study area, design, sampling, and data collection methods

This study was conducted in Dar es Salaam, the largest commercial city in Tanzania. Dar es Salaam is one of Africa's most populated and fast-growing cities (URT, 2016) and serves as the official business

registration headquarters through the Business Registration and Licensing Agency (BRELA) (URT, 2017). Dar-es-Salaam was selected because it is endowed with several higher learning institutions specializing in applied sciences, engineering, and technology (TCU, 2019). Some of them include the Dar es Salaam Institute of Technology (DIT), St. Joseph University of Tanzania (SJUIT), National Institute of Transport (NIT), College of Information Communication Technology (CoICT), and College of Engineering and Technology (CoET),

This study employs a cross-sectional design and collects quantitative data through a self-administered questionnaire. The choice of cross-section research design suits studies with multiple variables that intend to establish their inter-relationship using mathematical models, theories, and hypotheses (Creswell, 2014). Over 60% of empirical studies in entrepreneurship education employed a cross-section research design (Nabi *et al.*, 2017). The study involved a population of 10,981 technical institution graduates obtained from the offices of student registrars of the technical colleges and universities namely DIT, CoET, and SJUI particularly those who graduated between 2012 and 2017 and lived in Dar es Salaam during data collection. The choice of time frame was guided by Mueller and Anderson's (2014) observation that university graduates take five (5) to ten years after graduation to venture into business start-ups perhaps for preparing and mobilizing the required resources.

Moreover, the integration of entrepreneurship courses into the mainstream education system in Tanzania started around the 2008s and as an add-on in non-business majors (Fulgence, 2015). In this context, the first batch of technical institution graduates who studied entrepreneurship courses entered the labour market in 2012s. During the time of data collection in July to December 2018, DIT and CoET had fully integrated entrepreneurship courses as compulsory subjects across ASET programmes. Although SJUIT had not yet integrated entrepreneurship courses in its ASET programmes, its graduates were included for comparing the level of entrepreneurial competencies acquisition between technical institution graduates who studied entrepreneurship courses and those who didn't, as critical requirements in impact evaluation studies (Fayolle, 2013). The sample size of 384 technical institution graduates was estimated through Cochran's (1977) formula at 95% confidence and $\pm 5\%$ precision level:

$$\text{Sample size (n)} = \frac{z^2 pq}{e^2} \dots\dots\dots(1)$$

Whereby; n = estimated sample size; z = confidence level at 95% (a standard value of 1.96); p = estimated technical institution graduates (a standard value of 0.5 was used since technical institution graduates living in Dar es Salaam only were not known); q = (1.0 – p); and e = margin of error at 5% (standard value of 0.05).

$$\text{Therefore, } n = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = \frac{3.8416 \times 0.25}{0.0025} = 384.16 \approx 384$$

Furthermore, the proportionate formula by Fisher *et al.* (1991) was used to estimate the sub-sample for each technical university/college as follows:

$$\text{Sample Size per University} = \frac{\text{Estimated Sample Size (n)}}{\text{Total Population (N)}} \times \text{Population per University (N)} \dots\dots\dots (2)$$

From equation (2), the computation of the sub-sample size was as follows:

$$\text{For CoET} = \frac{384}{10,981} \times 2,103 = 73, \text{ DIT} = \frac{384}{10,981} \times 3,818 = 134, \text{ SJUIT} = \frac{384}{10,981} \times 5,060 = 177$$

However, as Israel (1992) recommended, 15% of the sample size was added to compensate for non-

response potentials. This resulted in the addition of 58 respondents, making a final sample size of 442, as shown in Table 1.

Table 1: Sub-sample size per technical university/college

University/college	Population	Sub-sample	Sub-sample after 15%	Percent
CoET	2,103	73	84	19.2
DIT	3,818	134	154	34.7
SJUIT	5,060	177	204	46.1
Total	10,981	384	442	100

In Tanzania, technical institution graduates are required to register through professional bodies such as the Engineers Registration Board (ERB), the Contractors Registration Board (CRB), and the Architects and Quantity Surveyors Registration Board (AQRB) to practice their professional activities. Moreover, through the Structured Engineering Apprenticeship Programme (SEAP), the government recruits engineering graduates for three years to equip them with engineering-related hands-on skills critical to enhancing their professionalism (URT, 2005). Since the surveyed respondents were still engaged under SEAP, they were easily accessible which hastened the data collection exercise. A random number Table was used to select respondents to avoid potential selection bias. The questionnaire was administered in person from July to December 2018. Among the 442 copies of distributed questionnaires, 391 copies were successfully collected equivalent to 88.5% of the completion rate. This completion rate is above the threshold of 70% for a paper survey (Nulty, 2008).

3.2 Variable operationalization, measurement scales, and reliability

The items of the questionnaire were adopted from previously validated studies following a comprehensive literature review. The items for the domains of entrepreneurial competencies were adapted from Mets *et al.* (2017) and Kozlinska (2016) and were slightly modified to reflect the study context. The item statements were measured using a five-point Likert-type scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The choice of the Five-point Likert scale centers on its potential to reduce respondents' degree of frustration, increase the completion rate and quality of responses (Babakus and Mangold, 1992), and improve reliabilities (Jenkins and Taber, 1977). The study used self-assessment considering that entrepreneurial competencies are unobservable requiring graduates' understanding of their acquisition levels (Adeyonu *et al.*, 2022). Respondents were asked to indicate their age, marital status, previous work experience, business ownership experience, the extent of exposure to entrepreneurship courses (without exposure, one-course exposure, and two or more courses exposure), and parent's education level and employment category as predictors of entrepreneurial competencies acquisition.

To minimize the Common Method Bias (CMB) as an inherent phenomenon in social science, the researcher avoided double-barrelled questions, adequately explained key concepts, assured anonymity, and explained that there are no right or wrong answers. In addition, a statistical measure using Harman's one-factor test was used to extract one fixed factor from all the constructs. Harman's one-factor test results suggest that the constructs explain 34.7% of the variance, below the threshold level of 50% (Kock *et al.*, 2021). This implies that CMB was not significant and could not adversely affect empirical findings. Similarly, Cronbach Alpha coefficient techniques were used to measure internal consistency reliability. The results show that all constructs attained the recommended threshold level of (≥ 0.70) for cognitive outcomes ($\alpha = 0.807$), affective outcomes ($\alpha = 0.814$), and skill-based outcomes ($\alpha = 0.821$) (Taber, 2018). The constructs had a high correlation between items, and the questionnaire was consistently reliable (Taber, 2018). This implies all constructs had high cohesiveness among

response options of the multiple items in the Likert scale (Warmbrod, 2014).

Table 2: Measurement instruments

Construct	Measurement items	Source
Cognitive outcomes	Entrepreneurship courses increased my understanding of planning a business.	Mets <i>et al.</i> , 2017; Kozlinska (2016)
	increased my understanding of generating innovative business ideas	
	improved my understanding of theoretical aspects of business start-ups.	
	enhanced my understanding of legal issues related to new business start-ups.	
	increased my understanding of the steps for establishing a business venture.	
	increased my business communication skills	
Affective outcomes	increased my confidence in new business start-ups	Mets <i>et al.</i> 2017; Kozlinska (2016)
	enhanced my preference for business start-ups to provide freedom and autonomy.	
	increased my interest in starting a business venture	
	increased my motives to engage in business start-up	
Skill-based outcomes	increased my skills in controlling business projects.	Mets <i>et al.</i> 2017; Kozlinska (2016)
	increased my skills in identifying and evaluating business opportunities.	
	improved my practical management skills for business start-ups	
	increased my skills to attract potential investors in business ventures.	
	improved my skills to develop profitable business models.	
	increased my skills in identifying and analyzing business start-up risks.	
	courses enhanced skills in negotiating a deal with other business partners.	

3.3 Analytical methods

The study used descriptive analysis to examine the extent to which the three domains of entrepreneurial competencies (cognitive, affective, and skill-based outcomes) correspond to the extent of technical institution graduates' exposure to entrepreneurship courses (without, one course, two or more courses exposure). The study used the Ordinal Logistic Regression Model to estimate factors influencing the acquisition of entrepreneurial competencies among technical institution graduates. Respondents' ordinal responses classification followed Adeyonu's *et al.* (2022) recommendations (low = < 2.7), (moderate = 2.7–3.5), and (high = > 3.5). The study used the following OLRM by Agresti and Tarantola (2018):

$$\text{Log} \left[\frac{p}{1-p} \right] = \beta_{0k} + x_1\beta_1 + \dots x_m\beta_m + \varepsilon \dots \dots \dots (3)$$

Whereby;

$\text{Log} \left[\frac{p}{1-p} \right]$ = The log odds (logit) of being in low, moderate, or high competencies.

$x_1\beta_1 \dots x_m\beta_m$ = The slope coefficients that influence individuals' choices of different levels equally.

$x_1 \dots x_m$ = is the vector of the studied factors as predictor variables

β_{0k} = Is an intercept/cut-off varying from one level of entrepreneurial competencies to another.

ε = is an error term.

4.0 Results and Discussions

4.1 Descriptive statistics

The socio-demographic characteristics presented in Table 3 show that males over-represented females by 77.7%. The male dominance in ASET programmes can be attributed, among others, to the low dedication of female students in science subjects at primary and secondary schools (Ndalichako and Komba, 2014). To increase their enrollment in ASET programmes, concerted efforts are needed to entice female students to pursue science subjects to enhance the supply of potential scientists, engineers, and technologists. Although the age range is relatively broad, many technical institution graduates were aged in their 20s (65.2%), mostly below 30 years. The late 20s and early 40s are the age range for entrepreneurship (Bohlmann *et al.*, 2017). Moreover, 72.4% of graduates had Bachelor's Degrees with limited work experience (62.4%), and the majority were single (69.3%). Similarly, 64.2% of the surveyed graduates were exposed to at least one entrepreneurship course with limited experience in salaried employment (70.6%) and business start-ups (62.4%). Concerning parents' education level, 47.8% had a college/university education level, and 47.6% were public/private servants. Self-employed parents have a higher potential to facilitate children's acquisition of entrepreneurial knowledge, skills, and attitudes than employed parents (Liu *et al.*, 2020).

Table 3: Socio-demographic characteristics of respondents

Variables	Categories	Number	Percent (%)
Sex	Male	304	77.7
	Female	87	22.3
Age	Below 30 years	255	65.2
	30 – 39	92	23.5
	40 – 49	34	8.7
	50 years and above	10	2.6
Marital status	Single	271	69.3
	Married	120	30.7
	Diploma	84	21.5
Academic qualifications	Bachelor Degree	283	72.4
	Master Degree	20	5.1
	PhD	4	1.0
Extent of exposure to entrepreneurship courses	No exposure	140	35.8
	One-course exposure	210	53.7
	Two or more courses exposure	41	10.5
Previous employment experience	No experience	276	70.6
	Below 2 years	77	19.7
	Above 3 years	24	6.1
	10-years and above	9	3.6
Parents' employment type	Public/private	186	47.6
	Self-employed	92	23.5
	Peasants	113	28.9
Business experience	No experience	244	62.4
	Less a year	85	21.7
	1 – 3-years	50	12.8
	Above 3-years	12	3.1

Variables	Categories	Number	Percent (%)
Parents education level	No education	110	28.1
	Primary	28	7.2
	Secondary	66	16.9
	College/University	187	47.8

4.1.1 Factors Influencing Entrepreneurial Competencies Acquisition

Firstly, the study intended to examine factors influencing entrepreneurial competencies acquisition. To achieve this objective, the first stage was to test the assumptions of the guiding analytical model as follows:

4.1.2 Testing the assumption of the Ordered Logistic Regression

The proportional odds assumption, also known as the parallel regression assumption was tested using different tests. The assumption tests whether the coefficients of the ordinal logistic regression model are the same across the levels of outcome variables (low, moderate, or high). If this assumption is violated, impliedly, the effect of the predictor variables on the outcome variable varies across the level of the outcome variable. The test results highlight that the p -values across the domains of entrepreneurial competencies (cognitive, affective, and skill-based) were ($p > 0.05$). These results suggest that the assumption is not violated and the coefficients of the predictor variables are constant across different levels of entrepreneurial competencies. Impliedly, the ordinal logistic regression model is valid for further analysis.

Table 4: Parallel regression assumption test

Test type	Cognitive outcomes			Affective outcomes			Skill-based outcomes		
	Chi ²	Df	P > Chi ²	Chi ²	Df	P > Chi ²	Chi ²	Df	P > Chi ²
Wolfe Gould	13.1	9	0.160	11.9	9	0.219	14.3	9	0.113
Brant	13.2	9	0.154	11.0	9	0.273	16.5	9	0.057
Score	13.3	9	0.149	11.1	9	0.272	14.4	9	0.110
Likelihood	13.9	9	0.127	12.2	9	0.205	14.8	9	0.097
Wald	13.4	9	0.146	10.7	9	0.295	13.8	9	0.129

4.1.3 Ordered logistic Regression results

Table 5 presents the ordered logistic results on the factors influencing entrepreneurial competencies acquisition among technical institution graduates. The findings suggest that the coefficient for age is significant for affective ($p < 0.001$, odds 0.91) but not for cognitive and skill-based outcomes. This implies that age significantly influences affective competencies acquisition, such that older graduates have higher odds of acquiring attitudinal competencies than younger ones. Specifically, a one-year increase in age increases by 9.1% of the odds for graduates to acquire affective competencies. However, their affection towards entrepreneurship might be affected in the middle of adulthood due to employment and family commitments than younger graduates (Bohlmann *et al.*, 2017). The findings contradict what Liu *et al.* (2020) reported that individual age did not significantly influence students' enterprising tendencies. The coefficients for sex, marital status, extra-curricular activities, and business experience were not significant ($p > 0.05$). The findings suggest that sex, marital status, extra-curricular activities, and business experience had insignificant effects on graduates' odds of acquiring entrepreneurial competencies.

Moreover, the coefficient for graduates whose parents had primary education is significant for affective ($p < 0.05$, odds 1.08) and skill-based ($p < 0.05$, odds 6.56). This implies that graduates whose parents had primary education had 1.08-and 6.56-times log-odds of acquiring affective and skill-based

competencies than graduates whose parents had no formal education. Similarly, the coefficients for graduates whose parents had university education were significant on affective ($p < 0.05$, odds 4.79) and skill-based ($p < 0.001$, odds 7.48). This implies that graduates whose parents had university education had 4.79- and 7.48-times log-odds of acquiring affective and skill-based competencies than those whose parents had no formal education. Parents' education level significantly facilitates graduates' acquisition of entrepreneurial competencies. The findings correspond with von Graevenitz *et al.* (2010) and Rwamtoga (2011) who found that educated parents as role models facilitate the acquisition of entrepreneurial knowledge and skills among children. However, they contradict Liu *et al.* (2020), who reported that age, parent's education, and employment type do not significantly facilitate entrepreneurial skills acquisition.

Table 5: Factors Influencing Entrepreneurial Competencies Acquisition

Independent Variables		Dependent variable: entrepreneurial competencies					
		Cognitive		Affective		Skill-based	
		Odds	SE	Odds	SE	Odds	SE
Sex	Female	0.60	0.21	1.103	0.44	1.21	0.45
Age	Actual age in years	0.97	0.03	0.91***	0.03	0.96	0.03
Marital status	Married	0.89	0.40	1.76	0.88	1.16	0.53
Parents' education level	Primary	3.65	3.88	1.08*	1.15	6.56*	7.45
	Secondary	3.39	3.27	1.76	1.82	3.63	3.48
	College/University	3.39	2.87	4.79*	4.15	7.48***	5.79
Previous work experience	Less than two years	0.67	0.27	7.35**	6.17	4.96**	3.71
	3 – 5 years	0.44	0.27	6.54**	5.67	14.2***	11.28
	Above five years	1.06	1.01	0.65	0.26	1.24	0.47
Parent's employment	Self-employed	3.30*	2.33	4.62*	0.88	1.85	0.92
	Peasants	3.53	2.98	0.89	1.09	2.23	2.59
Previous business experience	Less than 1-year	0.60	0.22	0.88	0.38	1.22	0.50
	Between 1 – 3 years	1.12	0.53	0.40	0.26	0.46	0.28
Extracurricular Extents of exposure to EE	No	0.83	0.25	0.75	0.25	1.53	0.48
	One course	13.4***	4.7	17.3***	7.18	14.4***	5.41
	Two or more	18.3***	14.3	33.9***	36.6	19.2***	6.02
Ancillary Parameters	/Cut1	-4.29	1.40	-6.45	1.64	-2.57	1.29
	/Cut2	0.11	1.22	-1.47	1.26	1.28	1.17

Key: * = $p < 0.05$; ** = $p < 0.01$ and *** = $p < 0.001$, Standard Error (SE)

Moreover, the coefficient of graduates with at least two years of work experience is significant for affective ($p < 0.01$, odds 4.96) and skill-based outcomes ($p < 0.01$, odds 7.35). The coefficient of graduates with three to five years of work experience is significant for affective outcomes ($p < 0.01$, odds 6.54) and skill-based outcomes ($p < 0.001$, odds 14.19). These findings infer that employment experience increases the log-odds of graduates' potential to acquire affective and skill-based outcomes by 6.54 and 14.19 times respectively than those without experience. These findings correspond with Maresch *et al.* (2016) and Olomi and Sinyamule (2009), who underscore that employment and business start-up experiences significantly facilitate graduates' acquisition of entrepreneurial competencies. Marvel (2016) highlighted that employment experience has often been used in entrepreneurship education and is ranked first among human capital constructs. The findings complement HCT assumptions that employment experience facilitates entrepreneurial knowledge and skills acquisition (Becker, 1964).

The findings further show that the coefficient of graduates with self-employed parents is significant for cognitive ($p < 0.05$, odds 3.30) and affective outcomes ($p < 0.05$, odds 4.62). This means graduates whose parents are self-employed the log-odds to acquire cognitive and affective competencies increased by 3.30 and 4.62 times respectively compared to those whose parents are public/private servants. Impliedly, the tendency of self-employed parents particularly those who own business ventures to engage their children in business affairs equips them with not only requisite entrepreneurial abilities but also develop their entrepreneurship affection through role modeling. These findings correspond with Liu *et al.* (2020), Olomi and Sinyamule (2009), and Graevenitz *et al.* (2010) who reported that graduates who grow up with self-employed parents learn and replicate their parents' entrepreneurial behaviours than those raised by public/private servants' parents. Based on the findings, the null hypothesis H_{01} is partly rejected. Impliedly, parental role modeling through self-employment and education, age, and work experience significantly enhance technical institution graduates' entrepreneurial competencies acquisition.

Lastly, it was discovered that the coefficients for graduates exposed to one entrepreneurship course are significant for cognitive ($p < 0.001$, odds 13.4), affective ($p < 0.001$, odds 17.3), and skill-based competencies ($p < 0.001$, odds 14.4). Similarly, the coefficients for graduates exposed to two or more entrepreneurship courses are significant for cognitive ($p < 0.001$, odds 18.3), affective ($p < 0.001$, odds 33.9), and skill-based competencies ($p < 0.001$, odds 19.2). The findings infer that studying at least one entrepreneurship course increases the odds of acquiring cognitive (13.4), affective (17.3), and skill-based competencies (14.4) than not studying. The odds of entrepreneurial competencies acquisition correspond to the number of graduates' exposure to entrepreneurship courses graduates ($p < 0.001$). Specifically, graduates exposed to at least two entrepreneurship courses had more than 10 times the odds of acquiring entrepreneurial competencies across the domains compared to those who did not.

The findings imply that entrepreneurship education is an effective intervention for facilitating the acquisition of entrepreneurial competencies among technical institution graduates. The findings correspond with Marvel (2016) who ranked education second after employment experience among the human capital constructs used in existing entrepreneurship education studies. The findings further complement HCT assumptions that entrepreneurship education is an investment whose outcomes include the development of entrepreneurial knowledge, skills, and attitudes critical for business start-ups (Krieger *et al.*, 2022; Mets *et al.*, 2017; Marvel, 2016; Becker, 1964). Entrepreneurial competencies can potentially enhance graduates' employability in self-employment as independent entrepreneurs or entrepreneurial employees (intrapreneurs) in public/private sector companies. The findings supplement previous studies that highlight entrepreneurship education roles in the acquisition of entrepreneurial knowledge, skills, and attitudes (Liu *et al.*, 2020; Solesvik, 2019; Mets *et al.*, 2017; Hahn *et al.*, 2017; Kozlinska, 2016).

In contrast, these findings contradict some studies that reported that entrepreneurship education did not significantly enhance graduates' entrepreneurial competencies acquisition (Malekipour *et al.*, 2018; Seabela and Fatoki, 2014). Specifically, Malekipour *et al.* (2018) reported that despite exposure to entrepreneurship courses, graduates' ability to generate new business ideas, identify business opportunities, develop business plans, and understand the sources of finance were below average. They further contradict with Oosterbeek *et al.* (2010), who underscored that the effects of entrepreneurship courses on university students' self-assessed entrepreneurial knowledge and skills remained significantly different from zero and the point of estimation was even negative. They also contradict Wakkee *et al.* (2017) who found that many university graduates in Tanzania lack adequate entrepreneurial capabilities to tackle real-life challenges besides exposure to entrepreneurship courses.

4.1.4 Exposure to entrepreneurship courses and entrepreneurial competencies acquisition

The study's second objective was to measure the influence of exposure to entrepreneurship courses on entrepreneurial competencies acquisition among technical institution graduates. To measure their influences, the extent of exposure to entrepreneurship courses (no exposure, one-course exposure, and two or more courses exposure) was cross-tabulated against the perceived entrepreneurial competencies acquisition (low, medium, or high). Table 6 cross-tabulates the extent of exposure to entrepreneurship courses against entrepreneurial competencies acquisition.

Table 6: Entrepreneurship courses and entrepreneurial competencies acquisition

Construct		Categories		Extents of exposure to entrepreneurship courses							
				No exposure		One-course exposure		Two/more courses		Overall sample	
						N	%	N	%		
Cognitive outcomes	Low	2	1.4	0	0.0	0	0.0	2	0.5		
	Medium	64	46	14	6.6	2	4.9	80	20.5		
	High	73	52.5	197	93.4	39	95.1	309	79		
	Total	139	100	211	100	41	100	391	100		
Affective outcomes	Low	1	0.7	0	0.0	0	0.0	1	0.3		
	Medium	56	40.3	10	4.7	1	2.4	67	17.1		
	High	82	59	201	95.3	40	97.6	323	82.6		
	Total	139	100	211	100	41	100	391	100		
Skills-based outcomes	Low	3	2.2	0	0.0	0	0.0	3	0.8		
	Medium	56	40.3	13	6.2	3	7.3	72	18.4		
	High	80	57.6	198	93.8	38	92.7	316	80.8		
	Total	139	100	211	100	41	100	391	100		

The findings in Table 6 deduce that graduates who did not study any entrepreneurship course fall in the lower category of entrepreneurial competencies acquisition across the domains than those who studied one or more entrepreneurship courses. For example, only 52.5% of graduates who did not study any entrepreneurship course fall in the higher cognitive competencies relative to 95.1% and 93.4% of those who studied one course and two or more entrepreneurship courses respectively. Similarly, only 59% of graduates who did not study any entrepreneurship course fall in the higher category of affective competencies than 95.3% and 97.6% of those who studied one course and two or more courses respectively. Lastly, only 57.6% of graduates who did not study entrepreneurship courses fall in the higher category of skill-based competencies than 93.8% of those with one-course exposure and 92.7% with two or more course exposure. The findings supplement the inferential findings that entrepreneurship education influences entrepreneurial competencies acquisition in the cognitive, affective, and skill-based domains.

The inferential and descriptive findings suggest rejecting the null hypothesis H_02 . This implies that entrepreneurship courses are effective interventions for facilitating graduates' entrepreneurial competencies acquisition in terms of knowledge, interest, motivation, and skills to venture into business start-ups. The findings are consistent with those of Lange *et al.* (2011) and Malebana (2016), who reported that university graduates with at least one entrepreneurship course exposure for three consecutive years had a higher likelihood of acquiring requisite entrepreneurial competencies than those without exposure. However, entrepreneurship education can enhance entrepreneurial competencies acquisition only up to a certain threshold, beyond which students cannot further acquire anything (Hahn *et al.*, 2017). Consistent with the study's findings, it remains unclear at which level of

exposure to entrepreneurship courses makes graduates reach the saturation point. However, the study findings underscore that technical institution graduates exposed to entrepreneurship courses have significantly higher odds of acquiring requisite entrepreneurial competencies compared to those who didn't.

5.0 Conclusions, Implications, and Recommendations

5.1 Conclusions

This paper empirically examined factors influencing entrepreneurial competencies acquisition among technical institution graduates in Tanzania. Based on the findings, the paper draws the following conclusions: *First*, formal entrepreneurship education is an effective strategic intervention for facilitating entrepreneurial competencies acquisition among technical institution graduates. In particular, graduates exposed to entrepreneurship courses have higher odds of acquiring requisite entrepreneurial competencies than those without exposure. *Second*, beyond formal entrepreneurship education intervention, informal entrepreneurship exposure through lifelong learning in age, work experience, and parental role modeling through self-employment and education level significantly facilitates technical institution graduates' entrepreneurial competencies acquisition. The study concludes that university course lecturers should strike a balance between using lecture and experiential teaching methods to enhance the acquisition of theoretical and hands-on entrepreneurial competencies critical for business start-ups.

5.1.1 Theoretical and practical implications

Consistent with Human Capital Theory (Becker, 1964) and previous empirical studies (Krieger *et al.*, 2022; Marvel, 2016), this study presents several theoretical and empirical implications. *First*, entrepreneurship education is worth investing in, whose outcomes, among others, include entrepreneurial competencies acquisition in cognitive, affective, and skill-based domains critical for starting and operating business ventures. *Second*, the Ministry of Education, Science, and Technology (MoEST) should emphasize the integration of at least two entrepreneurship courses across educational institutions from primary schools to universities to entrench employability attributes among students. This policy intervention should correspond with the engagement of experienced and successful entrepreneurs in their design and delivery process. This will facilitate the acquisition of theoretical and hands-on entrepreneurial competencies critical for graduates to venture into business start-ups and reflect what is required to start and operate business ventures. This will enhance their innovative potential as independent entrepreneurs and entrepreneurial employees (intrapreneurs) in established small-scale businesses and corporate ventures.

5.2 Recommendations

Technical universities and colleges should commit more institutional resources to designing and delivering entrepreneurship courses while striking the balance between using lecture-based and experiential pedagogies to reap the intended benefits. The MoEST should facilitate technical universities and colleges in establishing incubation centres for students to incubate the feasibility of business ideas before full-scale investment and enhance hands-on start-up skills acquisition. Curriculum designers and course instructors should consider informal entrepreneurship exposure in entrepreneurship course delivery to equip learners with relevant entrepreneurial competencies critical for business start-ups. The MoEST should finance technical universities and colleges to establish business incubation centres for graduates to experiment and commercialize their business ideas before further investment. This will equip graduates with theoretical and practical aspects vital for venturing into business start-ups to create self and employment for others.

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