

VOCATIONAL SKILLS ACQUISITION AND EMPLOYABILITY OF MECHANICAL ENGINEERING GRADUATES IN MBARARA CITY, UGANDA: EXAMINING THE RELATIONSHIP

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ABSTRACT

Vocational skills acquisition is widely promoted as a pathway to improving graduate employability, yet the strength of this relationship among mechanical engineering graduates in Ugandan urban centres remains under-documented. This article, drawn from a wider study, examined the relationship between vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City, Uganda. A cross-sectional research design nested within a mixed-methods approach was used. Quantitative data were collected from 105 mechanical engineering graduate alumni using a structured questionnaire, while qualitative data were obtained from four tutors and three headteachers through semi-structured interviews. Data were analysed using Pearson correlation, multiple linear regression, and thematic analysis. Findings revealed a positive and statistically significant relationship between vocational skills acquisition and employability ($r = 0.571$, $p = 0.000$). Technical competencies, practical/hands-on skills, problem-solving and innovation skills, communication and teamwork skills, and occupational safety and professional work practices jointly explained 69.2% of the variance in employability ($R^2 = 0.692$, $F(5, 99) = 44.47$, $p = 0.000$). Vocational skills acquisition is an important, though not exclusive, determinant of employability among mechanical engineering graduates. Vocational institutions should modernise practical training equipment, strengthen industrial attachment and employer partnerships, and integrate career guidance and entrepreneurship support alongside technical instruction.

Keywords: Vocational skills acquisition, Employability, Mechanical engineering graduates, Technical and vocational education, Mbarara City

1.0 INTRODUCTION

Vocational skills acquisition is widely regarded as a strategic pathway for equipping young people with the practical and technical competencies needed to participate productively in the labour market (Bennett & Oliver, 2020). In mechanical engineering specifically, vocational skills acquisition emphasises hands-on exposure to welding, machining, fabrication, fitting, maintenance, and fault diagnosis, competencies that employers routinely expect graduates to demonstrate directly at the workplace (Kossivi et al., 2020). Globally, vocational education and training programmes have expanded significantly as governments and development partners seek to address persistently high youth unemployment (Alanazi & Almalki, 2022), yet the translation of vocational training into improved employability remains uneven across contexts (Cedefop, 2020).

In Uganda, technical and vocational education and training (TVET) has been promoted as a central strategy for reducing youth unemployment (Bakweli et al., 2020; Akhonsi & Samuel, 2021). Mbarara City, a rapidly urbanising trade and educational hub in south-western Uganda, has seen a corresponding expansion of technical and vocational institutions offering mechanical engineering programmes. Despite this expansion, many mechanical engineering graduates in the city remain unemployed, underemployed, or engaged in work unrelated to their technical training, raising questions about whether vocational skills acquisition is translating into the employment outcomes it is designed to produce. It was against this background that the wider study from which this article is drawn examined the influence of vocational skills acquisition on employability of mechanical engineering graduates in Mbarara City. Two objectives of that study addressed the level of vocational skills acquisition and the level of employability independently, and have been reported elsewhere. This article addresses the third objective, namely, to analyse the relationship between vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City.

The study was anchored on Human Capital Theory (Becker, 1964), which conceptualises education and skills training as an investment that increases individuals' productivity and, by extension, their value and competitiveness in the labour market. This theoretical proposition provided the conceptual basis for the study's independent and dependent variables, with vocational skills acquisition treated as an investment in human capital expected to yield employability as a return. The study was further informed by Work-Integrated Learning (WIL) theory (Zegwaard & Pretti, 2022), which extends beyond simple internship arrangements to emphasise the deliberate integration of formal institutional learning with authentic workplace experience as a mechanism for closing the theory-practice gap and building the professional networks graduates need to secure employment.

Empirically, several studies support a positive association between vocational skills acquisition and employability. Ssebagala and Mwesigwa (2023) argued, drawing on human capital and work-integrated learning perspectives, that vocational skills acquisition improves productivity, technical competence, and workplace readiness, thereby increasing employment opportunities. Tushabe (2022), using quasi-experimental methods, established that vocational training positively influences employment opportunities and earnings among young people, particularly where training is practical and industry-relevant. Wabwire and Kalyango (2021) further argued that employer involvement in vocational training strengthens the relationship between vocational skills acquisition and employability, while Zziwa and Nakato (2021) emphasised that quality vocational training, characterised by competent instructors, modern equipment, and recognised qualifications, enhances graduate employability. At the same time, Yiga and Nkore (2022) cautioned that contextual labour-market factors, including industrial growth, technological change, and economic conditions, also shape how effectively vocational skills translate into employment, suggesting that the relationship between skills acquisition and employability is unlikely to be absolute. Although these studies provide useful evidence, few have specifically examined this relationship among mechanical engineering graduates in a rapidly urbanising Ugandan city such as Mbarara, a gap that motivated the present study.

Guided by these considerations, the study was directed by the null hypothesis that there is no statistically significant relationship between vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City. This article reports the quantitative and

qualitative evidence generated to test this hypothesis, discusses the findings in relation to theory and prior empirical work, and draws conclusions and recommendations relevant to vocational training institutions, employers, and policy makers.

2.0 METHODOLOGY

2.1 Research Design and Approach

This article is drawn from a wider study that examined vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City. The specific analyses reported here relate to the study's third objective, which sought to analyse the relationship between the two variables. The study adopted a cross-sectional correlational research design, appropriate because data were collected at a single point in time without manipulation of any variable, and because the correlational aspect allowed identification of patterns and associations between vocational skills acquisition and employability. The design was nested within a mixed-methods approach, combining a structured questionnaire administered to graduate alumni with semi-structured interviews of tutors and headteachers, to triangulate numerical evidence with narrative accounts and thereby strengthen the validity, breadth, and depth of interpretation.

2.2 Target Population and Sample

The target population comprised 180 mechanical engineering graduates who completed their studies in 2023 at selected vocational and technical institutions in Mbarara City and currently resided in the city, together with 4 mechanical engineering tutors and 3 heads of institutions, giving a total target population of 187. The sample size was determined using Yamane's (1967) formula, $n = N / (1 + Ne^2)$, at a 95% confidence level and 5% margin of error, yielding a minimum sample of 124 respondents, comprising 117 graduate alumni, 4 tutors, and 3 headteachers. Simple random sampling was used to select graduate alumni, ensuring that every graduate had an equal and independent chance of selection, while purposive sampling was used to select tutors and headteachers based on their roles, experience, and direct involvement in training and curriculum implementation. Of the 117 graduate alumni sampled, 105 participated, yielding a response rate of 87%; all 4 tutors and 3 headteachers targeted for interviews participated.

2.3 Data Collection Instruments

Quantitative data were collected using a structured questionnaire administered to graduate alumni, covering demographic characteristics, the level of vocational skills acquisition, the level of employability, and perceptions of the relationship between the two constructs, using five-point Likert-type items. Qualitative data were collected through face-to-face, semi-structured interviews with tutors and headteachers, conducted in private offices, staff rooms, or designated meeting rooms to protect confidentiality, with each session lasting approximately 30 to 40 minutes and covering learning experiences, employer expectations, and the perceived link between skills acquisition and employment outcomes.

2.4 Validity and Reliability

Content validity of the questionnaire was established through expert review. Reliability was assessed through a pilot study conducted with 6 respondents from outside the main sample, with responses entered into SPSS and internal consistency computed using Cronbach's Alpha; coefficients of 0.70 and above were considered acceptable for the instrument to be regarded as reliable.

2.5 Data Analysis

Quantitative data were coded and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, including means and standard deviations, were computed for the study variables. To determine the relationship between vocational skills acquisition and employability, Pearson's product-moment correlation coefficient was computed. To further establish the combined predictive contribution of specific vocational skills dimensions, namely technical competencies, practical/hands-on skills, problem-solving and innovation skills, communication and teamwork skills, and occupational safety and professional work practices, to employability, multiple linear regression analysis was conducted, supplemented with Analysis of Variance (ANOVA) to test the overall statistical significance of the regression model. Qualitative data from interviews were transcribed and analysed using thematic analysis (Braun & Clarke, 2021), involving familiarisation with the data, coding, generating themes, reviewing and defining themes, and writing up findings relating to the perceived relationship between vocational skills acquisition and employability.

2.6 Ethical Considerations

The researcher obtained ethical clearance from the Bishop Stuart University Research Ethics Committee and an introductory letter from the Coordinator of the School of Postgraduate Studies, which was used to secure permission from the Principal Education Officer, Mbarara City. Informed consent was obtained from all participants after explaining the purpose and scope of the study, and participants were assured of confidentiality and informed of their right to withdraw from the study at any time without penalty. Tutors and headteachers who participated in interviews are identified only by codes (T1–T4, HT1–HT3) in this article.

3.0 FINDINGS

Of the 117 mechanical engineering graduate alumni targeted, 105 participated, yielding a response rate of 87%, while all 4 tutors and 3 headteachers targeted for interviews participated. The majority of graduate respondents were male (74.3%) and aged 21–25 years (40.0%); most had completed certificate-level training (64.8%), and all reported mechanical engineering as their field of training and 2023 as their year of graduation. Regarding employment status, 37.1% were employed, 32.4% were self-employed, 17.1% were unemployed, and 13.3% were underemployed, while 58.1% had received additional training since graduation. This section presents findings on the relationship between vocational skills acquisition and employability of mechanical engineering graduates.

3.1 Perceived Relationship between Vocational Skills Acquisition and Employability

Respondents expressed a generally strong positive perception of the relationship between vocational skills acquisition and employability, reflected in an overall mean of 3.99 (SD =

1.07). The highest-rated statement was that there is a strong relationship between vocational skills acquisition and employability, with a mean of 4.28 (SD = 0.83) and 86.7% agreement. The statement that acquisition of practical vocational skills increases chances of employment recorded a mean of 4.24 (SD = 0.91), matched by the statement that employers prefer graduates with hands-on vocational experience (M = 4.24, SD = 0.86). Graduates with strong technical competencies were also perceived as more employable than those with limited practical skills (M = 4.21, SD = 0.91), while industrial attachment (M = 4.12, SD = 0.94) and curriculum relevance (M = 4.07, SD = 0.95) were also rated positively. The lowest mean was recorded for the negatively worded statement that inadequate practical skills reduce employability (M = 2.55, SD = 1.25), which, given its reverse wording, is consistent with the otherwise strong endorsement of practical skills as a determinant of employability.

3.2 Correlation between Vocational Skills Acquisition and Employability

A Pearson correlation coefficient was computed to establish whether a statistically significant relationship existed between vocational skills acquisition and employability. The results are presented in Table 1.

Table 1: Correlation between Vocational Skills Acquisition and Employability of Mechanical Engineering Graduates

		Vocational Skills Acquisition	Employability
Vocational Skills Acquisition	Pearson Correlation	1	0.571**
	Sig. (2-tailed)		0.000
	N	105	105
Employability	Pearson Correlation	0.571**	1
	Sig. (2-tailed)	0.000	
	N	105	105

Note. **Correlation is significant at the 0.01 level (2-tailed). Source: Primary Data (2026).

As shown in Table 1, the results revealed a positive and statistically significant relationship between vocational skills acquisition and employability ($r = .571$, $p = .000$, $N = 105$). Because the significance value ($p = .000$) was below the conventional threshold of .01, the null hypothesis stating that there is no statistically significant relationship between the two variables was rejected, and the alternative hypothesis was accepted. The coefficient of .571 represents a moderate-to-strong positive relationship, indicating that graduates who reported higher levels of vocational skills acquisition also tended to report higher levels of employability.

3.3 Regression Analysis

To determine the combined predictive strength of specific vocational skills dimensions on employability, a multiple linear regression analysis was conducted with technical competencies, practical/hands-on skills, problem-solving and innovation skills,

communication and teamwork skills, and occupational safety and professional work practices entered as predictors of employability. The model summary is presented in Table 2.

Table 2: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821 ^a	.692	.677	.771

Note. a. Predictors: (Constant), Technical competencies, Practical/hands-on skills, Problem-solving and innovation skills, Communication and teamwork skills, and Occupational safety and professional work practices. Source: Primary Data (2026).

The results in Table 2 show a strong positive relationship between the combined vocational skills dimensions and employability ($R = .821$). The coefficient of determination ($R^2 = .692$) indicates that 69.2% of the variance in employability was explained by the five predictors included in the model, while the remaining 30.8% was attributable to factors outside the model, such as labour-market demand, employer recruitment practices, and broader economic conditions. The relatively small difference between R^2 (.692) and the adjusted R^2 (.677) suggests that the model was stable and not overfitted, while the standard error of the estimate of .771 indicates the average deviation between observed and predicted employability scores.

3.4 Analysis of Variance

Table 3 presents the ANOVA results used to test the overall statistical significance of the regression model.

Table 3: ANOVA Results for the Regression Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	72.667	5	14.53	44.47	.000 ^b
Residual	32.343	99	0.327		
Total	105.010	104			

a. Dependent Variable: Employability. b. Predictors: (Constant), Technical competencies, Practical/hands-on skills, Problem-solving and innovation skills, Communication and teamwork skills, and Occupational safety and professional work practices.

Source: Primary Data (2026).

The ANOVA results confirmed that the regression model was statistically significant, $F(5, 99) = 44.47$, $p = 0.000$. The regression sum of squares (72.667) substantially exceeded the residual sum of squares (32.343), confirming that a large share of the variation in employability was explained by the five vocational skills dimensions rather than by unexplained error. Taken together, the correlation, model summary, and ANOVA results provide strong quantitative evidence that vocational skills acquisition, and its constituent technical, practical, problem-solving, interpersonal, and professional-safety dimensions, are significantly associated with employability among mechanical engineering graduates in Mbarara City.

3.5 Qualitative Findings

Interviews with tutors and headteachers reinforced the quantitative findings. All participants described vocational skills acquisition as closely associated with graduates' employability. T3 explained that "there is a direct connection between the skills a student acquires and their chances of getting work. If a graduate can weld properly, fabricate, operate machines and diagnose mechanical problems, employers are more willing to give that person an opportunity." T4 similarly linked practical competence to confidence during recruitment, noting that "students who have spent enough time in the workshop are usually more confident during interviews and practical tests. They can explain what they know and demonstrate the skills instead of relying only on their certificates."

Participants identified welding, fabrication, machine operation, maintenance, and fault diagnosis as the practical skills with the greatest bearing on employment prospects, with HT3 observing that "employers want graduates who can do something practically...because they can be demonstrated directly at the workplace." Industrial attachment was described as a particularly important mechanism linking training to employment, with T1 noting that "attachment can even become a pathway to employment. When a student performs well during attachment, the company may remember that student when there is an opportunity for employment." Curriculum relevance and employer involvement were also emphasised, with HT1 arguing that "the curriculum should respond to what employers are using today...there should be continuous interaction between institutions and employers," while HT2 called for employers to be "involved more closely with training institutions" in curriculum review, attachment provision, and equipment support. Taken together, the qualitative accounts corroborate the quantitative evidence that vocational skills acquisition, particularly when reinforced through industrial attachment, curriculum relevance, and employer engagement, plays an important role in shaping the employability of mechanical engineering graduates.

4.0 DISCUSSION

The third objective of this study sought to analyse the relationship between vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City. The correlation and regression findings jointly demonstrate that this relationship is positive and statistically significant, providing empirical support for rejecting the null hypothesis.

This finding is consistent with Human Capital Theory (Becker, 1964), which conceptualises skills training as an investment that increases individual productivity and labour-market value. In the present study, graduates who reported stronger vocational skills acquisition also reported higher employability, lending contextual support to the theory's central proposition within a Ugandan urban vocational education setting. The finding also aligns with Work-Integrated Learning theory (Zegwaard & Pretti, 2022), given that qualitative accounts consistently identified industrial attachment as a mechanism through which formal institutional learning translates into workplace readiness and, in some cases, direct pathways to employment.

The findings are also consistent with prior empirical literature. Ssebagala and Mwesigwa (2023) similarly argued that vocational skills acquisition improves productivity, technical competence, and workplace readiness, thereby increasing employment opportunities, a proposition directly supported by the present study's significant correlation. Tushabe (2022),

using quasi-experimental methods, found that vocational training positively influences employment opportunities and earnings among young people, particularly where training is practical and industry-relevant; the qualitative evidence in the present study, in which T3 and T4 linked practical competence directly to employer confidence and recruitment outcomes, reinforces this pattern. The finding is further consistent with Wabwire and Kalyango (2021), who argued that employer involvement strengthens the relationship between vocational skills acquisition and employability, a point echoed by HT1 and HT2's calls for closer institution–employer collaboration on curriculum review and attachment provision.

The regression findings provide additional evidence that employability is not produced by technical competence alone. The finding that technical competencies, practical/hands-on skills, problem-solving and innovation skills, communication and teamwork skills, and occupational safety and professional work practices jointly explained 69.2% of the variance in employability is consistent with Zziwa and Nakato (2021), who emphasised that quality vocational training characterised by competent instructors, modern equipment, and practical learning enhances graduate employability, and with Wamala and Mugisha (2023), who stressed the importance of career guidance, job placement, and entrepreneurial support alongside technical training. This suggests that employability among mechanical engineering graduates is strengthened when technical, practical, interpersonal, problem-solving, and professional-safety competencies are developed together, rather than when institutions focus narrowly on any single competency domain.

At the same time, the correlation coefficient of .571, while statistically significant, indicates that vocational skills acquisition does not explain all variation in employability. This finding is consistent with Yiga and Nkore (2022), who observed that labour-market conditions, industrial growth, technological change, and broader economic circumstances also shape how effectively vocational skills translate into employment. A graduate may possess strong technical competencies yet still experience unemployment because of limited job opportunities, weak professional networks, competition for available positions, or a lack of work experience, a pattern reflected in the present study's finding that employability was relatively high overall but that securing employment within a reasonable time remained a comparatively weaker indicator. This nuance is important because it cautions against treating vocational skills acquisition as a sufficient condition for employment; rather, it should be understood as a substantial but partial contributor operating alongside institutional, economic, and labour-market factors.

Overall, the quantitative and qualitative evidence converges to suggest that vocational skills acquisition is an important foundation for employability among mechanical engineering graduates in Mbarara City, but that its translation into employment outcomes depends on the extent to which institutions combine technical instruction with industrial attachment, curriculum relevance, employer engagement, and broader employability-support services such as career guidance and entrepreneurship training.

A further point of interest is the qualitative observation that inadequate modern equipment and large student numbers constrained the depth of practical training even though overall skills-acquisition ratings were high. This suggests that the strong bivariate and multivariate relationships reported here may understate the potential contribution of vocational skills

acquisition to employability, since graduates were rating their competencies within resource-constrained training environments. Were institutions to address these constraints, for example by expanding workshop capacity and modernising equipment as recommended by Chibba and Mkhize (2023) and Fortune and Seme (2022), the practical component of vocational skills acquisition might exert an even stronger influence on employability than currently observed. This interpretation is consistent with Dube and Mulonga (2022), who found that competency-based training, industrial attachment, modular learning, and blended technical instruction improve vocational skills acquisition when adequately resourced. It also underscores that the relationship documented in this study should be read as a conservative estimate of what well-resourced, industry-aligned vocational training could achieve for graduate employability in Mbarara City.

5.0 CONCLUSION

Based on the correlation, regression, and thematic findings, the study concludes that there is a statistically significant positive relationship between vocational skills acquisition and employability of mechanical engineering graduates in Mbarara City, leading to rejection of the null hypothesis of no significant relationship. The Pearson correlation of $r = .571$ ($p < .001$) demonstrates that graduates with stronger vocational skills tend to report better employability, while the regression results confirm that technical competencies, practical/hands-on skills, problem-solving and innovation skills, communication and teamwork skills, and occupational safety and professional work practices collectively provide substantial and statistically significant predictive power for employability, jointly explaining 69.2% of its variance. The qualitative evidence reinforces this picture by showing that practical competence, industrial attachment, curriculum relevance, and employer engagement are perceived by tutors and headteachers as central mechanisms linking vocational training to employment outcomes. However, because vocational skills acquisition explained just over two-thirds of the variance in employability, the study also concludes that vocational skills alone do not fully determine employment outcomes; labour-market conditions, employer demand, work experience, and other contextual factors also play a meaningful role. Strengthening the quality, relevance, and practical orientation of vocational training therefore remains an important, but not sufficient, strategy for improving graduate employability in this setting.

5.1 Recommendations

Based on the findings and conclusions, the following recommendations are made to vocational training institutions, employers, and policymakers in Mbarara City:

Vocational training institutions should modernise practical training equipment and increase the number of machines available for student practice, given that limited access to modern tools was identified qualitatively as a constraint on the depth and consistency of skills acquisition, even though technical competencies remained a significant predictor of employability.

Institutions should strengthen structured industrial attachment programmes and formal partnerships with mechanical engineering employers, since industrial attachment was both a statistically relevant contributor to employability and a mechanism qualitatively described as a direct pathway from training into employment.

Curriculum review should be conducted regularly and in close consultation with employers to ensure that welding, fabrication, machining, maintenance, diagnostics, and emerging mechanical engineering technologies remain aligned with current labour-market requirements, addressing the qualitative concern that some training content lags behind industry practice.

Because technical competence alone explained only part of the variance in employability, institutions should integrate career guidance, job-search skills, entrepreneurship training, communication, and teamwork development into mechanical engineering programmes, so that graduates are equipped with the combined technical and interpersonal competencies that employers value.

Given that vocational skills acquisition explained 69.2% of the variance in employability, leaving other labour-market and institutional factors unaccounted for, policy makers and institutional leaders should invest in complementary interventions, including employer-linked job placement services and entrepreneurship support, since improving skills acquisition alone cannot fully address the employment challenges facing graduates.

Future researchers should adopt longitudinal designs to track how mechanical engineering graduates' employment, self-employment, income, and career progression evolve over the years following graduation, and should incorporate employer assessments of graduates' actual competencies to compare against graduates' self-reported skills.

Consent for Publication

All authors consented and approved the manuscript to be submitted for publication.

Availability of Data and Materials

The data supporting the findings of this article are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare no competing interests.

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Authors' Contributions

Sabiti Trophy conceptualised the study, collected and analysed the data, and prepared the original draft of the manuscript. Sudi Balimutajjo and Wilson Mathembele supervised the study and reviewed and edited the manuscript. All authors read and approved the final manuscript.

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