

Industrial training programme curriculum alignment and competency development of the construction workforce in Uganda

Christine Nyiraneza^{1*}
Wamalwa Chrispinus Mukoche²
John Simiyu³

^{1*}nezachristine@gmail.com

^{1,2,3}University of Eldoret, Kenya

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ABSTRACT

This study examined the relationship between industrial training programme curriculum alignment and competency development among Uganda's construction workforce. The study was motivated by concerns about the alignment of industrial training with changing construction industry requirements, particularly in relation to practical skills, modern technologies, and workplace competencies. A pragmatist philosophical approach and mixed-methods design were adopted. The study focused on National Diploma in Building and Civil Engineering (ND-BCE) graduates from five public technical colleges in Uganda. The target population comprised 2,760 individuals, including graduates from 2020–2023, principals, and employers. A planned sample of 347 participants was determined, while quantitative analysis was based on 309 usable responses and qualitative data were obtained through interviews with nine key informants. Quantitative data were analysed using descriptive statistics, Pearson correlation, and linear regression, while qualitative data were analysed thematically. The findings showed that respondents generally perceived the industrial training curriculum as aligned with industry skill requirements. However, lower ratings were reported regarding access to advanced equipment and software and keeping pace with technological advancements. Curriculum alignment was positively and significantly associated with construction workforce competency ($r = .312$, $p < .001$). Regression analysis further showed that curriculum alignment significantly predicted competency ($\beta = .312$, $p < .001$), explaining 9.7% of the variance in workforce competency ($R^2 = .097$). Qualitative findings revealed persistent implementation gaps, including outdated curriculum content, inadequate practical exposure, limited access to modern construction technologies and equipment, insufficient instructor capacity, slow curriculum review processes, and inconsistent integration of soft skills. The study concludes that curriculum alignment is an important component of construction workforce competency, but formal alignment alone may not ensure adequate workplace competence. The study recommends regular curriculum review with stronger industry participation, improved practical training and access to modern technologies, continuous instructor professional development, and systematic integration of technical and soft skills into industrial training programmes.

Keywords: Competency Development, Construction Workforce, Curriculum Alignment, Industrial Training, Technical and Vocational Education, Uganda

I. INTRODUCTION

Industrial training has historically played an important role in preparing individuals with practical knowledge, technical skills, and competencies required to participate effectively in the world of work. Early forms of occupational learning relied largely on observation, apprenticeship, trial and error, and oral instruction, through which individuals acquired skills necessary for survival and productive activities (Roy, 2021). The Industrial Revolution of the late eighteenth and early nineteenth centuries subsequently transformed these informal arrangements into more structured forms of vocational and industrial education as industries increasingly required workers with specialized technical skills (Wollschlager & Guggenheim, 2004). The emergence of factory-based training institutions and organized apprenticeship systems reflected the growing recognition that workforce skills needed to correspond with the technologies, production processes, and occupational requirements of industry. Over time, industrial training expanded into specialized fields, including engineering, manufacturing, and construction, while contemporary approaches increasingly emphasize competency-based education, digital skills, modern technologies, and responsiveness to changing industry requirements (Alaloul et al., 2020; Haque et al., 2024). Consequently, the effectiveness of industrial training increasingly depends not only on the availability of training programmes but also on the extent to which their curricula reflect the actual competencies required in the workplace.

In Africa, industrial training and technical and vocational education have similarly evolved in response to changing economic and labour-market requirements. During the colonial period, technical education was largely oriented towards supplying basic manpower for sectors such as construction, agriculture, mining, and other economic activities. Following independence, African governments increasingly viewed vocational and industrial training as mechanisms for addressing shortages of skilled labour, promoting employment, and supporting national economic development. Initiatives such as Nigeria's Industrial Training Fund, established in 1971, illustrate efforts to institutionalize workforce development and improve the availability of skilled personnel (Akpan, 2023). More recently, African countries have sought to modernize technical and vocational education and training (TVET) through competency-based approaches, digital technologies, flexible training arrangements, and greater collaboration between training institutions and industry (McGrath et al., 2020). However, concerns remain regarding outdated curricula, inadequate resources, weak links between training institutions and employers, and limited responsiveness of training programmes to changing occupational requirements (Beber et al., 2021). These challenges raise an important question concerning the alignment between what industrial training programmes teach and the competencies that employers require from graduates and workers.

The challenge is particularly significant in Sub-Saharan Africa, where the expansion of infrastructure, urbanization, industrialization, and population growth has increased demand for technically competent workers. Technical and vocational education and training has therefore become increasingly important in developing occupational skills capable of supporting economic transformation. Although several countries have invested in rehabilitating training institutions, introducing competency-based training, and strengthening trainer capacity, concerns about the quality, relevance, and labour-market responsiveness of TVET programmes persist (Eicker et al., 2017). Earlier assessments of vocational education in the region identified weaknesses in the capacity of training systems to provide adequate numbers of appropriately skilled workers (Godwin, 1990). Similarly, concerns about the cost-effectiveness and sustainability of training systems have reinforced the need for closer relationships between training providers and industry (Atchoarena & Delluc, 2002). Thus, curriculum alignment has become increasingly important because a curriculum that reflects contemporary occupational practices can potentially facilitate the development of competencies that are relevant to actual workplace demands.

The issue of curriculum alignment is particularly important in the construction industry, which depends heavily on workers possessing practical, technical, safety, managerial, and problem-solving competencies. Construction activities have become increasingly influenced by technological developments, new construction methods, changing safety requirements, digital tools, and evolving standards. Consequently, construction workers require more than theoretical knowledge; they need demonstrable competencies that enable them to perform occupational tasks effectively within real work environments. Alaloul et al. (2020) emphasize the increasing complexity and technological transformation of the construction industry, which has implications for the skills required by its workforce. Where training curricula do not adequately reflect such changes, a gap may emerge between competencies acquired during training and those expected by construction employers. Curriculum alignment therefore provides an important mechanism through which industrial training can remain responsive to the occupational realities of the construction sector.

In Uganda, industrial training has developed considerably since independence in 1962 as the country has sought to expand its technical and vocational skills base. The establishment of the Directorate of Industrial Training (DIT) in 1972 represented an important institutional development in the regulation and provision of industrial training, including apprenticeship and vocational training arrangements (Ogwang, 2009). Further developments included the establishment of the Uganda Business and Technical Examinations Board (UBTEB) in 2009 to support the assessment, standardization, and certification of technical and vocational qualifications (Okumu & Bbaale, 2019). Uganda has also introduced the Uganda Vocational Qualifications Framework (UVQF) and competency-based education and training approaches intended to standardize occupational competencies and strengthen the relevance of vocational qualifications to labour-market requirements (Mukooli, 2022). These developments demonstrate Uganda's recognition of the importance of structured industrial training and competency development in preparing its workforce for economic development.

Despite these institutional and policy developments, questions remain regarding the extent to which industrial training curricula in Uganda are aligned with the competencies required in the workplace. Existing literature identifies challenges including skills mismatches, limited industry participation in curriculum development, restricted access to training, and difficulties in translating training into employment and continued professional development (Okware & Ngaka, 2017). These challenges are particularly relevant to the construction sector, where the effectiveness of the workforce depends on the practical application of technical knowledge, adherence to occupational standards and safety requirements, use of modern construction technologies, and the ability to perform occupational tasks to industry expectations. If curriculum content, instructional approaches, practical training, and assessment practices do not

correspond with these requirements, graduates and trainees may acquire qualifications without developing the full range of competencies demanded by construction employers.

The alignment of industrial training curricula with construction-industry requirements is therefore an important consideration in Uganda's workforce development agenda. Curriculum alignment may involve the correspondence between training content and occupational tasks, the incorporation of current construction technologies and methods, adequate practical exposure, industry participation in curriculum development, and assessment of competencies that reflect actual workplace requirements. The extent to which these elements are incorporated into industrial training programmes may influence the technical, practical, problem-solving, safety, and other competencies developed by construction workers. However, while previous studies have highlighted general challenges in Uganda's TVET system, there remains a need for empirical evidence specifically examining how curriculum alignment within industrial training programmes relates to the competency development of the construction workforce.

1.1 Statement of the Problem

Ideally, industrial training programmes in Uganda should provide construction workers with market-relevant competencies through curricula that are closely aligned with industry requirements, supported by adequate practical training, industry participation, and apprenticeship opportunities. Uganda has introduced reforms such as the Uganda Vocational Qualifications Framework (UVQF) and competency-based education and training (CBET) to improve the relevance of technical and vocational training. However, concerns persist regarding the alignment of training curricula with changing labour-market and industry requirements, limited industry participation in curriculum development, inadequate apprenticeship opportunities, and insufficient practical training resources (Otago, 2021; Okware & Ngaka, 2017; Charles et al., 2023).

The problem is particularly important in the construction sector, where technological changes, evolving construction methods, occupational safety requirements, and increasing demand for practical technical skills require workers to possess competencies that correspond closely with workplace expectations. Weak curriculum–industry alignment may therefore contribute to gaps between the competencies acquired through industrial training and those required by construction employers. Evidence of skills mismatch and difficulties in transitioning from training to employment further suggests challenges in the effectiveness and labour-market responsiveness of Uganda's vocational training system (Nakirigya, 2021; Mukhaye, 2022).

If these gaps persist, Uganda's construction sector may continue to experience shortages of appropriately competent workers, while training institutions may produce graduates whose competencies do not adequately correspond to workplace requirements. Despite existing reforms, limited empirical evidence specifically explains the extent to which industrial training programme curriculum alignment influences the competency development of Uganda's construction workforce. This study therefore examines the impact of curriculum alignment on the competency development of the construction workforce in Uganda, with the aim of generating evidence to inform curriculum improvement and strengthen the relevance of industrial training to construction-industry needs.

1.2 Research Objectives

To assess the impact of industrial training program curriculum alignment on the competency development of the construction workforce in Uganda.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study was anchored in two theories: Experiential Learning Theory (ELT) and Human Capital Theory (HCT). Experiential Learning Theory was developed by David Kolb in 1984 and posits that learning occurs through a continuous cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb & Kolb, 2005). ELT shaped this study by providing the lens through which practical exposure opportunities such as internships, equipment handling, and mentorship were investigated as core drivers of competency development among construction trainees. Methodologically, ELT guided the emphasis on assessing how hands-on training methods and real-world experiences translate into workplace readiness. This informed both the survey items on practical sessions and the interview questions probing the theory practice linkage in Uganda's technical colleges. The theory directly supported Objective Three, which examined the influence of practical exposure on workforce competency, and reinforced the study's focus on experiential learning as a mechanism for skill acquisition. However, ELT presents a critical weakness in that it assumes learners are inherently motivated to reflect on and apply their experiences while overlooking external factors such as institutional structures, workplace environments, and economic

constraints that may limit experiential learning opportunities (Kayes, 2002). This gap necessitated the introduction of a second theory to account for these external influences.

Human Capital Theory was introduced by Gary Becker in 1964 and fills the gap left by ELT by asserting that investments in education and training enhance individual productivity and generate economic returns, while also recognizing that external factors such as labor market conditions and workplace environments influence the returns on these investments (Gillies, 2015). HCT shaped this study by framing industrial training program components, namely curriculum relevance, training methods, and practical exposure, as human capital investments whose effectiveness must be empirically evaluated against real world outcomes. Methodologically, HCT guided the selection of workforce competency, measured through technical skills, safety practices, and workmanship quality, as the dependent variable based on the assumption that higher quality training should produce more competent and employable graduates. The theory directly supported Objective One, which assessed curriculum alignment with industry skill requirements, and Objective Two, which evaluated training methods. Furthermore, HCT informed the moderation analysis that tested how the workplace environment influences the translation of training investments into actual workforce competence, thereby addressing the external factors that ELT overlooked.

2.2 Empirical Review

2.2.1 Industry–Curriculum Alignment and Competency Development

Curriculum relevance plays a critical role in shaping the competency of the workforce, particularly in sectors like construction and engineering, where alignment with industry needs is essential for enhancing employability and technical skills. Stan et al. (2023) found that designing industrial training curricula in collaboration with the construction industry, while integrating modern technologies, industry-specific standards, and soft skills, significantly improves graduates' employability and workplace performance.

In Uganda, Sophia & Onen (2024) highlighted Makerere University's efforts to enhance employability by integrating subject knowledge, practical skills, and personal development through interactive and experiential learning methods. However, they identified challenges such as funding constraints, outdated infrastructure, and gaps in curriculum implementation, suggesting the need for ongoing improvements and stronger industry linkages to better align with market demands. Moreover, Mustajab & Irawan (2023) reviewed older literature, lacking up-to-date empirical insights necessary for addressing current industry and educational demands. The current study bridged these gaps by adopting a mixed-methods approach, focusing on industry-specific training in Uganda, considering vocational training contexts across five technical colleges and offering fresh empirical data that can be generalized to similar regions facing the same challenges of curriculum alignment and workforce employability.

2.2.2 Technology Integration and Competency Development

Technology integration is an important dimension of curriculum alignment in technical and construction education because contemporary construction practice increasingly requires graduates to use digital tools, modern equipment, and emerging technologies. Abouelnaga et al. (2024) found that technological integration in Egyptian private universities positively influenced students' perceived employability, while Kalyani (2024) emphasized its contribution to digital literacy, problem-solving, communication, and other 21st-century skills. However, unequal access to technology and limitations in implementation can constrain these benefits. In Uganda, Okware and Ngaka (2017) identified challenges associated with outdated methods and equipment in vocational training, suggesting a continuing gap between training provision and changing industry requirements.

These studies demonstrate the relevance of technological integration to competency development but provide limited evidence on how access to and practical use of modern construction technologies are reflected in industrial training programmes in Uganda's public technical colleges. The present study therefore examined technology integration as part of curriculum alignment and explored, through both quantitative and qualitative evidence, the extent to which training content; equipment, instructor capacity, and practical exposure reflect contemporary construction industry requirements.

2.2.3 Soft-Skills Integration and Competency Development

Soft skills are an important component of construction workforce competency because construction work requires employees to communicate effectively, collaborate with others, solve problems, demonstrate leadership, and adapt to changing workplace conditions. Vasanthakumari (2019) identifies communication, teamwork, leadership, time management, problem-solving, and interpersonal skills as important employability competencies. Hirudayaraj et al. (2021) similarly identified communication and interpersonal skills, together with attributes such as reliability and empathy, as important competencies for entry-level engineers, while noting deficiencies among some new graduates. Mahasneh and Thabet (2015) reported a mismatch between the soft-skills requirements of the construction industry and graduates' preparedness, with deficiencies affecting workplace performance and efficiency. Bhasin and Mishra

(2023) further emphasize the importance of developing employability-related competencies alongside technical knowledge.

Although these studies demonstrate the importance of soft skills, limited evidence exists on how such competencies are integrated and demonstrated within Uganda's construction-focused TVET system. Existing research also provides limited insight into the institutional and implementation challenges affecting soft-skills development during industrial training. The present study therefore explored the integration and workplace demonstration of soft skills as part of the broader assessment of construction workforce competency, with particular attention to curriculum content, practical training, and the experiences reported by institutional and industry stakeholders.

III. METHODOLOGY

3.1 Research Design

The study adopted a descriptive research design, which enables researchers to describe the characteristics of a phenomenon or population without manipulating variables (Cohen et al., 2018). A mixed-methods approach was integrated to provide a comprehensive understanding of industrial training programmes and competency development (Creswell & Creswell, 2023). Quantitative data were collected through structured questionnaires administered to graduates of the National Diploma in Building and Civil Engineering (ND-BCE), while qualitative data were obtained through semi-structured interviews with institutional heads and employers. The combination of surveys and interviews enabled the study to examine measurable relationships while capturing stakeholder perspectives on curriculum alignment, training methods, practical exposure, and workforce competency.

3.2 Study Area

The study was conducted across Uganda and focused on five public technical colleges offering the National Diploma in Building and Civil Engineering (ND-BCE): Uganda Technical College Elgon, Uganda Technical College Lira, Uganda Technical College Bushenyi, Uganda Technical College Kichwamba, and Uganda Technical College Kyema. The institutions were selected to provide regional representation and because they are the public technical colleges offering the ND-BCE. The study also included employers of ND-BCE graduates distributed across different regions of Uganda, thereby providing perspectives on industrial training and workforce competency within different geographical and workplace contexts.

3.3 Target Population

The target population comprised 2,760 participants, including 2,750 ND-BCE graduates who graduated from the five selected technical colleges between 2020 and 2023, together with 5 principals of the institutions and 5 employers of the graduates. The graduate population comprised 751 from UTC-Elgon, 726 from UTC-Lira, 732 from UTC-Bushenyi, 337 from UTC-Kichwamba, and 204 from UTC-Kyema. The population figures were obtained from UBTEB (2024).

3.4 Sampling Procedure

The study employed stratified random sampling and purposive sampling. Stratified random sampling was used to select graduates by grouping them according to the five technical colleges and drawing a sample proportionate to the number of graduates in each institution, thereby ensuring fair representation (Creswell & Plano Clark, 2018). Purposive sampling was used to select the five institutional heads and five employers because of their administrative roles, experience, and direct knowledge of industrial training and graduate competencies (Creswell & Creswell, 2023).

3.5 Sample Size

The Krejcie and Morgan sample size formula was used to determine the quantitative sample from the 2,750 graduates, resulting in a required sample of 337 graduates. In addition, all five institutional heads and five employers were included in the qualitative component because of their direct involvement in industrial training and experience with ND-BCE graduates. Thus, the total planned sample was 347 participants, comprising 337 graduates, 5 institutional heads, and 5 employers.

3.6 Data Collection Instruments

The study used survey questionnaires and an interview guide as the primary data collection instruments. The questionnaire was administered to ND-BCE graduates and consisted of demographic information and closed-ended statements measured on a five-point Likert scale covering curriculum relevance, training methods, practical exposure, workplace environment, and workforce competency (Clark & Ivankova, 2015; Creswell & Plano Clark, 2018). A semi-structured interview guide was used with institutional heads and employers to obtain detailed perspectives on

curriculum alignment, training methods, practical exposure, challenges, and opportunities for improving industrial training programmes (Clark & Ivankova, 2015; Creswell & Plano Clark, 2018).

3.7 Data Analysis

Quantitative data were analyzed using SPSS version 27.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondents' characteristics and study variables. Pearson correlation analysis was used to establish the strength and significance of relationships between curriculum relevance, training methods, practical exposure, and workforce competency, while regression analysis was conducted to assess the predictive influence of the independent variables on workforce competency (Field, 2024).

Qualitative data from interviews were analyzed using thematic/content analysis. Interview responses were reviewed, coded, categorized, and organized into themes and recurring patterns relating to curriculum relevance, training methods, practical exposure, and workforce competency. Thematic analysis enabled the qualitative findings to provide contextual insights that complemented the quantitative results (Braun & Clarke, 2021).

3.8 Ethical Considerations

The study adhered to ethical principles of confidentiality, privacy, anonymity, informed consent, and plagiarism prevention. Participants were informed about the study's objectives, procedures, potential benefits and risks, and their voluntary participation was obtained through informed consent. Data were securely stored and accessed only by authorized persons, while responses were anonymized and reported in aggregate form to protect participants' identities. The study also followed established academic citation and referencing practices to prevent plagiarism and maintain research integrity.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Descriptive Findings on Curriculum Alignment

Table 1 presents respondents' perceptions of the alignment of the industrial training programme curriculum with the skill requirements of the construction industry in Uganda. Overall, respondents perceived the curriculum as generally aligned with industry requirements. The highest-rated item was that the curriculum aligns with the skill requirements of the construction industry ($M = 4.41$, $SD = 0.837$), followed by the incorporation of modern construction technologies and tools ($M = 4.18$, $SD = 0.836$), the contribution of soft-skills training to workplace performance ($M = 4.19$, $SD = 0.944$), and preparation for current construction-sector demands ($M = 4.13$, $SD = 0.827$). However, comparatively lower ratings were reported for training in advanced construction equipment and software ($M = 3.47$, $SD = 1.106$) and keeping pace with technological advancements in the construction industry ($M = 3.38$, $SD = 1.051$). These findings suggest that although the curriculum was perceived as broadly aligned with industry requirements, gaps remained in practical exposure to advanced technologies and equipment.

Table 1

Descriptive statistics on Curriculum Alignment

	Statement	SD (%)	D (%)	NS (%)	A (%)	SA (%)	Mean	σ
1	The industrial training program curriculum aligns with the skill requirements of the construction industry in Uganda.	7 (2.3)	6 (1.9)	22 (7.1)	153 (49.5)	121 (39.2)	4.41	.837
2	The curriculum prepares graduates to meet the current demands of the construction sector.	6 (1.9)	7 (2.3)	31 (10.0)	162 (52.4)	103 (33.3)	4.13	.827
3	The topics covered in the curriculum are relevant to my job responsibilities.	4 (1.3)	18 (5.8)	47 (15.2)	147 (47.6)	93 (30.1)	3.99	.897
4	The curriculum incorporates modern construction technologies and tools.	5 (1.6)	9 (2.9)	28 (9.1)	151 (48.9)	116 (37.5)	4.18	.836
5	I was adequately trained to use advanced construction equipment and software.	19 (6.1)	45 (14.6)	65 (21.0)	132 (42.7)	48 (15.5)	3.47	1.106
6	The program kept up with technological advancements in the construction industry.	9 (2.9)	68 (22.0)	67 (21.7)	126 (40.8)	39 (12.6)	3.38	1.051
7	The curriculum included training on essential soft skills such as communication and teamwork.	21 (6.8)	13 (4.2)	35 (11.3)	143 (46.3)	97 (31.4)	3.91	1.097
8	Soft skills training have helped me perform better in the workplace.	10 (3.2)	10 (3.2)	23 (7.4)	133 (43.0)	133 (43.0)	4.19	.944
9	The program balanced technical skills with soft skills development.	8 (2.6)	27 (8.7)	26 (8.4)	178 (57.6)	70 (22.7)	3.89	.940

Source: Primary Data (2025)

4.1.2 Relationship between Curriculum Alignment and Competency

Table 2 presents the Pearson correlation between industrial training programme curriculum alignment and competency of the construction workforce. Curriculum alignment was positively and significantly associated with competency of the construction workforce ($r = .312$, $p < .001$, $n = 309$). This indicates that higher perceived curriculum alignment was associated with higher reported workforce competency. The finding provides statistical support for H1.

Table 2

Relationship between Curriculum Alignment and Competency

Correlations			
		Curriculum Alignment	Competency of Construction Workforce
Curriculum Alignment	Pearson Correlation	1	.312**
	Sig. (2-tailed)		.000
	N	309	309
Competency of Construction Workforce	Pearson Correlation	.312**	1
	Sig. (2-tailed)	.000	
	N	309	309

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Primary Data, (2025)

4.1.3 Regression Results

Table 3 presents the regression results examining the predictive relationship between curriculum alignment and competency of the construction workforce. The regression model was statistically significant, $F(1, 307) = 33.002$, $p < .001$, and explained 9.7% of the variance in workforce competency ($R^2 = .097$; adjusted $R^2 = .094$). Curriculum alignment was a significant positive predictor of workforce competency ($B = .251$, $SE = .044$, $\beta = .312$, $t = 5.745$, $p < .001$).

Table 3

Regression analysis

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.286	.174		18.938	.000
Curriculum Alignment	.251	.044	.312	5.745	.000
a. Dependent Variable: Competency of Construction Workforce					
R	R Square	Adjusted Square	Std. Error	F Statistic	Sig.
.312 ^a	.097	.094	.45408	33.002	.000 ^b

Source: Primary Data (2025)

4.1.4 Qualitative Findings

Table 4 presents the qualitative findings from interviews with key informants. Six themes emerged: curriculum alignment, identified competency gaps, modern technology integration, challenges updating the curriculum, soft-skills inclusion, and soft-skills demonstration.

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Thematic analysis

Theme	Key Issues	Impact on Competency	Frequency
Curriculum Alignment	Inconsistent implementation; no national standard; outdated on modern tech; theory dominates practice	Partial graduate readiness; significant variation in competencies across institutions	9/9
Identified Gaps	Lack of modern tech (BIM, software); theory-practice divide; weak soft skills; poor equipment proficiency	Graduates underprepared for technological, commercial, and practical demands of industry	8/9
Modern Tech Integration	Mostly theoretical; severe equipment shortages; untrained instructors; incidental exposure	Students aware of technologies but lack hands-on competence; low confidence on job sites	9/9
Challenges Updating Curriculum	Chronic underfunding; bureaucratic delays; rapid tech change; unstable policies; lack of industry feedback	Curriculum remains reactive and outdated; persistent lag behind industry practices	9/9
Soft Skills Inclusion	Minimal formal training; only communication covered; others incidental; inconsistent delivery	Graduates deficient in leadership, conflict resolution, and professional ethics	9/9
Soft Skills Demonstration	Extremely important for site management and client trust; graduates demonstrate significant deficiencies	Poor communication and collaboration undermine project efficiency and client relationships	9/9

Source: Primary Data (2025)

The first theme concerned curriculum–industry alignment. All nine informants noted inconsistent alignment between curriculum and industry needs. As one explained, *"The alignment is inconsistent because there is no standardized national curriculum for industrial training... leading to significant variation in the competencies graduates acquire"* (KII 1, 2025). Others cited outdated content on modern technologies (KII 3), dominance of theoretical instruction (KII 4), lack of formal structured curriculum (KII 5), and shortage of experienced technical instructors (KII 6). Only KII 8 viewed alignment as very good.

The second theme focused on identified competency gaps among graduates. Eight informants identified specific gaps, with KII 1 unable to specify due to absence of a defined curriculum. As one stated, *"Significant gaps exist, with the most notable being that many graduates lack essential hands-on skills... a clear mismatch between skills taught and those demanded by employers"* (KII 7, 2025). Others highlighted lack of training in BIM and digital skills (KII 2), trainers unfamiliar with latest tools (KII 3), theory-practice divide (KII 4), poor soft skills (KII 5), impractical application of local materials (KII 6), limited machinery proficiency (KII 8), and gaps in commercial knowledge (KII 9).

The third theme addressed integration of modern construction technologies into training. All nine informants reported technology integration is weak and mostly theoretical. As one noted, *"The curriculum mentions modern technologies, but the inclusion is often theoretical rather than practical. Students may learn about BIM in a lecture but rarely get hands-on experience"* (KII 9, 2025). Others described incorporation as minimal and not systematic (KII 1), effectiveness limited by lack of equipment and trained instructors (KII 2), ineffective hands-on integration (KII 3), limited partnership-based exposure (KII 4), incidental exposure only (KII 5), high-cost barriers (KII 6), moderately effective but unrealized potential (KII 7), and successful only in well-resourced partnerships (KII 8).

The fourth theme examined challenges in updating the curriculum to reflect industry developments. All nine informants identified systemic barriers to curriculum updates. As one explained, *"The primary challenge is the rapid pace of technological change, which outpaces the formal curriculum review and approval processes... chronic shortage of funding... lack of trained instructors"* (KII 9, 2025). Others cited chronic lack of funds preventing gap analysis (KII 1), slow bureaucratic processes and lack of industry feedback (KII 2), financial constraints (KII 3), rapid tech change and difficulty providing instructor CPD (KII 4), policy instability and inconsistent funding (KII 5), lack of tools to demonstrate new technologies (KII 6), slow review processes and gap between industry trends and institutional adaptation (KII 7), and lack of advanced machines for students (KII 8).

The fifth theme concerned the inclusion and delivery of soft-skills training. All nine informants reported soft skills training is minimal and inconsistent. As one stated, *"Formal training in soft skills is minimal and not systematically integrated... often expected to be developed incidentally during group projects or industrial attachments, without dedicated modules"* (KII 9, 2025). Others noted only a single unit on communication skills exists (KII 1), delivery is limited and lacks depth (KII 2), focus remains heavily on technical knowledge (KII 3), curriculum covers leadership and conflict resolution but delivery varies (KII 4), skills derived indirectly from projects (KII 5),

assessment needs refinement (KII 6), integrated through group assignments but could be stronger (KII 7), and explicitly included (KII 8).

The sixth theme focused on the demonstration of soft skills in the workplace. All nine informants agreed soft skills are critically important but poorly demonstrated by graduates. As one captured, *"Soft skills are critically important... Unfortunately, many graduates demonstrate a significant deficiency in these areas, often struggling with clear on-site communication, collaborative problem-solving, and adapting to the dynamic social environment"* (KII 9, 2025). Others noted significant deficiencies due to lack of training (KII 1), training does not translate into confident application (KII 2), direct result of inadequate emphasis (KII 3), graduates with skills are more effective (KII 4), only demonstrated through limited supervisory experiences (KII 5), demonstrated during presentations and supervision (KII 6), good in teamwork but need improvement in leadership and ethics (KII 7), and essential for planning and administration (KII 8).

4.2 Discussion of the Findings

The findings indicate that industrial training programme curriculum alignment is positively and significantly associated with competency development among the construction workforce. The correlation result ($r = .312$, $p < .001$) and regression findings ($\beta = .312$, $p < .001$) demonstrate that greater alignment between training content and construction industry requirements is associated with higher reported workforce competency. However, curriculum alignment explained 9.7% of the variance in competency, suggesting that competency development is influenced by several factors beyond curriculum alignment. This finding is consistent with Stan et al. (2023) and Mustajab and Irawan (2023), who emphasize the importance of aligning training curricula with workplace and industry requirements in strengthening graduates' occupational competencies. Similarly, Sophia and Onen (2024) and Charles et al. (2023) highlight the continuing importance of industry-responsive training in addressing skills gaps between training institutions and the labour market.

The descriptive findings further showed that respondents generally perceived the curriculum as aligned with construction industry requirements, but the qualitative evidence revealed inconsistencies in how this alignment is implemented. Informants identified outdated curriculum content, limited industry involvement, inadequate practical resources, and insufficiently experienced instructors as factors weakening the translation of curriculum content into workplace competence. This finding supports Nakato (2024) and Pervez et al. (2024), who identify gaps between training provision and changing workplace requirements as important constraints on effective skills development. It also reflects the concerns raised by Okware and Ngaka (2017) regarding weaknesses in the responsiveness of technical and vocational education to labour-market needs in Uganda.

A particularly important finding was the gap between the inclusion of modern construction technologies in the curriculum and graduates' practical ability to use them. Although respondents generally indicated that modern technologies and tools were incorporated into the curriculum, the lower ratings for training in advanced equipment and software and keeping pace with technological advancements, together with the qualitative findings, suggest that technology integration remains predominantly theoretical. Informants attributed this to inadequate equipment, limited instructor expertise, high costs, and insufficient opportunities for practical exposure. This finding is consistent with Ali et al. (2022) and Yudsono et al. (2018), who emphasize the importance of integrating contemporary technologies and practical learning experiences into technical training. Abouelnaga et al. (2024) and Kalyani (2024) similarly underscore the need for training systems to respond continuously to technological change.

The findings also demonstrate the importance of soft skills in construction workforce competency. Although communication, teamwork, leadership and related skills were recognized in the curriculum, their formal and systematic integration was reported to be limited. The qualitative findings further indicated that some graduates experienced difficulties applying these skills in workplace settings. This finding is consistent with Vasanthakumari (2019) and Hirudayaraj et al. (2021), who emphasize that technical competence alone is insufficient for effective workplace performance and that communication, teamwork and interpersonal competencies are integral to employability and professional effectiveness. Similarly, Mahasneh and Thabet (2015) and Bhasin and Mishra (2023) highlight the need for training programmes to integrate soft skills alongside technical competencies.

Overall, the findings suggest that curriculum alignment provides an important foundation for developing a competent construction workforce, but its effectiveness depends on the conditions under which the curriculum is implemented. The mixed-methods findings show that alignment at the curriculum-content level does not necessarily translate into equivalent workplace competency when practical resources, modern technologies, instructor capacity, industry engagement, curriculum responsiveness and soft-skills development remain limited. The study therefore extends previous evidence by demonstrating both the statistical association between curriculum alignment and construction workforce competency and the institutional and implementation factors that help explain this relationship in Uganda.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that industrial training programme curriculum alignment is positively and significantly associated with competency development among Uganda's construction workforce. Quantitative findings showed a significant relationship between curriculum alignment and workforce competency ($r = .312$, $p < .001$), while regression analysis indicated that curriculum alignment significantly predicted competency, explaining 9.7% of its variance.

Although respondents generally perceived the curriculum as aligned with construction industry skill requirements, qualitative findings revealed important implementation gaps. These included inconsistent curriculum–industry alignment across institutions, outdated curriculum content, inadequate practical exposure, limited access to modern construction equipment and software, insufficient instructor capacity, and slow curriculum review processes. The integration of soft skills was also found to be limited and inconsistent.

Overall, the findings indicate that curriculum alignment is an important component of construction workforce competency, but formal alignment alone may not ensure adequate workplace competence. Effective implementation requires stronger practical training, improved access to modern technologies and equipment, continuous curriculum updating, enhanced instructor capacity, and more systematic integration of soft skills.

5.2 Recommendations

The study recommends that training institutions and relevant education authorities strengthen curriculum–industry alignment through regular curriculum review and greater industry participation, while ensuring adequate access to modern construction equipment, digital technologies, and practical training facilities. Instructor capacity should be enhanced through continuous professional development, and practical and soft-skills training should be systematically integrated into industrial training programmes. These measures would help reduce the gap between curriculum content and workplace requirements and strengthen the competency of Uganda's construction workforce.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

- Abouelnaga, D., Ragheb, M. A., Tantawi, P., & Elsharbassy, A. (2024). The impact of technological integration on student perceived employability with mediation role of student learning experience: Evidence from international programs in Egyptian private universities. *Arab Journal of Administration*, 46(6), 1–16.
- Akpan, D. (2023). *Nigeria's technical, vocational education, and training programs: Insights and analysis*.
- Alaloul, W. S., Liew, M. S., Zawawi, N. A. W. A., & Kennedy, I. B. (2020). Industrial Revolution 4.0 in the construction industry: Challenges and opportunities for stakeholders. *Ain Shams Engineering Journal*, 11(1), 225–230.
- Ali, R., Malik, S., & Ahmad, F. (2022). Challenges and opportunities in aligning higher education curricula with industry needs: A case study of Pakistan. *Economic and Education Review*, 41(3), 211–230.
- Atchoarena, D., & Delluc, A. (2002). *Revisiting technical and vocational education in Sub-Saharan Africa: An update on trends, innovations and challenges*. UNESCO-IIEP.
- Beber, B., Dworschak, R., Lakemann, T., Lay, J., & Priebe, J. (2021). *Skills development and training interventions in Africa: Findings, challenges, and opportunities*.
- Bhasin, M., & Mishra, A. (2023). Integrating soft skills for professional development: A pathway towards enhanced workforce competence. *Journal of the School of Language, Literature and Culture Studies*, 26(7), 99–102.
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications.
- Charles, K., Song, Z., & Djaya, H. G. N. (2023). *TVET and socio-economic development in Uganda: Lessons from Chinese TVET*.
- Clark, V. L. P., & Ivankova, N. V. (2015). *Mixed methods research: A guide to the field* (Vol. 3). SAGE Publications.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.

- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative and mixed methods approaches*. SAGE Publications.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Eicker, F., Haseloff, G., & Lennartz, B. (2017). *Vocational education and training in Sub-Saharan Africa: Current situation and development*. W. Bertelsmann Verlag.
- Gillies, D. (2015). Human capital theory in education. In *Encyclopedia of educational philosophy and theory*. Springer.
- Godwin, D. (1990). Technical education in Sub-Saharan African countries: A review of developments and strategies. *The Vocational Aspect of Education*, 42(113), 91–99.
- Haqee, S. M. S., Shaha, S., & Sharmin, S. (2024). Future-proofing the workforce: Training and development in the digital age. *European Journal of Human Resource Management Studies*, 7(2).
- Hirudayaraj, M., Baker, R., Baker, F., & Eastman, M. (2021). Soft skills for entry-level engineers: What employers want. *Education Sciences*, 11(10), Article 641.
- International Labour Organization. (2019). *State of skills: Uganda*. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/@emp_ent/documents/genericdocument/wcms_736694.pdf
- Kalyani, L. K. (2024). The role of technology in education: Enhancing learning outcomes and 21st century skills. *International Journal of Scientific Research in Modern Science and Technology*, 3(4), 5–10.
- Kayes, D. C. (2002). Experiential learning and its critics: Preserving the role of experience in management learning and education. *Academy of Management Learning & Education*, 1(2), 137–149.
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2), 193–212.
- Mahasneh, J. K., & Thabet, W. (2015, April). Rethinking construction curriculum: A descriptive cause analysis for the soft skills gap among construction graduates. In *51st ASC Annual International Conference Proceedings* (Vol. 35).
- Malik, R., & Farooq, U. (2021). Leveraging technology for curriculum alignment: A roadmap for Pakistan's higher education. *Technology in Education Journal*, 7(2), 89–105.
- McGrath, S., Ramsarup, P., Zeelen, J., Wedekind, V., Allais, S., Lotz-Sisitka, H., Monk, D., Openjuru, G., & Russon, J. A. (2020). Vocational education and training for African development: A literature review. *Journal of Vocational Education and Training*, 72(4), 465–487.
- Morgan, D. L. (2013). *Integrating qualitative and quantitative methods: A pragmatic approach*. SAGE Publications.
- Mukhayee, D. (2022, August 25). 49% vocational graduates can't find jobs. *Daily Monitor*. <https://www.monitor.co.ug/uganda/news/national/49-vocational-graduates-can-t-find-jobs-report-3926114>
- Mukooli, H. M. (2022). *The role of vocational training in the industrial development in Uganda* [Doctoral dissertation, Makerere University].
- Mulder, M. (Ed.). (2017). *Competence-based vocational and professional education: Bridging the worlds of work and education*. Springer. <https://doi.org/10.1007/978-3-319-41713-4>
- Mustajab, D., & Irawan, A. (2023). The effectiveness of vocational training programs on employment outcomes. *Advances in Community Services Research*, 1(2), 54–63.
- Nakato, C. (2024, November 28). Mismatch between labour force and education system continues to affect employability. *Nile Post*. <https://nilepost.co.ug/education/229893/mismatch-between-labour-force-and-education-system-continues-to-affect-employability>
- Nakirigya, S. (2021, November 23). Skills mismatch hampers vocational training—Officials. *Daily Monitor*. <https://www.monitor.co.ug/uganda/news/national/skills-mismatch-hampers-vocational-training-officials-3628056>
- Ogwang, S. P. (2009). *Transfer of knowledge and skills in vocational training institutions in Uganda*.
- Okumu, I. M., & Bbaale, E. (2019). Technical and vocational education and training in Uganda: A critical analysis. *Development Policy Review*, 37(6), 735–749.
- Okware, J. C., & Ngaka, W. (2017). Rationale and challenges of technical vocational education and training in Uganda. In *Technical education and vocational training in developing nations* (pp. 26–44). IGI Global.
- Onwuegbuzie, A. J., & Hitchcock, J. H. (Eds.). (2022). *The Routledge handbook for advancing integration in mixed methods research*. Routledge.
- Otago, S. (2021, August 22). Current technical, vocational courses not working—UBTEB. *Daily Monitor*. <https://www.monitor.co.ug/uganda/news/national/current-technical-vocational-courses-not-working-ubteb--3520526>



- Pervez, N., Mahmood, W., Akram, M., & Waqas, M. (2024). Analyzing the alignment between university curriculum and job market requirements in Pakistan: Challenges and opportunities. *Indus Journal of Social Sciences*, 2(2), 397–410.
- Roy, K. (2021, July 8). Looking back: A brief history of the corporate training industry. *Corporate Training Materials*. <https://corporatetrainingmaterials.com/blogs/using-our-materials/looking-back-a-brief-history-of-the-corporate-training-industry>
- Sophia, G., & Onen, D. (2024). Curriculum alignment and graduate employability: A comprehensive exploration at Makerere University. *East African Journal of Education Studies*, 7(4), 712–727.
- Stan, M. I., Țenea, D. D., Vintilă, D. F., & Tasește, T. (2023). Curricular relevance and workforce preparedness: Student perspectives on practical experiences in urban planning and construction courses. *Studies in Business and Economics*, 18(3), 261–280.
- Uganda Business and Technical Examinations Board. (2024). *Graduate tracer study (2020–2023)* [Unpublished document].
- UNESCO. (1996). *The development of technical and vocational education in Africa: Case studies from selected countries*. UNESCO/BREDA.
- Vasanthakumari, S. (2019). Soft skills and its application in the workplace. *World Journal of Advanced Research and Reviews*, 3(2), 66–72.
- Winterton, J. (2017). Competence-based vocational and professional education. In M. Mulder (Ed.), *Competence-based vocational and professional education: Bridging the worlds of work and education*. Springer.
- Wollschlager, N., & Guggenheim, É. F. (2004). A history of vocational education and training in Europe: From divergence to convergence. *European Journal: Vocational Training*, 32, 1–3.
- Yudiono, H., Soesanto, & Haryono. (2018). An industrial competency-based curriculum alignment model. *World Transactions on Engineering and Technology Education*, 16(1), 18–22.