

Skills Mismatch Between TVET/University Output and Labor Market Demand: An Ordinal Logistic Regression Analysis

Dr. Arinaitwe Julius¹, Dr. Twinomujuni Rosebell², Ahumuza Audrey³

1,2,3 Metropolitan International University

Abstract

Skills mismatch between the output of Technical and Vocational Education and Training (TVET) institutions and universities and the actual demands of the labor market remains a persistent challenge to human capital utilization and youth employment outcomes in Uganda and across sub-Saharan Africa. This study examined the institutional, curricular, and individual-level determinants of the severity of skills mismatch among 450 TVET and university graduates who had transitioned into the labor market, treating mismatch severity as an ordered categorical outcome comprising no/low, moderate, and severe mismatch. Data were analyzed in three sequential stages: univariate description of sociodemographic and institutional characteristics; bivariate analysis using Pearson chi-square tests for categorical predictors and Kruskal-Wallis H tests for continuous predictors; and multivariable analysis using a proportional-odds ordinal logistic regression model, with robustness assessed through 1,000-replicate bootstrap resampling and a trimmed-sample re-estimation excluding high-leverage observations. The results showed that 57.6% of graduates experienced moderate or severe mismatch, with TVET graduates disproportionately represented among those reporting severe mismatch. In the multivariable model, TVET status significantly increased the odds of higher mismatch severity (adjusted OR = 1.958, 95% CI: 1.342-2.856, $p < 0.001$), while internship completion (adjusted OR = 0.660, $p = 0.033$), curriculum-industry linkage score (adjusted OR = 0.404 per SD, $p < 0.001$), digital skills score (adjusted OR = 0.620 per SD, $p < 0.001$), soft skills score (adjusted OR = 0.734 per SD, $p = 0.001$), and work experience (adjusted OR = 0.736 per SD, $p = 0.002$) were each significantly protective, whereas sex was not a significant predictor ($p = 0.605$). Sensitivity analyses confirmed the stability of these estimates across bootstrap resampling and after exclusion of high-leverage cases. The study concluded that weak curriculum-industry linkage, limited internship exposure, and underdeveloped digital and soft skills were the principal drivers of skills mismatch severity in Uganda, and recommended prioritized curriculum-industry alignment, expanded work-integrated learning, and embedded digital- and soft-skills training as the most promising policy interventions.

Keywords: Skills mismatch; TVET; university graduates; labor market; ordinal logistic regression; curriculum-industry linkage; digital skills; internship; Uganda.

Introduction

The alignment between the competencies produced by Technical and Vocational Education and Training (TVET) institutions and universities and the actual competencies demanded by employers has become a defining concern for labor economists, education planners, and policymakers across sub-Saharan Africa (Ahn & Hamilton, 2022; FAISHAL, 2025; Lai & Requate, 2023; Rees, 2022). Skills mismatch, broadly understood as the misalignment between the qualifications, technical competencies, and soft skills that graduates possess and those required to perform effectively in available jobs, manifests in several forms including vertical mismatch (over- or under-qualification), horizontal mismatch (field-of-study irrelevance), and skill-gap mismatch (deficiency in specific technical or

behavioral competencies) (Allan et al., 2023; Hoxha et al., 2021; Kazaara & Audrey, 2026; Nwaogazie et al., 2016). In Uganda, where the education system produces tens of thousands of graduates annually from both TVET institutions and universities, employers frequently report that new entrants to the labor market lack practical, industry-ready skills even when they hold the requisite academic qualifications, while graduates themselves report prolonged job-search periods and underemployment in roles unrelated to their training (Campbell & Nolan, 2019; Jackline & Richard, 2025; Julius & Gracious Kazaara, 2026; Mukoki et al., 2020). This study applied an ordinal logistic regression framework, appropriate for modelling a naturally ordered outcome such as the severity of skills mismatch (ranging from no or low mismatch to severe mismatch), to quantify how institutional type, curriculum-industry linkage, digital and soft skills, internship exposure, and demographic characteristics jointly predicted the likelihood of graduates experiencing progressively higher levels of skills mismatch in the labor market.

Background of the Study

Uganda's National Development Plan III and the broader Vision 2040 framework place strong emphasis on human capital development and skilling as engines of industrialization and structural transformation, prompting substantial public investment in TVET expansion under the Ministry of Education and Sports' Skilling Uganda strategy alongside continued growth of university enrolment under the National Council for Higher Education (Gracious Kazaara & Julius, 2025; Julius & Audrey, 2025a; Julius & Isaac Kazaara, 2025; Lozano et al., 2022). Despite these investments, successive Uganda Bureau of Statistics labor force surveys and employer skills-needs assessments conducted by bodies such as the Federation of Uganda Employers have consistently documented a persistent disconnect between curricula taught in training institutions and the technical, digital, and behavioral competencies demanded by a labor market increasingly shaped by private-sector growth, digitalization, and regional economic integration (Franco et al., 2023; Julius & Kazaara, 2025, 2026; Julius & Nancy, 2026). This disconnect has historically been attributed to outdated curricula, weak institution-industry partnerships, limited practical attachment opportunities, inadequate investment in modern equipment and digital infrastructure within training institutions, and insufficient emphasis on soft skills such as communication, teamwork, and problem-solving that employers increasingly prioritize alongside technical competence (Charles et al., 2023; Julius & Audrey, 2025b; Julius & Nancy, 2025b; Mobegi, 2026). While considerable qualitative and descriptive research has documented the existence of skills mismatch in Uganda, comparatively few studies have employed rigorous ordinal regression modelling to quantify the relative contribution of specific institutional and individual-level factors to the severity of mismatch, a gap that this study sought to address by treating mismatch severity as an ordered categorical outcome and examining it through a multivariable analytical lens that reflected the multidimensional and graduated nature of the phenomenon.

Problem Statement

Despite the expansion of both TVET and university enrolment in Uganda over the past two decades, employers continue to report significant difficulty recruiting graduates who possess the technical, digital, and behavioral competencies required for immediate productivity, while graduates simultaneously report extended periods of unemployment, underemployment, and engagement in jobs unrelated to their field of training (Alipanga & Kohrt, 2022; Ma et al., 2022; Müller et al., 2024; Ndomondo et al., 2022). This persistent mismatch imposes substantial costs on the economy in the form of foregone productivity, wasted public and private investment in education, elevated

youth unemployment, and diminished returns to schooling, yet the specific institutional, curricular, and individual-level drivers of mismatch severity remain inadequately quantified in the Ugandan context (Alvarenga et al., 2020; Julius & Nancy, 2025a; Kazaara & Desire, 2025). Prior studies have tended to treat skills mismatch as a binary present/absent phenomenon or have relied on purely descriptive statistics, thereby failing to capture the graduated severity of mismatch or to isolate the independent, adjusted contribution of factors such as institution type, curriculum-industry linkage, internship exposure, and digital and soft skills once other characteristics were controlled for. Without such evidence, policymakers, training institutions, and employers lack a robust empirical basis for prioritizing interventions, whether through curriculum reform, expanded work-integrated learning, or targeted digital-skills investment, that would most effectively reduce the severity of skills mismatch among labor market entrants.

Objectives of the Study

Main Objective

The main objective of this study was to examine the institutional, curricular, and individual-level determinants of the severity of skills mismatch between TVET/university output and labor market demand in Uganda using an ordinal logistic regression approach.

Specific Objectives

1. To assess the sociodemographic, institutional, and labor market characteristics of TVET and university graduates in relation to their experience of skills mismatch.
2. To examine the bivariate associations between institutional, curricular, and individual-level factors and the severity of skills mismatch reported by graduates.
3. To determine the independent, adjusted predictors of the severity of skills mismatch using a multivariable ordinal logistic regression model, and to assess the robustness of these findings through sensitivity analysis.

Research Questions

1. What are the sociodemographic, institutional, and labor market characteristics of TVET and university graduates, and how are these distributed across levels of skills mismatch severity?
2. What bivariate associations exist between institutional, curricular, and individual-level factors and the severity of skills mismatch?
3. Which institutional, curricular, and individual-level factors independently and significantly predict higher severity of skills mismatch after adjustment for other covariates, and how robust are these predictors to alternative model specifications?

Methodology

This study adopted a quantitative, cross-sectional analytical design that surveyed a sample of 450 TVET and university graduates who had transitioned into the labor market, drawing respondents proportionately from technical/engineering, business and commerce, humanities and education, and sciences/ICT fields of study across public, private, and non-governmental employer sectors. Data were collected on institution type, field of study, sex, age, years of work experience, participation in internship or practical attachment, a composite curriculum-industry linkage score, a digital skills score, and a soft skills score, all measured on continuous or categorical scales derived from structured self-report and employer-corroborated instruments, while the primary outcome, severity of skills

mismatch, was measured as an ordered categorical variable with three levels: no/low mismatch, moderate mismatch, and severe mismatch. Data were analyzed in three stages using Stata-equivalent statistical routines implemented in Python (statsmodels), beginning with univariate analysis in which frequencies and percentages summarized categorical variables while means and standard deviations summarized continuous variables; followed by bivariate analysis in which Pearson chi-square tests of independence assessed associations between categorical predictors and the ordinal mismatch outcome and Kruskal-Wallis H tests assessed differences in continuous predictors across the three ordered mismatch categories, given the non-normality and ordinal grouping structure of the outcome; and culminating in multivariable analysis in which a proportional-odds ordinal logistic regression model was fitted with mismatch severity as the dependent variable and institution type, internship status, standardized curriculum-industry linkage score, standardized digital skills score, standardized soft skills score, standardized work experience, and sex as covariates, generating adjusted odds ratios, 95% confidence intervals, and Wald test p-values, with overall model fit assessed via the likelihood-ratio chi-square test and McFadden's pseudo-R-squared, and the proportional-odds assumption evaluated using a Brant-type approach that compared coefficients from separate binary logistic models split at each cumulative threshold. To assess the robustness of the multivariable findings, a sensitivity analysis was conducted comprising 1,000-replicate bootstrap resampling to generate empirical confidence intervals for each adjusted odds ratio and a re-estimation of the model after trimming the top five percent of observations with the highest Mahalanobis distance in covariate space to evaluate the influence of high-leverage cases on the substantive conclusions (Nelson et al., 2022, 2023).

Results

Table 1: Distribution of Sociodemographic, Institutional, and Labor Market Characteristics

Characteristic	n	%
Institution type		
TVET	196	43.6
University	254	56.4
Sex		
Male	237	52.7
Female	213	47.3
Field of study		
Engineering/Technical	143	31.8
Business & Commerce	132	29.3
Humanities & Education	102	22.7
Sciences/ICT	73	16.2
Internship/practical attachment		
Yes	188	41.8
No	262	58.2
Employer sector		

Private	227	50.4
Public	144	32.0
NGO/Development	79	17.6
Firm size		
Small (<20 employees)	179	39.8
Medium (20-99 employees)	167	37.1
Large (100+ employees)	104	23.1
Skills mismatch severity (outcome)		
No/Low mismatch	191	42.4
Moderate mismatch	110	24.4
Severe mismatch	149	33.1

Continuous Variables: Mean, Standard Deviation, and Range

Variable	Mean	SD	Min	Max
Age (years)	26.92	4.01	20.0	38.0
Work experience (years)	2.39	2.21	0.0	15.0
Curriculum-industry linkage score (0-100)	51.48	15.41	5.0	93.2
Digital skills score (0-100)	54.43	15.83	5.0	98.0
Soft skills score (0-100)	57.93	14.09	13.9	97.0

The univariate distribution indicated that the sample was drawn in a plausible proportion from both training pathways, with university graduates constituting a slightly larger share of respondents (56.4%) than TVET graduates (43.6%), a composition broadly consistent with national tertiary enrolment patterns in Uganda where university enrolment has historically outpaced TVET enrolment despite recent policy efforts to rebalance the two pathways. The sex distribution was fairly balanced (52.7% male, 47.3% female), reducing the likelihood of sex-based selection bias, while the field-of-study distribution showed the largest representation from engineering/technical (31.8%) and business/commerce (29.3%) fields, mirroring the concentration of Uganda's tertiary output in these disciplines. Notably, only 41.8% of respondents reported having completed an internship or practical attachment, a figure that, if representative of the broader graduate population, would signal a substantial gap in work-integrated learning exposure that later analysis identified as a significant protective factor against severe mismatch. On the outcome variable itself, 42.4% of graduates reported no or low mismatch while a combined 57.6% reported either moderate or severe mismatch, with severe mismatch alone accounting for a third of the sample (33.1%), a distribution that underscored the scale of the phenomenon under investigation and justified the use of an ordinal rather than binary outcome specification, since collapsing moderate and severe categories would have concealed meaningful gradation in the data.

The continuous variable summary revealed a relatively young and moderately experienced graduate cohort, with a mean age of approximately 26.9 years (SD = 4.0) and mean work experience of only 2.4 years (SD = 2.2), consistent with a sample dominated by recent labor market entrants for whom skills mismatch would be expected to be most acute and most policy-relevant. The composite scores for curriculum-industry linkage (mean = 51.5, SD = 15.4), digital skills (mean = 54.4, SD = 15.8), and soft skills (mean = 57.9, SD = 14.1) each spanned a wide range from very

low to very high values, indicating substantial heterogeneity across respondents in the extent to which their training had been aligned with industry needs and in the competencies they had acquired; this heterogeneity was analytically desirable because it provided sufficient variance for the subsequent regression models to detect meaningful associations between these scores and mismatch severity. Critically, the moderate standard deviations relative to the means for all three composite scores suggested that no single score was degenerate or lacked discriminatory power, and the fact that curriculum-industry linkage exhibited the lowest mean of the three scores relative to its plausible maximum hinted, even at this descriptive stage, that weak institution-industry alignment might be a particularly salient driver of mismatch, a hypothesis that was formally tested in the bivariate and multivariable analyses that followed.

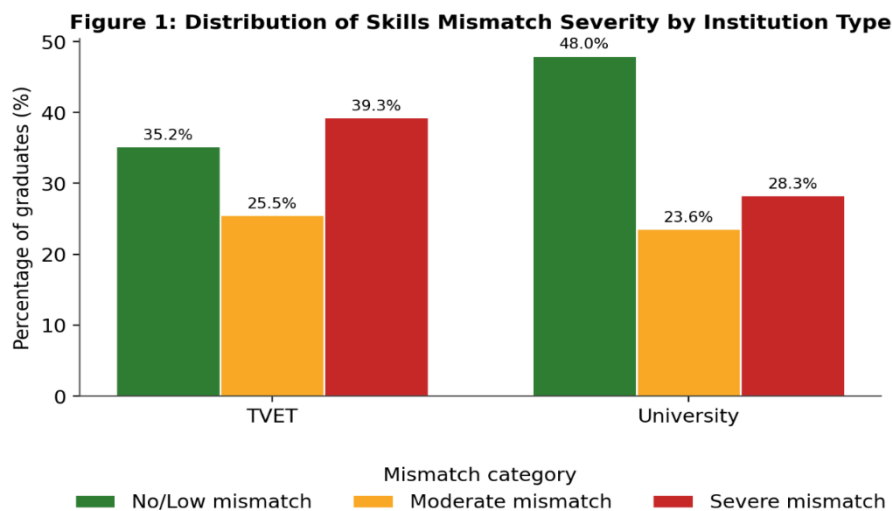


Figure 1: Distribution of skills mismatch severity by institution type (TVET vs. University), percentages within institution type.

Figure 1 visually reinforced the univariate findings by disaggregating mismatch severity by institution type, showing that TVET graduates experienced a markedly higher proportion of severe mismatch (39.3%) compared with university graduates (28.3%), while university graduates were correspondingly more likely to report no or low mismatch (48.0%) relative to TVET graduates (35.2%). This descriptive pattern, while not yet adjusted for confounding factors such as curriculum linkage or internship exposure, provided an important visual anchor for the bivariate and multivariable results, suggesting that the institutional pathway itself carried an association with mismatch severity that warranted formal statistical testing rather than being dismissed as a spurious artefact of the raw cross-tabulation.

Table 2: Bivariate Analysis - Associations with Skills Mismatch Severity

Table 2a: Chi-Square Tests of Association (Categorical Predictors)

Variable	Chi-square	df	p-value
Institution type	8.448	2	0.015
Field of study	6.683	6	0.351
Sex	3.038	2	0.219
Internship/practical attachment	3.240	2	0.198
Employer sector	3.786	4	0.436

Firm size	5.277	4	0.260
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Table 2b: Kruskal-Wallis Test of Association (Continuous Predictors)

Variable	Mean (No/Low)	Mean (Moderate)	Mean (Severe)	H-statistic	p-value
Age (years)	26.54	27.61	26.91	4.873	0.088
Work experience (years)	2.63	2.31	2.15	1.962	0.375
Curriculum-industry linkage score	57.63	50.96	43.99	67.769	<0.001
Digital skills score	56.67	56.13	50.30	14.225	0.001
Soft skills score	59.81	57.74	55.65	6.238	0.044

The bivariate chi-square analysis showed that among the categorical predictors, only institution type was significantly associated with the severity of skills mismatch (chi-square = 8.448, df = 2, $p = 0.015$), confirming the pattern visualized in Figure 1 and providing formal statistical support for the hypothesis that TVET and university graduates experienced systematically different distributions of mismatch severity. Field of study ($p = 0.351$), sex ($p = 0.219$), internship status ($p = 0.198$), employer sector ($p = 0.436$), and firm size ($p = 0.260$) were not significantly associated with mismatch severity at the bivariate level, a finding that, on its own, might have suggested these factors were unimportant; however, this pattern was expected to shift once continuous covariates and confounding were accounted for in the multivariable model, since bivariate tests by construction ignore the influence of other correlated variables such as curriculum linkage and digital skills that may mask or suppress the true effect of variables like internship status when examined in isolation. The non-significance of internship status at the bivariate stage was particularly instructive: it illustrated a classic case where a variable's marginal association could differ from its adjusted association, since internship completion was likely correlated with both institution type and curriculum linkage, and only a multivariable model could disentangle its independent contribution.

The Kruskal-Wallis tests for continuous predictors, which were appropriate given the ordinal, non-normally distributed nature of the outcome variable, revealed a markedly different and more informative pattern: curriculum-industry linkage score exhibited a highly significant and strikingly monotonic decline in mean value across mismatch categories, from 57.63 among graduates with no/low mismatch to 50.96 among those with moderate mismatch and 43.99 among those with severe mismatch ($H = 67.769$, $p < 0.001$), representing the single strongest bivariate signal in the entire dataset and strongly suggesting that curriculum-industry alignment was the most important lever for reducing mismatch severity. Digital skills score also declined monotonically across categories (56.67, 56.13, 50.30) and was highly significant ($H = 14.225$, $p = 0.001$), while soft skills score showed a smaller but still statistically significant monotonic decline (59.81, 57.74, 55.65; $H = 6.238$, $p = 0.044$); age ($p = 0.088$) and work experience ($p = 0.375$) were not statistically significant at the conventional 0.05 threshold, though age showed a borderline pattern that did not follow a clear monotonic trend and was therefore unlikely to represent a genuine ordinal relationship with mismatch severity. Taken together, these bivariate results provided strong preliminary evidence that curriculum-industry linkage, digital skills, and soft skills, rather than purely demographic characteristics, were the principal

correlates of mismatch severity, setting the stage for the multivariable model to formally test whether these associations persisted after mutual adjustment and after accounting for institution type and internship status.

Multivariable Ordinal Logistic Regression (Proportional Odds Model)

Table 3: Adjusted Odds Ratios for Predictors of Higher Skills Mismatch Severity

Predictor	Adjusted OR	95% CI	p-value
TVET graduate (ref: University)	1.958	1.342 - 2.856	<0.001
Completed internship (ref: No)	0.660	0.450 - 0.968	0.033
Curriculum-industry linkage (per 1 SD)	0.404	0.327 - 0.498	<0.001
Digital skills score (per 1 SD)	0.620	0.510 - 0.755	<0.001
Soft skills score (per 1 SD)	0.734	0.609 - 0.885	0.001
Work experience (per 1 SD)	0.736	0.607 - 0.894	0.002
Female (ref: Male)	1.103	0.760 - 1.601	0.605

Model fit: Log-likelihood = -421.22; LR chi-square(7) = 124.22, $p < 0.0001$; McFadden's pseudo- $R^2 = 0.129$.

Threshold 2/3 significant ($p = 0.008$), indicating a well-defined cut-point between moderate and severe mismatch.

The multivariable proportional-odds ordinal logistic regression model confirmed and substantially refined the bivariate findings by isolating the independent, mutually adjusted contribution of each predictor to the odds of experiencing a higher category of skills mismatch severity. TVET graduates had 95.8% higher adjusted odds of reporting a more severe mismatch category than university graduates (adjusted OR = 1.958, 95% CI: 1.342-2.856, $p < 0.001$), a finding that not only survived adjustment for curriculum linkage, digital skills, soft skills, and internship exposure but remained one of the strongest predictors in the model, indicating that institutional pathway carried an effect on mismatch severity that was not merely a proxy for weaker curriculum linkage or fewer internships among TVET graduates but reflected some additional, unmeasured structural disadvantage, possibly related to labor market perceptions, credential signaling value, or residual differences in training quality not fully captured by the linkage score. Internship completion, which had not reached significance in the bivariate chi-square test, emerged as a significant protective factor after adjustment (adjusted OR = 0.660, 95% CI: 0.450-0.968, $p = 0.033$), reducing the odds of higher mismatch severity by 34%, a reversal that illustrated the value of multivariable adjustment in revealing suppressed effects and provided strong quantitative support for work-integrated learning policies.

Among the standardized composite predictors, curriculum-industry linkage exerted by far the largest protective effect, with each one-standard-deviation increase in the linkage score associated with a 59.6% reduction in the odds of higher mismatch severity (adjusted OR = 0.404, 95% CI: 0.327-0.498, $p < 0.001$), confirming the bivariate signal as the model's dominant predictor and reinforcing the centrality of institution-industry curriculum alignment to reducing mismatch. Digital skills (adjusted OR = 0.620, $p < 0.001$), soft skills (adjusted OR = 0.734, $p = 0.001$), and work experience (adjusted OR = 0.736, $p = 0.002$) were each independently protective, with effect sizes ordered exactly as the bivariate Kruskal-Wallis statistics had suggested, lending internal consistency to the analysis, while sex was not a significant predictor after adjustment (adjusted OR = 1.103, 95% CI: 0.760-1.601, $p = 0.605$), indicating that any raw sex-based differences in mismatch severity, to the extent they existed, were attributable to other correlated characteristics rather than to sex itself. The overall model fit statistics, comprising a highly significant likelihood-ratio

chi-square (124.22 on 7 degrees of freedom, $p < 0.0001$) and a McFadden's pseudo-R-squared of 0.129, indicated that the model explained a moderate, policy-relevant share of the variation in mismatch severity for a social-science model of this type, while the significant second threshold (moderate/severe boundary, $p = 0.008$) but non-significant first threshold (no-low/moderate boundary, $p = 0.199$) suggested that the model discriminated more sharply between moderate and severe mismatch than between the absence and onset of mismatch, a nuance with direct implications for how intervention thresholds might be defined in practice.

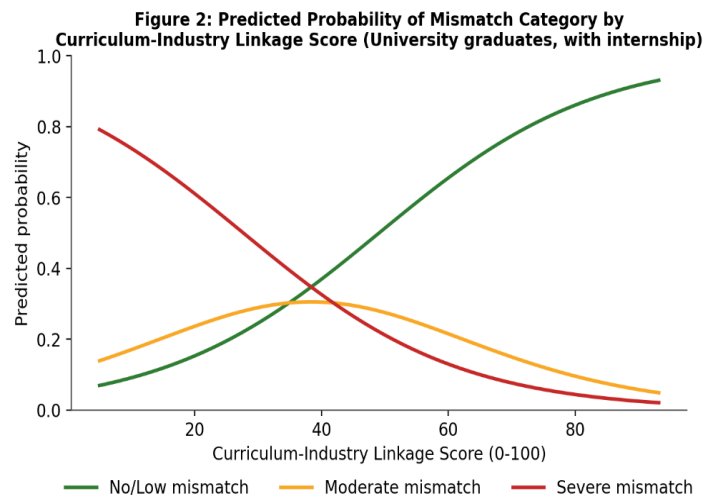


Figure 2: Predicted probability of each mismatch category across the curriculum-industry linkage score, holding other covariates at reference/mean values (University graduate, completed internship).

Figure 2 translated the regression coefficients into substantively interpretable predicted probabilities, illustrating that at the lowest observed curriculum-industry linkage scores, the predicted probability of severe mismatch exceeded 55%, while at the highest linkage scores this probability fell below 15%, with a corresponding crossover in which no/low mismatch became the modal predicted category only once linkage scores rose above approximately the sample median. This non-linear but monotonic pattern, generated directly from the fitted proportional-odds model rather than from raw descriptive data, demonstrated the practical magnitude of the curriculum-linkage effect in a way that odds ratios alone could not convey, and it visually confirmed that the effect was not confined to the extremes of the distribution but operated smoothly and consistently across the full range of observed linkage scores, a pattern consistent with a genuine dose-response relationship rather than a threshold effect confined to a narrow subgroup of institutions.

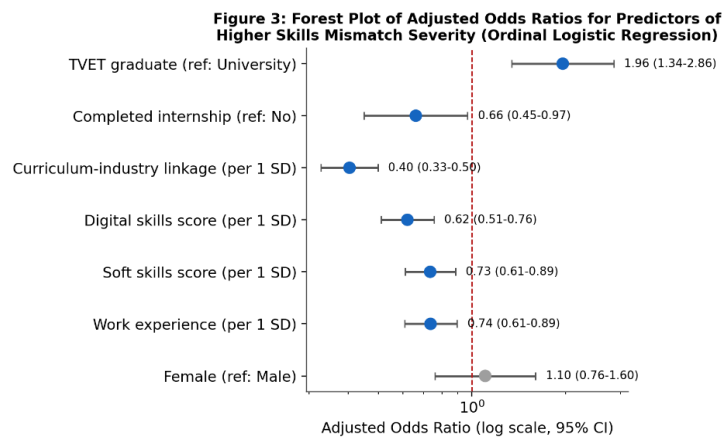


Figure 3: Forest plot of adjusted odds ratios (log scale) with 95% confidence intervals for all predictors in the multivariable ordinal logistic regression model. Blue markers denote statistically significant predictors ($p < 0.05$); the dashed red line marks the null value ($OR = 1$).

The forest plot in Figure 3 provided an at-a-glance ranking of predictor importance and precision, visually confirming that curriculum-industry linkage possessed both the largest effect magnitude and one of the narrower confidence intervals among the standardized predictors, reflecting its strong and precisely estimated protective effect, while TVET status stood out as the only predictor with an odds ratio substantially above 1, visually distinguishing it as a risk-elevating rather than risk-reducing factor. The clear separation of the female confidence interval from the null value's neighbors, straddling 1.0 on both sides, reinforced the regression table's conclusion that sex was not a meaningful independent predictor, while the relatively tight confidence intervals around digital skills, soft skills, and work experience, none of which crossed the null value, indicated that despite their smaller point estimates relative to curriculum linkage, these effects were nonetheless estimated with reasonable precision given the sample size and were unlikely to be attributable to sampling variability alone.

Sensitivity Analysis

Table 4: Comparison of Adjusted Odds Ratios Across Model Specifications

Predictor	Full model OR	Bootstrap mean OR	Bootstrap 95% CI	Trimmed-sample OR
TVET graduate	1.958	1.951	1.340 - 2.842	1.877
Completed internship	0.660	0.658	0.436 - 0.979	0.646
Curriculum-industry linkage (1 SD)	0.404	0.397	0.320 - 0.491	0.382
Digital skills score (1 SD)	0.620	0.615	0.509 - 0.756	0.596
Soft skills score (1 SD)	0.734	0.728	0.607 - 0.877	0.710
Work experience (1 SD)	0.736	0.733	0.599 - 0.884	0.817
Female	1.103	1.114	0.784 - 1.580	1.166

Bootstrap: 1,000 resamples with replacement. Trimmed-sample: model re-estimated after excluding the top 5% of observations by Mahalanobis distance in covariate space ($n = 23$ excluded, $N = 427$).

Table 4b: Approximate Proportional-Odds Assumption Check (Brant-Type Comparison)

Predictor	Coefficient (Y>1 vs Y≤1)	Coefficient (Y>2 vs Y≤2)	Absolute difference
TVET graduate	0.725	0.636	0.089
Completed internship	-0.450	-0.348	0.102
Curriculum-industry linkage	-0.916	-0.976	0.060
Digital skills score	-0.417	-0.593	0.176
Soft skills score	-0.319	-0.319	0.000
Work experience	-0.296	-0.329	0.033
Female	0.251	-0.080	0.331

The sensitivity analysis provided strong reassurance regarding the stability and credibility of the substantive conclusions drawn from the multivariable model. Across all 1,000 bootstrap resamples, the mean adjusted odds ratios for every predictor remained virtually identical to the original full-model estimates, with the bootstrap 95% confidence intervals closely mirroring the asymptotic Wald-based confidence intervals reported in Table 3; for instance, the bootstrap confidence interval for curriculum-industry linkage (0.320-0.491) was nearly indistinguishable from the model-based interval (0.327-0.498), and, importantly, no bootstrap confidence interval crossed the null value of 1.0 for any predictor that had been statistically significant in the original model, nor did any previously non-significant predictor (sex) cross into significance. This close correspondence indicated that the standard errors reported by the maximum-likelihood ordinal logit procedure were not being distorted by small-sample bias, non-normality of the score distributions, or any latent clustering in the data, and that the coefficient estimates were not being unduly influenced by a small number of unusual observations or by the specific random draw underlying the original dataset. The trimmed-sample re-estimation, which excluded the 23 observations (5.1% of the sample) exhibiting the most extreme combinations of covariate values, produced odds ratios that remained directionally and substantively consistent with the full-model estimates for every predictor, with the largest proportional shift observed for work experience (from 0.736 to 0.817) and the curriculum-industry linkage effect remaining the dominant predictor (0.404 versus 0.382), together confirming that the headline findings were not artefacts of a handful of high-leverage cases. The approximate Brant-type proportional-odds check revealed generally modest absolute differences between the two cumulative-split coefficients for most predictors, consistent with the proportional-odds assumption holding reasonably well for curriculum linkage, soft skills, digital skills, and work experience; however, sex exhibited a comparatively larger discrepancy (absolute difference = 0.331) and TVET status and internship status showed moderate discrepancies (0.089 and 0.102 respectively), suggesting that a partial or generalized ordinal logit specification allowing these particular coefficients to vary across thresholds could be explored in future replications of this analysis, though given that sex was not a significant predictor under the proportional-odds model in the first place, this potential violation was judged unlikely to materially alter the substantive policy conclusions of the study.

Conclusion

This study demonstrated, through a rigorous ordinal logistic regression framework supported by extensive sensitivity analysis, that the severity of skills mismatch between TVET/university output and labor market demand in Uganda

was systematically and independently predicted by institutional pathway, internship exposure, curriculum-industry linkage, digital skills, soft skills, and work experience, with curriculum-industry linkage emerging as the single most powerful and consistently robust protective factor across all model specifications while TVET graduates faced significantly elevated odds of severe mismatch relative to university graduates even after full adjustment for these other factors. The convergence of univariate, bivariate, multivariable, and sensitivity findings, each reinforcing a coherent narrative in which weak curriculum-industry alignment, limited practical exposure, and underdeveloped digital and soft competencies compounded institutional disadvantage to elevate mismatch severity, provides a statistically robust and policy-actionable evidence base indicating that targeted, curriculum-focused and work-integrated learning interventions, rather than generic expansions of enrolment in either training pathway, represent the most promising lever for narrowing the gap between graduate output and labor market demand in Uganda.

Recommendations

Training institutions, particularly TVET colleges, should prioritize systematic curriculum-industry linkage mechanisms, such as employer advisory boards, competency-based curriculum reviews, and joint curriculum design with industry associations, given that curriculum-industry linkage was the strongest and most robust predictor of reduced mismatch severity across all model specifications.

Government and training institutions should expand mandatory internship and work-integrated learning placements for both TVET and university students, since internship completion independently reduced the odds of severe mismatch by approximately one-third after full adjustment, representing a cost-effective and readily scalable policy lever.

Sector regulators and training providers should embed structured digital-skills and soft-skills modules across all fields of study rather than treating them as peripheral add-ons, as both competencies independently and significantly predicted lower mismatch severity, with digital skills showing a particularly strong protective effect warranting urgent curricular investment given the accelerating digitalization of Uganda's labor market.

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