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The Mediating Role of Industry Partnerships in the Relationship between Practical Skills Outreach and TVET Teaching Quality in Uganda

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Abstract **Introduction:** Today, acquiring skills through TVET is not enough; there is a need to identify the market within communities, with the aim of delivering multiple benefits for trainees, trainers, industry, and TVET institutions. This study explores the mediating role of industry partnerships in the relationship between practical skills outreach and TVET teaching quality in Uganda.

Methods: The study used a cross-sectional observational design. The study sites were Nyamitanga VTI and Rwentanga Farm Institute in Western Uganda, as well as Sesse Farm Institute in Central Uganda. A quantitative approach was used, with a structured questionnaire administered and later digitized in the Kobo Collect toolbox. The analyses were done in JASP version 0.98.1. Descriptive statistics and mediation analysis were conducted.

Results: Results from the mediation analysis show that industry partnerships strongly mediate the relationship between practical skills outreach and quality teaching in TVET. Therefore, without proper industry exposure, collaborations, innovations, and strong teamwork, the practical skills outreach may not impact the quality of teaching effectively.

Conclusion: Outreach programmes create a mutual win-win situation among the three players: trainees, industry, and TVET institutions. TVET institutions must introduce outreach programmes in their curriculum to enhance their teaching effectiveness through industry partnerships. These programmes enable the institution to gain reputation and prestige; trainees gain both field and institutional skills as well as create immediate employment, while the industries benefit through innovations.

Keywords TVET, practical skills outreach, industry partnerships, quality teaching, mediation

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1. Introduction

For most institutions, the idea of introducing outreach strategies in their programs only seems possible in the distant future, but in some TVET institutions and farm institutes in Uganda, this reality is not far away. Except for Technical Vocational Education and Training (TVET) institutions, outreach program strategies have been enormously embraced by universities. Makerere University, Islamic University in Uganda, and many other higher learning institutions were highlighted by [Kisambira et al. \(2024\)](#) as institutions that have well-established coordination units to assist communities. [Amutuhair \(2023\)](#) mentioned that it is a legal mandate for higher learning institutions to develop solutions for existing and emerging problems in society, stipulated by the University and Other Institutions Act. [Atusingwize et al. \(2020\)](#) cited university outreach programs such as One Health Innovation Club and field placements in Makerere University as focal in participating in hands-on community engagement activities, including mass vaccinations of animals in response to zoonotic outbreaks. [Kaye et al. \(2011\)](#) commends university involvement in outreach programs, especially immunization programs, health promotion programs, community diagnosis and sensitization programs. U.S. land-grant universities were built around community involvement, and many universities now explicitly include outreach in their mission ([Irrázaval, 2020](#)). Other universities run outreach in many forms rather than one standard model: K-12 engineering activities, teacher development, service-learning, community planning, health literacy, refugee inclusion, museum partnerships, and counseling-center prevention programs all appear in the evidence ([Jeffers et al., 2004](#); [Restini et al., 2024](#)). Some institutions have embedded outreach directly into coursework or degree expectations, such as mandatory experiential-learning courses and service-learning requirements in medical education ([Schaffer, 2021](#)). This study defined outreach as a process where TVET students, through practical skills outreach accompanied by their trainers, take their expertise and reach out to the communities or industry sites to directly interact with the locals, identify problems relating to the skills taught, and find solutions on a free, in-kind payment, or cash basis in a bid to expand their knowledge.

Outreach programs bring fresh benefits to TVET. Outreach programs, if managed well, create a ready market for the trainees. They would no longer have to travel long distances to find where to place their skills since communities already have existing issues to be solved. Outreach also creates a solid reputation for the TVET institution. Most parents wish to have their children acquire the skills that are overly demanded to create a difference in incomes. ([Narsico et al., 2024](#)). Outreach programs cannot be run solely by TVET institutions; development partners willing to invest heavily in production would also welcome the opportunity to participate in practical skills training outreach ([Putra, 2023](#)). TVET outreach can increase access to training pathways, especially for disadvantaged or underrepresented learners, by improving awareness, easing school-to-work transitions, and widening participation and equity ([Shi & Bangpan, 2022](#)). Outreach and related bridge activities can support smoother transitions into VET through internships, mentoring, vocational orientation, and improved credentials, which are associated with more stable entry into training ([Busse & Maué, 2025](#)). Some outreach-linked training also strengthens entrepreneurial interest and self-employment potential, with greater exposure associated with a higher inclination to pursue entrepreneurship ([Mack et al., 2021](#)). In Uganda, the TVET outreach programs face several challenges that hinder their effectiveness and efficiency. Some of the challenges include low public perception and awareness, low participation and completion rates, gender disparities, inadequate infrastructure and equipment, insufficient and unqualified teachers, and limited funding and financing mechanisms ([McGrath & Russon, 2023](#)). These challenges affect the quality, relevance, and accessibility of TVET and limit its impact on the socio-economic development of the country. According to the Technical and Vocational Education and Training Act, 2025 (as cited on page 61 of the Act), some of the core functions of TVET are to identify the needs of the labor market for occupational competences. Labor market identification therefore cannot be done by individual trainees. All the relevant stakeholders, such as the TVET institutions, the trainees, and the industries, must converge to create a change. In addition, Sustainable Development Goal 4 emphasizes the need for quality education, which also speaks to Target 4.3 that seeks to ensure equal access to affordable education and quality technical, vocational, and tertiary education ([Indicators, 2020](#)). Also, Target 4.4 aims to substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship ([Indicators, 2020](#)). Despite the importance of outreach programs, there remains a paucity of evidence on how it influences effective TVET teaching in Uganda. Existing studies point to collaboration between TVET trainers and the workplaces ([Arinaitwe, 2021](#)). Some have looked at industry partnership as a powerhouse for the quality of training in TVET ([Muhwezi et al., 2025](#)), while [Sempala and Kisilu \(2025\)](#) examined the training needs identification. No study links outreach program strategies to the quality of TVET teaching as mediated by industry partnerships. Therefore, this study investigates the mediating role of industry partnerships in the relationship between outreach program strategies and TVET teaching among the TVET institutions in Uganda.

2. Methods and Materials

2.1 Study Design

This study employed an observational design. Particularly, a cross-sectional design was utilized to evaluate the connection between outreach program strategies and the quality of TVET teaching as mediated by industry partnerships. The study involved observing both exposures, such as practical skills outreach, and the study outcomes, such as the skills acquired, the monetary benefits to the trainees, the shared learning between communities and the trainers, and mutual collaboration. Industry partnerships involved different government ministries, agencies, and departments such as the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), National Agricultural Research Organization (NARO), and many others, organizing events and exhibitions to display new innovations from the students so that they can identify potential and marketable products.

2.2 Study Setting

This study was conducted in three TVET institutions in Uganda. These were Nyamitanga Vocational and Technical Institute (VTI), located 4km from Mbarara City; Rwentanga Farm Institute, located in Bubaare sub-county in Western Uganda; and Sesse Farm Institute, located at Kalangala Bugala Islands in Lake Victoria. These institutions were selected to provide a diverse array of TVET institutions in Uganda. Nyamitanga VTI represented the most typical TVET institutions in the country, while Rwentanga and Sesse Farm Institute represented the agricultural training institutions. While outreach was found to be more inclined to the farm institute due to the regular visits conducted by the trainees to the farms, Nyamitanga stood out amongst other conventional TVET institutions that send out the trainees and audit their operations back and forth. Although the broader study examined a range of outreach programmes implemented by TVET institutions, including soft skills training, equity-focused initiatives aimed at reaching underserved groups, and industry collaborations that strengthen links between training institutions and employers, this paper focuses specifically on practical skills outreach. These activities involved hands-on training, demonstrations, and community-based learning experiences in which participants acquired practical technical skills while interacting directly with instructors and trainees. Practical skills outreach was the focus of this study because it is a central component of TVET, providing opportunities to apply classroom knowledge in real-life settings while supporting community development through skills transfer.

2.3 Sampling Procedure

The participants in this study were selected by a random sampling procedure. Particularly, stratified sampling was employed to group participants who were taking on various outreach programs at the TVET institutions. This was done to ensure a balanced and unbiased selection of participants in the study. In addition, the stratification enabled an understanding of the trades and fields that embraced outreach programs and the frequency of the take-up of the program. The attributes that attracted stratification were sex of participant, the TVET program/field and the TVET institution.

A sample size of 269 was used. The sample size was calculated by the Taro Yamane sample size formula. Approximately 26,680 candidates who successfully completed their TVET courses in the Nov/Dec 2024 exams were considered as the finite population size. The margin of error of 6.1% was used. (This was considered suitable since most large survey take a minimum of 10%). Feeding these into the sample size formula gave a sample size of 269 participants considered for quantitative data analysis. A response rate of 100% was achieved. This was due to the overwhelming number of TVET institutions which are embracing the outreach programmes as a new strategy for market and creating new skills in a highly competitive world.

2.4 Data Collection

Data were collected using a structured questionnaire administered to trainees in the selected TVET institutions. The questionnaire was designed to gather information on participants' experiences of practical skills outreach programmes, including their implementation, participation, and perceived contribution to skills development. This ensured consistent data collection across all study sites and facilitated quantitative analysis. The study used an interviewer-administered questionnaire. The questionnaire was first designed in MS Word and then later digitized on an online data collection survey platform called the Kobo Collect Toolbox. This survey platform enabled quick data collection using mobile phones, eliminating time wastage in data entry, data cleaning, and validation, which is typical with manual questionnaires. In addition, this process ensured that the data collected is downloadable in easily

analyzable formats. In particular, the data collected were downloaded in Ms. Excel format, which allowed easy access to all entries and an opportunity to confirm the cells and the number of observations and variables. Later, the data were imported into JASP version 0.98.1 for data analysis.

2.5 Instrument validation

The questionnaires were validated in several ways. The intrinsic validation was through strict supervision by university supervisors and the use of master study questionnaires. Additionally, the study conducted both convergent and divergent validity tests using the confirmatory factor analysis results. The convergent validity value of 86.7%, accompanied by the divergent validity value of 56.7%, shows evidence of external validity of the tests. Taken together, this implies that the questionnaire measured the constructs it was meant to measure. In addition, TVET teaching quality, practical skills outreach, and industry partnerships obtained reliability values of Cronbach's alpha of 0.8931, 0.8279, and 0.6461, respectively. This signaled higher reliability of the instrument used in the study.

2.6 Measurement of variables

The dependent variable was TVET teaching effectiveness. This was measured using 10 items rated on a 5-point Likert scale. These items contained statements relating to whether outreach enhanced understanding of course content, linked theoretical and practical skills, strengthened interaction between TVET institutions and communities, promoted mutual learning between students and communities, addressed real community needs, enhanced skills, and improved overall quality of TVET teaching. Participants rated the statements from 1-5, 1 for strongly disagree and 5 for strongly agree. The sum of the statements gave a picture of the overall mood of the participants with regard to the statements. The summed scores represented each construct/dimension. This process was done for all other variables in the study, including the outreach programs. This allowed the quantification of the ordinal values to integers to allow correlational and regression analysis. This approach has been approved and utilized by a variety of previous scholars (Koo & Yang, 2025; Liddell & Kruschke, 2018). For instance, Boone Jr and Boone (2012) noted that a Likert scale is composed of four or more Likert-type items combined into a single composite score/variable is fit for analytical procedure such as Pearson tests, t-tests, ANOVA, and regression modelling.

2.7 Data Analysis Technique

This study used JASP version 0.98.1 to estimate the mediation model. The model examined the effect of practical skills outreach (X) on quality teaching (Y), with industry partnership (M) specified as the mediating variable. The mediation model was estimated using the following regression equations:

Mediator model (effect of practical skills outreach on industry partnership):

$$M_i = \alpha_0 + aX_i + \varepsilon_{1i} \quad (i)$$

Outcome model (effect of practical skills outreach and industry partnership on quality teaching):

$$Y_i = \beta_0 + c'X_i + bM_i + \varepsilon_{2i} \quad (ii)$$

Total effect model (overall effect of practical skills outreach on quality teaching):

$$Y_i = \gamma_0 + cX_i + \varepsilon_{3i} \quad (iii)$$

The indirect (mediated) effect of practical skills outreach on quality teaching through industry partnership is:

$$\text{Indirect Effect} = ab$$

The relationship between total, direct, and indirect effects is:

$$c = c' + ab$$

where M represents industry partnership, X denotes practical skills outreach, Y represents quality teaching, α_1 estimates the effect of practical skills outreach on industry partnership (path a), β_1 estimates the effect of industry partnership on quality teaching while controlling for practical skills outreach (path b), and c' represents the direct effect of practical skills outreach on quality teaching. The indirect effect of practical skills outreach on quality teaching through industry partnership was estimated as $a \times b$, while the total effect was computed as $c = c' + (a \times b)$.

2.8 Ethical considerations

The study obtained research ethics committee approval from the Uganda Christian University (UCUREC) and later processed for the research registration certificate from the Uganda National Council of Science and Technology (UNCST), the Permanent Secretary, Ministry of Education and Sports, Uganda, and finally, the principals of the TVET institutions where the study was carried out. The second ethical consideration is that of confidentiality and anonymity. This is where the researcher explained to the participants their rights and the nature of their participation. During data collection and report writing, the confidentiality of the participants was maintained by keeping all the information confidential and anonymous using pseudonyms to maintain their anonymity. In addition, another ethical consideration that was considered was that of getting informed consent from the participants. Before data collection, participants were informed of the study's intentions and the elements of research, after which they were requested to sign the consent form. Lastly, the ethical consideration that was considered is that of reciprocity. This is done by making sure that the study report is made available to the institutions, participants, and stakeholders who participated in the study. In summary, the study obtained due permission, maintained confidentiality and anonymity, secured informed consent, and ensured reciprocity in sharing reports.

Results

The descriptive analyses were conducted to find out the age of trainees, the number of outreach programs they have been involved in, their average outreach program score obtained in the assessment, and the distance covered between the outreach site and the TVET institution.

Table 1. Descriptive statistics

	Mean (arithmetic)	Std. Deviation	Minimum	Maximum
Age of trainees	20.72	1.970	18.00	40.00
Number of outreaches	3.817	6.245	1.000	40.00
Student outreach score	87.00	9.967	47.00	100.0
Insti outreach score	80.08	12.66	7.000	100.0
Distance outreach	1.966	0.8865	1.000	3.000

Primary Data Collection, 2026

According to Table 1, the trainees were, on average, 21 years of age. Each of them reported having been to close to 4 different outreach sessions during their training. Based on the outreach readiness score, the trainees scored an average of 87%. The worst trainee had 47%, and the best had 100%. On the other hand, the overall institution preparedness for the outreach program was, on average, 80%, ranging between 7 and 100% for the worst and best institutions. The trainees reported trekking approximately 2 km between their TVET institutions and the field/farm visits to conduct outreach.

What is the primary focus of outreach programs?

The study sought to identify the vital focus of the TVET outreach programs. This was meant to find out if its implementation was biased by stakeholder preferential advantage. Table 2 shows the reported benefits of the outreach programmes.

Table 2. Primary focus of outreach programs

focus_outreach	Frequency	Percent	Valid Percent	Cumulative Percent
all the above	16	5.9	6.0	6.0
community service	18	6.7	6.8	12.8
industry exposure	20	7.4	7.5	20.4

skills training	211	78.4	79.6	100.0
Missing	4	1.5		
Total	269	100.0		

Primary Data Collection, 2026

Table 2 shows that an overwhelming proportion (78%) of participants reported skilling training being the primary focus of the outreaches conducted by their institutions. A smaller proportion of the participants believed that the outreaches were for offering community services, while some reported that the programs were targeting industrial exposures. The belief that outreach programs at TVET institutions are solely for skilling purposes opens a door for a significant setback in the quality of teaching. Outreach programs are meant to mutually benefit the trainees in terms of skills, the trainers in terms of acquisition of new forms of doing things, and the institution's prestige and credibility. Further analysis, as seen in Figure 1. Shows that the most common trades/fields that have fully embraced outreaches are agriculture and a little bit of automotive. This leaves a wider window of opportunity for marketing other trades for economic sustainability and relevance.



Slightly more males than females reported agriculture as the highest field to fully adopt outreach programs and embed them in their curriculum as a learning environment.

Mediation Analysis

Table 3 shows the role of the practical skills outreach program strategy on the quality of teaching in TVET, as mediated by industry partnerships.

Mediation Model Output

Table 3. Mediation Analysis Model

Direct effects

							95% CI	
							Lower	Upper
PS	→	teaching	0.5035	0.05314	9.475	< .001	0.4003	0.6096

Note. Estimator is ML.

Indirect effects

Direct effects

					95% CI	
					Lower	Upper
					95% CI	
					Lower	Upper
	Std. es	Std. error	z-value	p		
		Std. est	Std. error	z-value	p	
PS → IP → teaching	0.223	0.039	5.609	< .001	0.1431	0.2984

Note. Estimator is ML.

Total effects

					95% Confidence Interval	
					Lower	Upper
	Std. est	Std. error	z-value	p		
PS → teaching	0.7266	0.03207	22.66	< .001	0.6630	0.7882

Note. Estimator is ML.

Primary Data Collection, 2026

What stands out in the table is that the practical skills strategy alone significantly impacts quality teaching in TVET. The direct effect of practical skills outreach on quality teaching was positive and statistically significant (coef = 0.5035; p-value < 0.05; CI: 0.4037–0.6038). This result indicates that a one-unit rise in practical skills outreach leads to about a 0.5035 rise in teaching at TVET. This implies that practical skills outreach substantially enhances the skill set of the trainees. Introducing industry partnerships drags the coefficient of practical skills on the quality of teaching down to 0.2231 from 0.5035. This suggests that having industry partnerships as a link between practical skills and quality teaching divides the benefits of outreach programs from just skills-based to a diverse range of other benefits such as exposure, reputation, innovation, and collaboration. This is evidenced further by the effect of the combination of practical skills outreach and industry partnerships. When industry partnerships were collectively assessed, the effect size grew from 22% to about 72%, exemplifying the role of industry partnerships in mediating the relationship between practical skills outreach and quality of teaching in TVET.

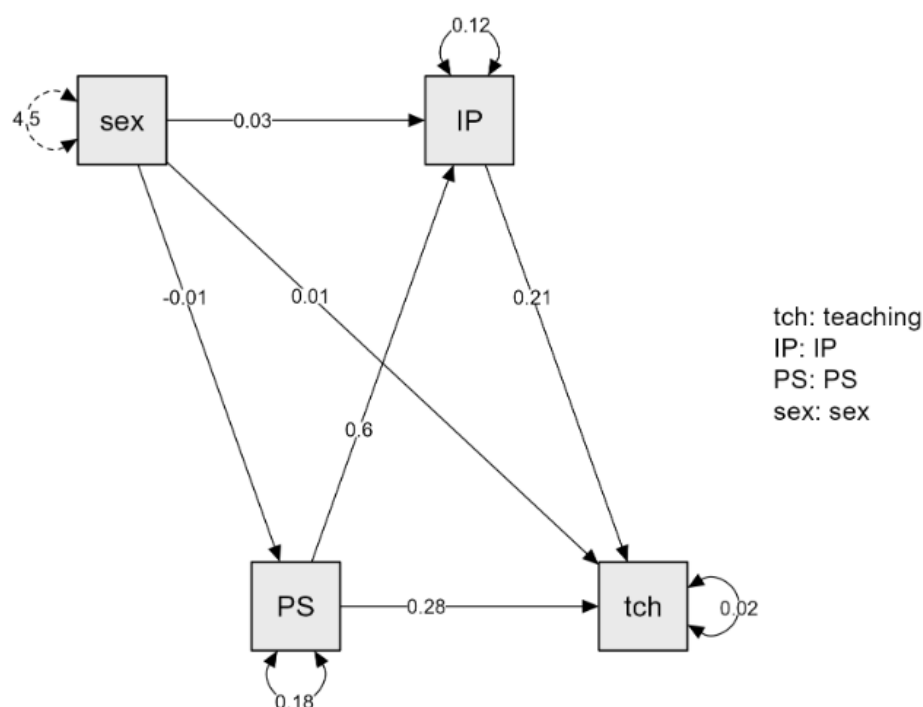
Diagnostic Tests and Model Fit Indicators*R-Squared*

	R ²
teaching	0.9784
IP	0.8785
PS	0.8153

The three models reveal interesting insights. The overall model of quality teaching generated a coefficient of determination, R² of approximately 98%, while the resultant models, direct and indirect, had 82% and 88%, respectively. This suggests that considering one outreach programme, whether practical skills or industry partnership,

does not yield an impact large enough to create successful TVET teaching, but a combination of these outreaches generates an overwhelming impact of 97%.

Path Coefficient Plot



The path plot shows the confounder adjustment effect of sex on the quality of teaching effectiveness. Of all the considered factors, practical skills show a much greater effect on quality teaching (0.28), while industry partnership follows with a 0.21 effect.

Conclusions

This study reveals that practical skills outreach serves as a powerful driver of quality teaching in Technical and Vocational Education and Training (TVET). Far from operating in isolation, its influence unfolds most effectively when connected to the wider ecosystem of industry partnerships. Rather than a simple, direct pathway, the relationship tells a richer story: practical skills initiatives lay a strong foundation, yet their true potential is unlocked and amplified when bridged with meaningful collaboration from industry.

At its core, the study demonstrates that investing in practical skills outreach meaningfully elevates the quality of teaching and, by extension, the preparedness of TVET trainees. Instructors and institutions that actively pursue hands-on skill development create immediate and tangible improvements in teaching effectiveness. However, the findings also illuminate an important nuance. When industry partnerships enter the picture, the pathway becomes more dynamic. What begins as primarily skills-focused outreach evolves into something broader and more multifaceted. Industry linkages transform the benefits, extending them beyond pure technical proficiency to include real-world exposure, enhanced institutional reputation, fresh innovation, and deeper collaborative opportunities. In this sense, industry partnerships do not merely supplement practical skills efforts; they mediate and expand their impact, creating a more holistic and potent effect on teaching quality.

This mediated relationship carries significant implications for TVET systems. It suggests that policymakers, institutional leaders, and educators should move beyond standalone skills programs toward integrated models that deliberately cultivate strong industry ties. Partnerships appear to act as a vital bridge, helping translate practical training into more relevant, responsive, and impactful teaching practices. For trainees, this means not only acquiring technical competencies but also gaining exposure to industry expectations, networks, and ways of working, advantages that better prepare them for the realities of the workplace.

Ultimately, the study reveals a clear message: strengthening quality teaching in TVET requires both robust practical skills outreach and strategic industry collaboration. The two work in concert, with partnerships serving as a powerful mechanism that channels and magnifies the value of skills development. By embracing this interconnected approach, TVET institutions can foster teaching excellence that is both deeply practical and forward-looking.

While this research contributes a clearer understanding of these dynamics, it also opens avenues for further exploration. Future studies could examine how different types of industry partnerships vary in their mediating strength, or how contextual factors such as regional economies and institutional capacity shape these relationships. Nevertheless, the present findings offer a compelling foundation for action.

Limitation of cross-sectional mediation analysis

The authors declare that, despite the ability of the mediation model to predict the mediation effect of one factor, it is not without limitations. Previous studies indicate that cross-sectional sample data can erroneously show support for mediation effects when no true mediation process exists in the population (Fairchild & McDaniel, 2017; Maxwell et al., 2011).

Conflict of Interest: None declared.

Ethical Approval: Not applicable.

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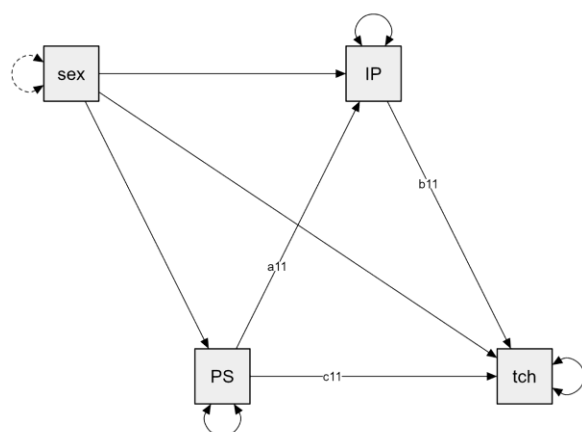
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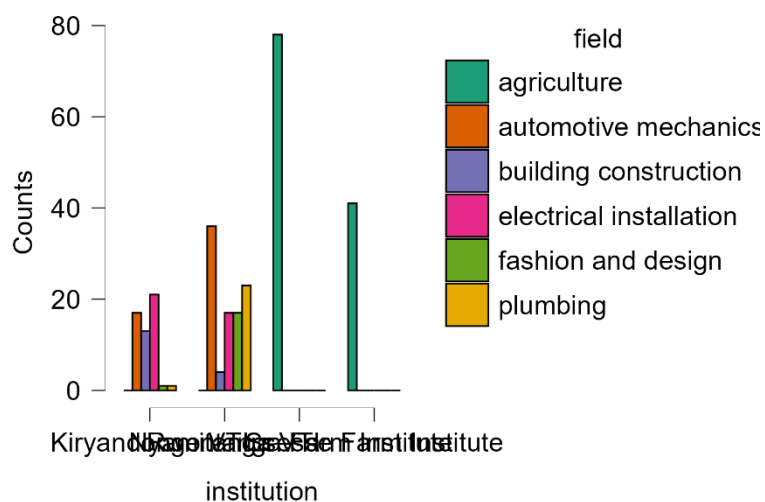
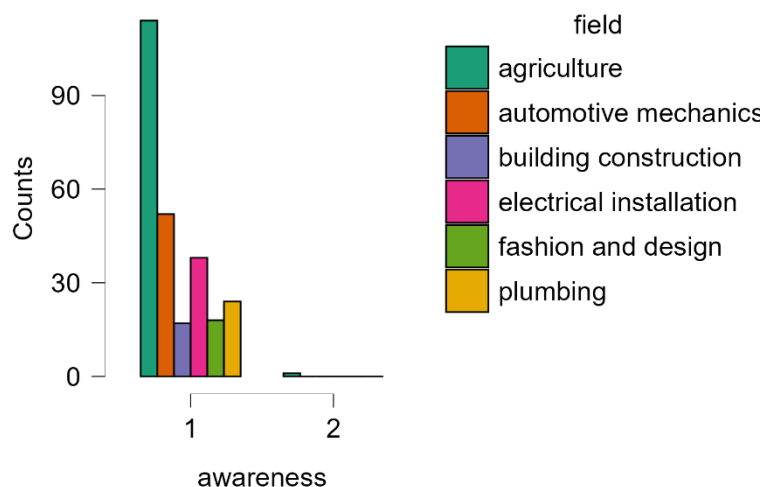
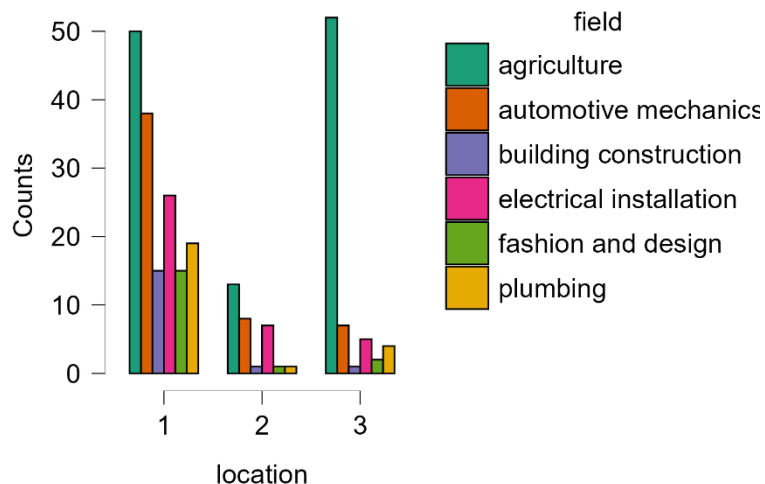
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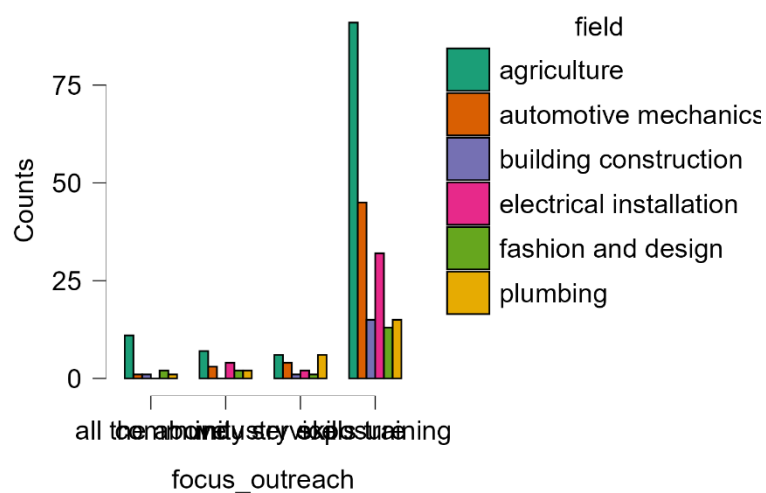
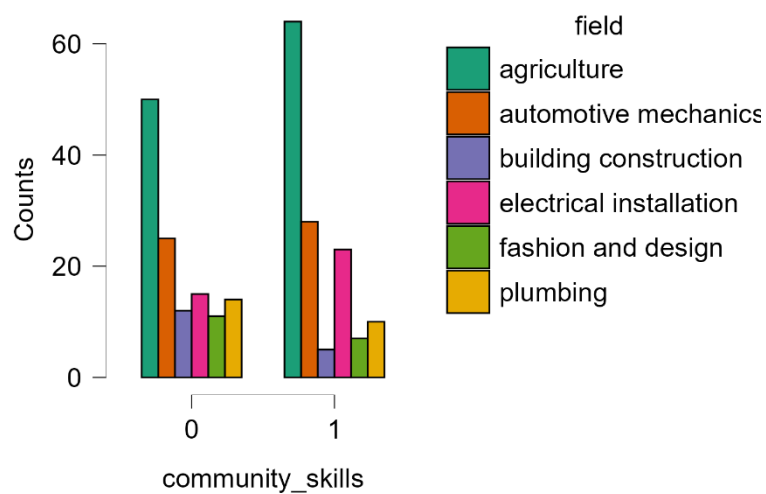
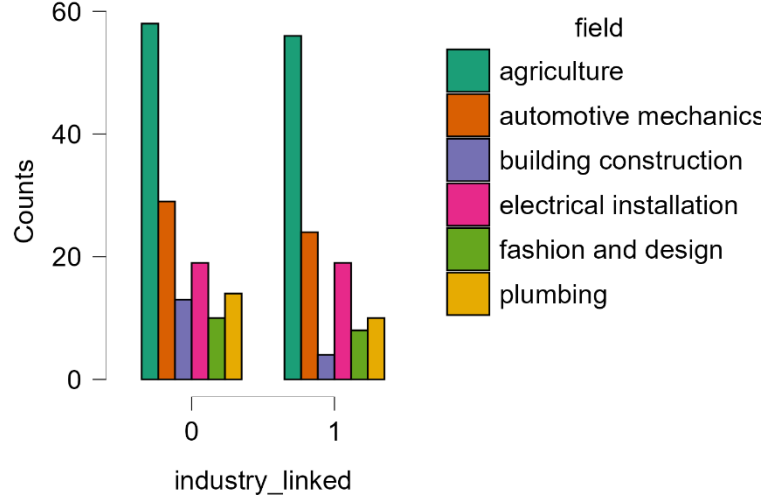
Path plot

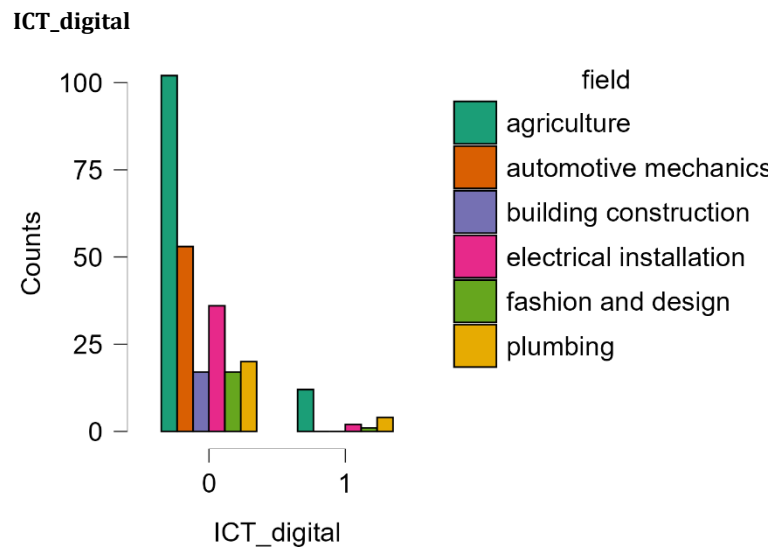


sex



institution**awareness****location**

focus_outreach**community_skills****industry_linked**



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