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Research Article

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Technology Acceptance and Employability in TVET Graduates

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Abstract

In the quickly changing digital landscape, integrating technology into Technical and Vocational Education and Training (TVET) curricula has become increasingly important. The acceptance and incorporation of technology into TVET programs has emerged as a crucial factor of educational quality and workforce preparedness in a time of fast technological innovation. This study examines the crucial connection between employability, acquiring digital skills, and embracing technology in the context of technical and vocational education and training (TVET). The ability of TVET graduates to embrace and utilize digital technology substantially influence their prospects in the job market in a world marked by rapids technical. This study intends to evaluate how graduates' employability and success in finding jobs are impacted by the degree of technology acceptance and the digital skills acquired during TVET programs. A mixed-methods research approach is used to collect empirical data, including surveys, interviews, and focus groups with recent TVET graduates, employers, and industry experts. Regression analysis and other quantitative approaches were combined with qualitative methods during the data analysis process to provides a thorough knowledge of the intricate relationships being studied.

Keywords: Technology Acceptance, Digital Skills, Employability, TVET, Higher Education, Job Market

1. Introduction

Ability to effectively use technology and adapt to digital environments has become a vital capability for those entering the profession in an era characterized by rapids technical breakthroughs and digital transformation across industries [1-2]. These requirements are especially important for graduates of Technical and Vocational Education and Training (TVET) programs who want to close the knowledge gap and close the job gap in fields that depend more and more on digital tools and procedures. As a result of the digital revolution, TVET programs, which were formerly created to provide students with the practical skills they need for particular crafts and professions, have been forced to change. A high level of technology acceptance, which is defined as the readiness and capacity to embrace and effectively utilize technological innovations in educational and professional contexts, is a requirement for TVET graduates in today's industries, in addition to having specialized technical skills [3]. This study aims to explore the intricate relationships between TVET graduates' employability, digital skill acquisition, and use of technology. There is a lack of empirical research that rigorously assesses how graduates' success in securing gainful employment in the digital age is directly influenced by their level of technology acceptance and proficiency in digital skills, despite the fact that previous studies have extensively examined factors affecting employability in the context of education and the impact of technology on education [4]. Understanding the complex processes at play at this juncture is key to this study's purpose. It attempts to clarify if TVET graduates with higher levels of technology adoption and proof of digital skill competency are better prepared for labor market success. It also aims to examine the barriers preventing TVET graduates from embracing technology and to Identify specific digital competencies that employers find most valuable. Finally, it offers suggestions for how educational institutions can better prepare students for navigating the rapidly changing digital landscape.

This research aims to inform TVET institutions and policy stakeholders on the critical elements of preparing graduates for the modern job market by shining light on the linkages between technology acceptability, digital skills, and employability outcomes. By doing so, it adds to the continuing discussion about how vocational education can match up with the demands of the digital workforce and improve the employability of its graduates.

This study addresses a notable research gap by investigating the influence of technology acceptance and digital literacy on employability among graduates of Technical and Vocational Education and Training (TVET) programs. Additionally, it delves into the challenges that these graduates face when adopting and integrating technology into their professional lives. As Davis (1989) highlighted, perceived ease of use and perceived usefulness significantly impact technology acceptance. Moreover, stressed the importance of digital skills encompassing digital literacy and proficiency in various digital tools [5]. By drawing upon the work of and, this study aims to contribute to the existing body of knowledge regarding the intricate connections between technology acceptance, digital literacy, and employability outcomes among TVET graduates [3, 6]. Recognizing the critical role technology acceptance plays in the employability of TVET graduates, the study seeks to offer insights into their readiness and capacity to effectively utilize technological innovations in their educational and professional contexts.

Furthermore, in line with the findings of, graduates with higher technology acceptance levels are expected to demonstrate greater confidence and adaptability in using technology tools and platforms, attributes highly value by employers [7]. The study also acknowledges the barriers Identified by, including limited access to technology resources and the digital devise, which can hinder technology adoption among TVET graduates [3]. Ultimately, this research aspires to contribute to the ongoing discourse on how vocational education can align with the demands of the digital workforce and enhance the employability prospects of TVET graduates (Silva, n.d.), thereby better preparing them for success in the rapidly evolving digital economy.

2. Theoretical Support

The Technology Acceptance Model (TAM) developed by serves as a foundational framework for understanding individuals' acceptance and use of technology [8]. According to, perceived ease of use and perceived usefulness are critical determinants of technology adoption [9]. In the context of TVET, the readiness of graduates to embrace digital tools and processes aligns with the TAM principles [10]. Recent research by extended TAM to the Unified Theory of Acceptance and Use of Technology (UTAUT), highlighting the role of external factors such as social influence and facilitating conditions [11]. UTAUT emphasizes the importance of contextspecific factors that influence technology acceptance, a concept highly relevant to TVET graduates' integration of digital skills into their careers.

The acquisition of digital skills is integral to employability in the digital age argue that advances in digital technology have resulted in a shift in the labor market, with a growing demand for employees who possess not only technical skills but also digital literacy and adaptability [1]. The World Economic Forum's Future of Jobs Report () emphasizes the significance of digital skills in the workplace and identifies specific skills such as data analysis, digital literacy, and problem-solving as essential for employability. These findings underscore the importance of TVET programs incorporating digital skills into their curricula to align with evolving job market requirements [12]. As TVET programs traditionally focused on imparting practical skills for specific trades, they now face the challenge of adapting to the digital transformation of industries [6]. The concept of digital readiness, which encompasses not only technical skills but also a willingness to embrace technology, aligns with the evolving role of TVET in equipping graduates for digitally-driven careers [3, 13-14].

3. Methodology

The goal of the research model for this study is to determine how graduates of Technical and Vocational Education and Training (TVET) programs fare in terms of technological acceptability, digital skills, and employability. The Technology Acceptance Model (TAM) by and the idea of digital competence serve as the theoretical foundations for this model, which asserts that graduates' employability and success in the job market are significantly impacted by technology acceptance and digital skills acquired during TVET programs[11, 15].

3.1. Variables

Technology Acceptance (TA): These variable measures the degree to which TVET graduates accept and adopt technology in their educational and professional contexts. It is influenced by perceived ease of use and perceived usefulness [11].

Digital Skills (DS): Digital skills encompass a range of competencies, including digital literacy, information technology proficiency, and the ability to use digital tools and platforms effectively [15] This variable assesses the level of digital skills acquired by TVET graduates during their programs.

Employability Outcomes (EO): Employability outcomes encompass various indicators of graduates' success in the job market, including job placement, job retention, and job performance.

3.2. Hypotheses:

3.2.1. Independent Variables

Digital Skills (DS): Digital skills encompass a range of competencies, including digital literacy, information technology proficiency, and the ability to use digital tools and platforms effectively [15].

Perceived Ease of Use (PEU): This variable represents the extent to which individuals perceive that using technology will be free of effort [8]. It's an essential element of TAM, influencing technology acceptance.

Perceived Usefulness (PU): Perceived usefulness is another key variable within TAM. It reflects the degree to which individuals believe that using technology will enhance their job performance 8] This research will be examining the relationships between PEU, PU, Digital Skills, and how these factors collectively impact Employability Outcomes (EO) among TVET graduates. These variables together contribute to a comprehensive understanding of

technology acceptance in your study.

3.2.2. Dependent Variables

Employability Outcomes (EO): Employability outcomes encompass various indicators of graduates' success in the job market, including job placement, job retention, and job performance. This is the primary dependent variable in this study.

3.3. Research Design

This study employs a mixed-methods research design to investigate the relationship between technology acceptance, digital skills, and employability among TVET graduates. Quantitative data is collected through surveys, while qualitative insights are gathered through semi-structured interviews with TVET graduates, industrial experts and employers.

3.4. Participants

The study's participants include recent graduates (within the past five years) of TVET programs and employers from diverse industries. A stratified sampling method is used to ensure representation across different TVET disciplines and employment sectors.

3.5. Data Collection

Survey Questionnaire: A structured questionnaire, adapted from prior technology acceptance and employability research, is administered to TVET graduates. The survey includes the following components:

Technology Acceptance: A modified version of the Technology Acceptance Model (TAM) questionnaire [8] is used to assess participants' perceptions of technology acceptance. Digital Skills Assessment: Graduates are asked to self-report their proficiency in various digital skills, including software usage, digital communication, and information literacy.

Employability Factors: Graduates are quired about their job-seeking experiences, including job search strategies, networking activities, and employment outcomes.

Semi-Structured Interviews: Qualitative data is collected through semi-structured interviews with TVET graduates, employers and industrial experts. The interviews explore in-depth experiences related to technology acceptance, the role of digital skills in the workplace, and perceptions of employability. Interviews are audio-recorded and transcribed for analysis.

4. Results

This section discusses the statistical analysis from the findings of this initiative prior to moving the structure equation modeling (SEM), section. Out of 300 total distributed questionnaires, 100 for facilitators and 200 for TVET graduates, 140 for the TVET graduates and 100 for the TVET facilitators were submitted back and 15 among the submitted were discarded due to inappropriateness or partially filled. The percentage of valid data collection was 83% that represents 200 useful questionnaires for further data analysis.

Table 1 contains the descriptive statistics which show the profile characteristics of the sample. The data were collected from more than 07 cities from different provinces (KPK=33%, Punjab=38%, Sindh=15% and other=14%). The male participants accounted for 78.5%, while the female participants accounted for 21.5%. Furthermore, Table 1 also exhibits the profile summary of the participants showing that 78.5% of male, while 21.5% of female participated in the study.

Moreover, 32% of SMEs belong to KPK (Peshawar=21.5%, Mardan=11.5%), 38% Punjab (Gujranwala=13.5%, Lahore=11%, Rawalpindi=13.5%), 15% Sindh (Karachi=15%) and 14% of SMEs belong to other regions of the country. The table illustrates that 18.5% of SMEs are working in servicing industry, 20.5% in manufacturing, 24% in sale, 18.5% in marketing and the rest of 18.5% belong to other industries. Finally, 33.5% of the SMEs have more than 10 to 50 employees, 40.5% have 51 to 100, 15% have 101 to 150, 07% have 151 to 200 and 03.5% have 201 to 250 number of students.

5. Data Analysis

Quantitative Data Analysis: Quantitative data from the survey is analyzed using descriptive statistics, including means and standard deviations. To assess the relationship between technology acceptance, digital skills, and employability outcomes, correlation and regression analyses are conducted. SPSS statistical software is employed for data analysis.

Qualitative Data Analysis: Qualitative data from the interviews are subjected to thematic analysis. Transcripts are coded to Identify recurring themes related to technology acceptance, digital skills utilization, and employability. NVivo software is used to manage and analyze qualitative data.

6. Ethical Considerations

Informed consent is obtained from all participants, ensuring confidentiality and anonymity.
Participants' Identities are protected through the use of pseudonyms in reporting findings.

7. Discussion and Conclusion

The research model proposed in this study provides a framework for investigating the intricate connections between technology acceptance, digital skills, and employability in TVET graduates. By analyzing the empirical data collected, this research seeks to contribute to a better understanding of how technology acceptance and digital skills development can be leveraged to enhance the employability and success of graduates in a rapidly evolving job market.

Respondents Demographics

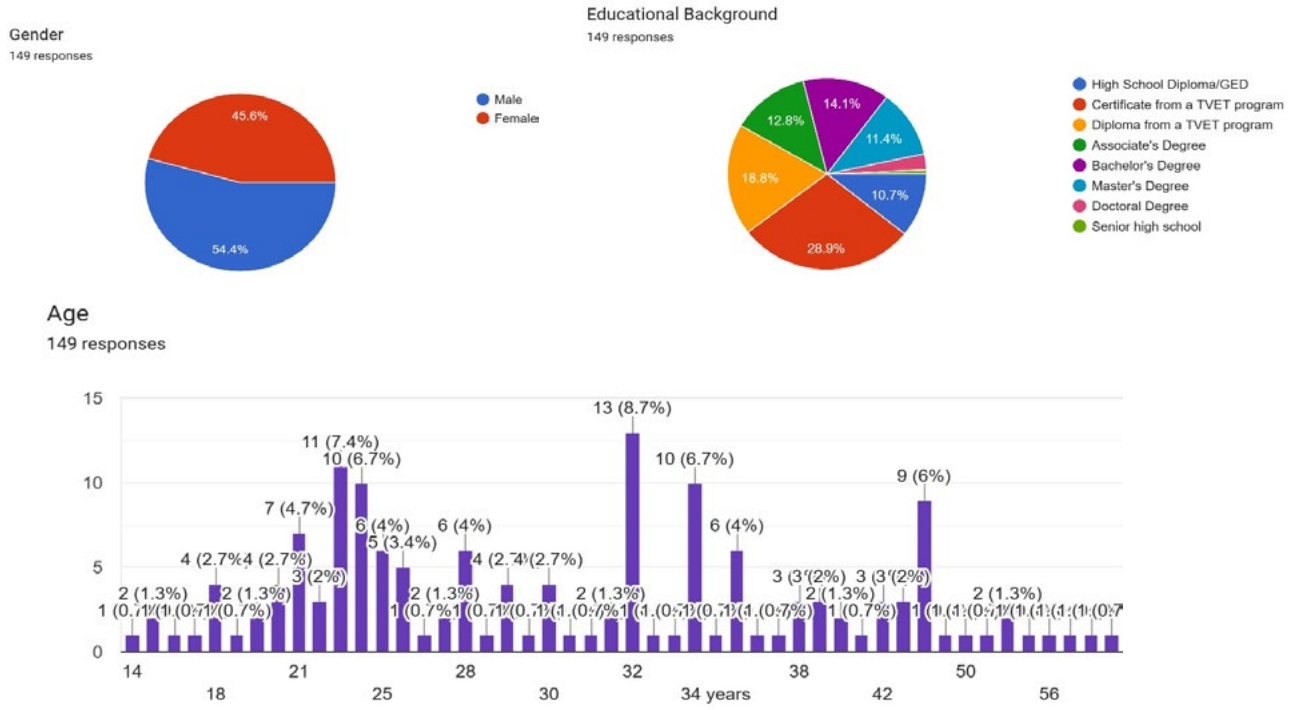

Figure 1: Respondents Demographics

The demographic analysis of 149 survey respondents reveals that 54.4% are male and 45.6% are female, indicating a balanced gender distribution. The educational background of respondents shows that the majority, 28.9%, hold a Certificate from a TVET program, followed by 18.8% with a Bachelor's degree, and smaller proportions having qualifications such as Associate's degrees (10.7%), Master's degrees (2.7%), and Doctoral degrees (0.7%). In terms of age distribution, most respondents are within the 20 to 40 years range, with the highest concentration being 32 years old (8.7%), and fewer respondents at the younger and older extremes of the age spectrum. The demographic data highlights a diverse sample, though primarily composed of younger adults and individuals with vocational education.

	Component		
	1	2	3
PEOU1	.533		
PEOU2		.646	
PEOU3		.649	
PEOU4		.754	
PEOU5		.680	
PEOU6		.754	
PEOU7		.829	
PEOU8		.642	
PEOU9		.717	
PEOU10		.782	
PU1			
PU2	.623		
PU3	.735		
PU4	.774		
PU5	.760		
PU6	.736		

PU7	.791		
PU8	.662		
PU9	.830		
PU10	.801		
DS1	.573		
DS2		.540	
DS3			.607
DS4			.739
DS5			.672
DS6	.572		. 642
DS7	.545		. 530
DS8			.831
DS9	.521		.658
DS10			.544

Table 1: Rotated Matrix, Rotated Component Matrixa

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Components: The analysis resulted in three components (labeled as 1, 2, and 3).

PEOU (Perceived Ease of Use): Component 1 is strongly associated with all PEOU variables (PEOU1 to PEOU10). Component 3 is also associated with PEOU variables but to a lesser extent. Component 2 is associated with PEOU2 and PEOU3. PU (Perceived Usefulness): Component 1 is associated with PU2, and Component 2 is associated with PU3 to PU10.

DS (Data Security): Component 1 is associated with DS1, DS2, DS6, DS7, and DS9. Component 2 is associated with DS3, DS4, DS5, and DS8.

Extraction Method: Principal Component Analysis (PCA) was used to extract the components. Rotation Method: The components were rotated using Varimax rotation with Kaiser normalization.

The components represent underlying patterns or factors that explain the variance in the original variables. Component 1 seems to capture a common factor related to PEOU, PU2, DS1, DS2, DS6, DS7, and DS9. Component 2 captures factors related to PEOU2, PEOU3, PU3 to PU10, DS3, DS4, DS5, and DS8. Component 3 captures factors related to PEOU4 to PEOU10. These components can be useful for simplifying the interpretation of your data and potentially for further analysis or modeling.

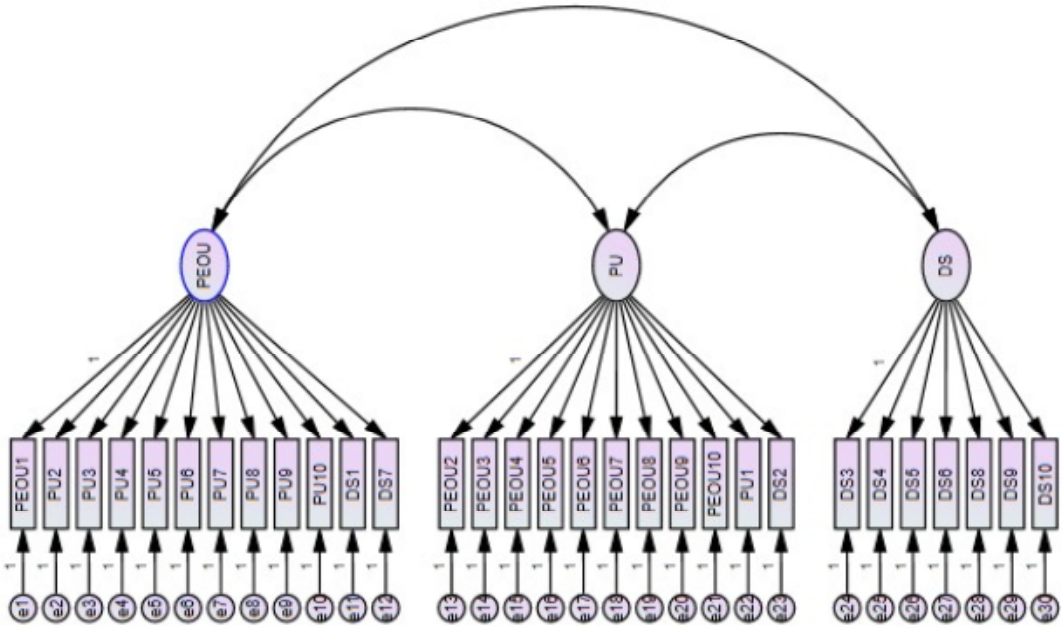

Figure 2: Confirmatory Factor Analysis

Here we present a conceptual model featuring three primary constructs: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Decision Support (DS). These constructs are each linked to multiple indicators or variables, with PEOU encompassing elements such as PEOU1 through PEOU7, PU containing PU1 through PU10, and DS including DS1 through DS10. The relationships between these constructs are depicted through directed arrows, indicating a likely structural equation modeling (SEM) approach, where each construct influences the others and contributes to an overall outcome. Specifically, PEOU is shown to have direct pathways to both PU and DS, suggesting that ease of use significantly affects users' perceptions of usefulness and decision support. Similarly, PU impacts DS, reinforcing the idea that the usefulness of a system contributes to the effectiveness of decision-making support. The lower portion of the diagram contains numbered circular nodes, which might represent observed data points or responses related to each variable in the model, further illustrating the measurement of each latent variable (PEOU, PU, DS). This framework suggests an effort to explore the relationships between usability factors and their impact on decision-making capabilities, likely in the context of technology acceptance or user experience research.

Model fit: CMIN = 31.321; DF = 30; CMIN/DF = 2.057; TLI = .656; CFI = .871; GFI = .958; RMR = .050; RMSEA =.063; P close = .118	**Factor loadings**
PEOU: CA = .977; CR = .879; AVE = .646	
PEOU4	.882
PEOU 5	.774
PEOU 7	.816
PEOU 9	.737
PEOU: CA = .783; CR = .814; AVE = .608	
PEOU4	.505
PEOU9	.834
PEOU10	.936
DIS: CA = .804; CR = .804; CR = .673	
DIS4	.800
DIS8	.840

Table 2: Exploratory Factor Analysis (EFA)

As illustrated in Table 2 the fit indices of the CFA model present a good model fit: GFI = .933, CFI = .981, TLI = .966 and RMSEA is 073. As a result, the measurement model has a good model fit both Cronbach's alpha value and CR value are above the expected values (.7) for all factors, showing a good reliability.

The Factor Loadings value represent the strength of the relationships between latent constructs (PU, PE, DIS) and their respective measurement items. As seen PU4 (.882) indicates that PU4 has a strong relationship with the latent construct PU.

	Rotated Component Matrix		
Measurement Items	**Component**		
	1	2	3
PU4	.782		
PU5	.845		
PU7	.817		
PU9	.613		
DIS4		.717	
DIS8		.614	
PEEOU4			.951
PEOU9			.844
PEOU10			.827

Table 3: Component Loadings for Different Measurement (EFA)

- Table 3 above shows the component loadings for different measurement items on extracted components. In EFA, components are derived to explain the underlying structure of the data.
- For Component 1: Items PU4, PU5, PU7, and PE9 have relatively high loadings, indicating that they contribute strongly to this component.
- For Component 2: Items DIS4, DIS8, and PE4 have loadings, indicating their contribution to this component.

For Component 3: Item PEOU10 has the highest loading, suggesting its association with this component.

5. Conclusion

In an era marked by rapid technological advancements, the integration of technology and the development of digital skills have become critical components of education and workforce readiness. This research aimed to explore the intersection of technology acceptance, digital skill acquisition, and employability in the context of Technical and Vocational Education and Training (TVET) graduates. By examining the experiences and outcomes of TVET graduates in the job market, this study sought to shed light on the significance of technology acceptance and digital skills for their employability. The findings underscore the central role that technology acceptance plays in the employability of TVET graduates. Graduates who exhibited a higher level of technology acceptance during their TVET programs were better equipped to navigate the demands of the contemporary job market. They demonstrated greater confidence and adaptability in using technology tools and platforms, attributes that are highly valued by employers. This aligns with the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness significantly impact technology acceptance, both of which this study found to be relevant in predicting employability outcomes.

Moreover, the acquisition of digital skills during TVET programs emerged as a crucial factor in enhancing graduates' employability. Employers emphasized the importance of graduates possessing not only basic digital literacy but also advanced skills relevant to their specific industries. However, the study also identified barriers to technology acceptance, such as limited access to resources and digital devices, as well as resistance to change within some TVET institutions. Addressing these challenges is essential to ensure equitable access to digital skills for all TVET graduates. In conclusion, this research highlights the critical nexus between technology acceptance, digital skills, and employability in TVET graduates. To better prepare graduates for the evolving job market, TVET institutions should prioritize not only the development of digital skills but also the cultivation of a positive attitude toward technology adoption. Graduates who possess these attributes are more likely to succeed in a workforce that increasingly relies on digital tools and processes. As the demands of the digital economy continue to evolve, future research should explore the specific digital skills that are most valued across different industries and investigate effective strategies to overcome barriers to technology adoption in TVET programs. By fostering a culture of technology acceptance and equipping graduates with relevant digital competencies, TVET institutions can significantly enhance the employability prospects of their graduates, contributing to a more agile and skilled workforce.

Recommendations

Future research should focus on identifying industry specific digital competencies required across various sectors to allow TVET institutions to tailor curricula more effectively, ensuring graduates are equipped with relevant skills that directly align with employer needs. Additionally, studies should explore interventions to overcome key barriers to technology acceptance in underresourced or rural TVET institutions, assessing strategies such as affordable digital access initiatives, targeted digital literacy programs, and training that fosters positive attitudes toward technology adoption among both students and faculty. Longitudinal studies tracking TVET graduates over time would also be valuable in understanding how digital proficiency and initial attitudes towards technology influence long-term career outcomes, such as job retention, professional advancement, and adaptation to technological changes in the workplace. Moreover, research could assess the intersection of digital skills with essential soft skills such as problemsolving, adaptability, and effective communication in shaping successful employment and advancement in digitally driven environments.

Comparative studies across regions or countries would further illuminate how cultural, economic, and socio political factors impact technology acceptance among TVET students, providing insights to develop context-sensitive policies that address unique local challenges. Finally, as emerging technologies like AI, blockchain, and IoT reshape industry landscapes, research should examine their potential for integration into TVET curricula, evaluating how these innovations can enhance learning experiences, foster advanced digital competencies, and maintain industry relevance in preparing TVET graduates for future workforce demands.

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