



THE INDIGENOUS PEOPLE'S TECHNICAL SKILLS DEVELOPMENT MODEL

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Abstract:

The Indigenous People (IP) students need to have competitive and suitable skills for them to become self-confident and productive in life, and their technical skills learning frequently lags behind because of the deficiency in culturally based learning methods and technical skills curriculum strategies, highlighting a substantial research gap. This study aimed to develop a technical skills development model, to resolve issues on essential technical skills needed in the indigenous people community and in the industry, and to know the current knowledge of indigenous people and their skills that must be gained, improved, and applied as what industry and community need for effective operations and development. By means of a mixed-methods research design, the research involved indigenous people's high school students from the SOCSKSARGEN Region. Data were gathered by means of surveys and interviews and were analyzed through thematic analysis using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The findings revealed six key dimensions of technical skills learning indigenous people high school students: Career Readiness and Employability through TVL Training, Personal growth and practical learning experiences in technical-vocational education, Empowerment, entrepreneurship, and community-based learning in technical-vocational education, Application and value of technical skills for real-world impact and entrepreneurship, Integrating practical learning with cultural relevance and innovation, and Bridging traditional culture and modern technical learning in indigenous communities. The final model demonstrated strong statistical reliability and validity and was within acceptable thresholds of model fit indices. These dimensions reflect the

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importance of culturally responsive and student-centered technical skills learning approaches that connect to real-life contexts and Indigenous cultural practices. The study concludes that technical skills learning for Indigenous students can be enhanced by integrating present industry standards, cultural relevance, interactive teaching methods, and practical applications into the learning course, which has vital implications for educational policymakers, curriculum developers, and trainers in creating inclusive and equitable learning environments for marginalized student groups.

SDG #4: Quality Education

Keywords: scale development, indigenous people, technical skills, meaningful learning

1. Introduction

The major issue in learning technical skills today is the widening gap between what is taught in schools and training centers and what industries actually require. Many organizations still depend on outdated tools, traditional teaching approaches, and limited resources, making it difficult for students to practice with modern technologies. Because of the speedy advancement in various fields, learners often graduate without being fully prepared to apply their skills in real-world settings.

Skills mismatch will likely worsen if the skills development training continues to rely on the old model of skills supply that aided its economic and technological “catch-up” in recent decades. If there is no alignment between the supply of skills and demand for skills, then there will be a negative impact on the development of appropriate skills needed for global shifts and trends of technology (Asian Development Bank, 2018). According to Alexandra van der Ploeg 2022, the skills mismatch is a worldwide issue, and a lack of education is the cause. In 57 of 108 nations, more than half of the employees do not match their level of education, with which seventy-two percent of this skills mismatch is due to under-education, and hundreds of millions of adults are jobless and unemployable, lacking the right skills to take up the jobs available. At present, the business environment is complex and rapidly changing.

The study hypothesized that the technical skills development model could be explained by active, constructive, cooperative, authentic, and intentional technical skills learning.

The landscape of skill development models is particularly different in terms of gaining knowledge and skills. Some models aim to improve the present educational system, while others provide an alternate technique outside of the established system. Some technical skills development models are implemented by a single entity (private, public, or nonprofit), but many rely on the power of multi-stakeholder collaborations to increase their quality, relevance, and sustainability.

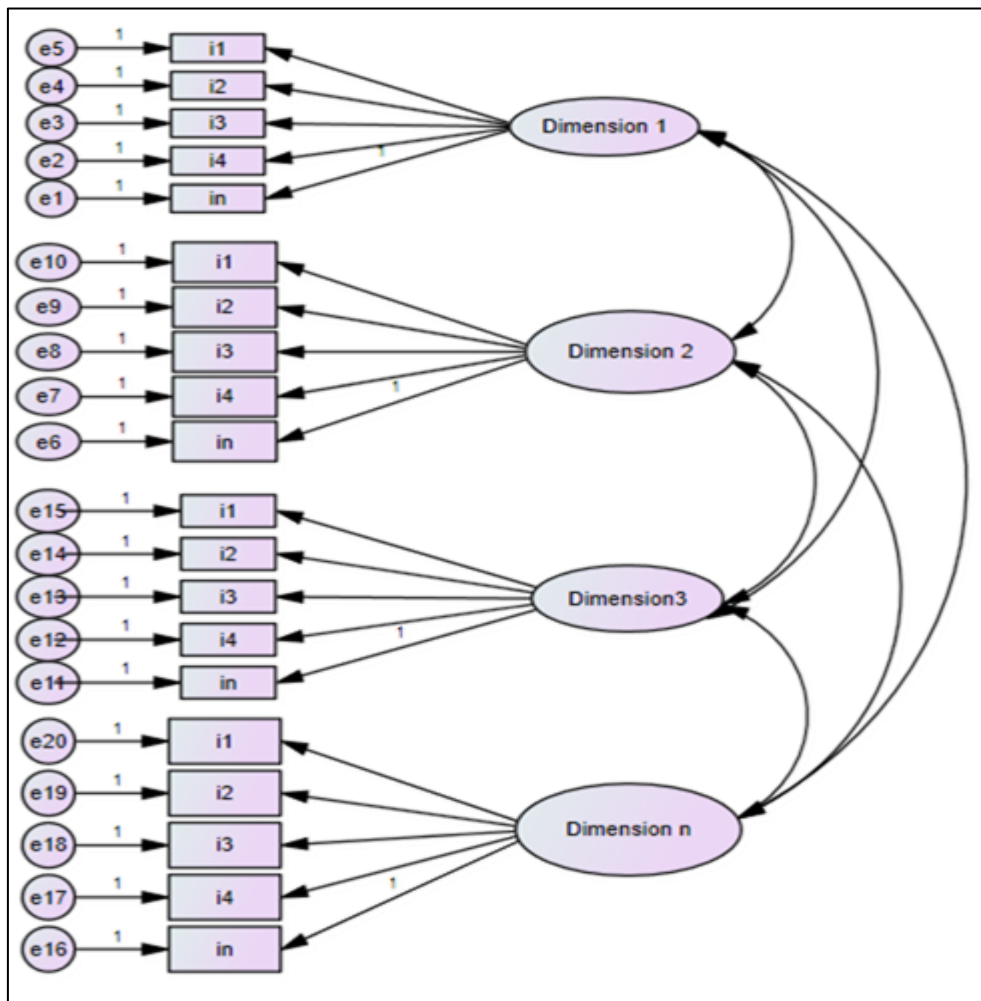


Figure 1: Hypothetical Observed Factors that Measure the Latent Dimensions of the Meaningful Technical Skills Learning Experiences

Figure 1 illustrates a hypothetical model representing these technical skills learning experiences, showing latent dimensions (D1, D2, D3, ... Dn) measured by observed variables derived from participant responses. Confirmatory Factor Analysis (CFA), as Suhr (2006) explained, was employed to test hypothesized relationships between observed indicators and their latent constructs. In this model, error terms (e1, e2, ... en) account for unexplained variances, one-headed arrows indicate factor loadings (beta coefficients), and two-headed arrows show the interrelationships among latent variables, all of which help validate the theoretical structure of meaningful mathematical learning experiences.

Moreover, the researcher is interested in developing a technical skills development model among Indigenous students using a pragmatic approach.

2. Methods

2.1 Study Participants

The researcher of the study used two types of sampling techniques- non-probability and probability sampling techniques. In the qualitative phase, the researcher utilized a

purposive sampling technique, which is a non-probability sampling. This ensures that the researcher interviewed the targeted participants, which was an indigenous high school student. In the quantitative phase, the researcher used simple random sampling to satisfy the assumption of the Exploratory Factor Analysis and Confirmatory Factor Analysis. A simple random sampling method was employed to ensure a fair representation of the population. This method guarantees that every member of the population has an equal opportunity to be included in the sample (Ghauri & Gronhaug, 2005).

In the qualitative phase, the researcher interviewed 12 indigenous high school students. The number of participants was sufficient to achieve data saturation, ensuring technical skills learning, as saturation is often reached when no new themes emerge in qualitative research (Majid et al., 2018). In the quantitative part of the study, the researcher surveyed 300 indigenous high school students since the EFA requires a minimum of 100-200 participants for stable results (Daniel, 1989). Some researchers recommend a minimum of 300 participants for more reliable factor structures, particularly when factor loadings are lower (Willmer et al., 2019).

2.2 Materials and Instrument

The researcher utilized two types of research instruments. For the qualitative phase, the researcher utilized the interview guide questionnaire. The interview guide questionnaire was created based on the assumption of meaningful learning of Ausubel.

For the quantitative phase, the researcher utilized a custom survey questionnaire created based on the findings of in-depth interviews, relevant scholarly literature, and appropriate sources aligned with the goals of the investigation. The questionnaire focused explicitly on the study's variables, which encompassed the various factors that defined students' attitudes toward learning technical skills. The questionnaire is designed to elicit responses from participants using a 5-point Likert scale, enabling them to indicate their level of agreement on various statements swiftly.

2.3 Design and Procedure

This study implemented a mixed-method design to capture the technical skills learning experiences of indigenous students in the quantitative. It is a pragmatic approach combining quantitative and qualitative techniques using student interviews and survey questionnaires (Bonds & Raacke, 2014). As shown in Figure 2, the researcher started with the readings of literature and interviewed the students on their views of the technical skills learning. Significant statements were used in making a survey questionnaire. The researcher employed the Content Validity Ratio (CVR) method to ensure the questionnaire's validity. A panel of ten experts have been carefully chosen to evaluate the custom questionnaire. Only item statements surpassing the predetermined cutoff value of 0.80 were retained in the survey questionnaire, while those falling below the threshold will be excluded.

Moreover, factor analysis, specifically exploratory factor analysis (EFA), operates on the principle that measurable variables can be condensed into fewer latent variables.

These latent variables share a common variance and are not directly observable, a process known as reducing dimensionality (Bartholomew, Knott, & Moustaki, 2011). Similarly, EFA is commonly used to investigate the potential underlying factor structure of a set of measured variables without imposing any predetermined structure on the results (Child, 1990). Unlike discriminating between independent and dependent variables, EFA is an interdependence technique that does not require formal hypotheses. It allows researchers to identify a dataset's underlying dimensions or factors (Hooper, 2012). For this study, EFA is the most suitable method to explore the various factors influencing students' attitudes toward technical skills learning.

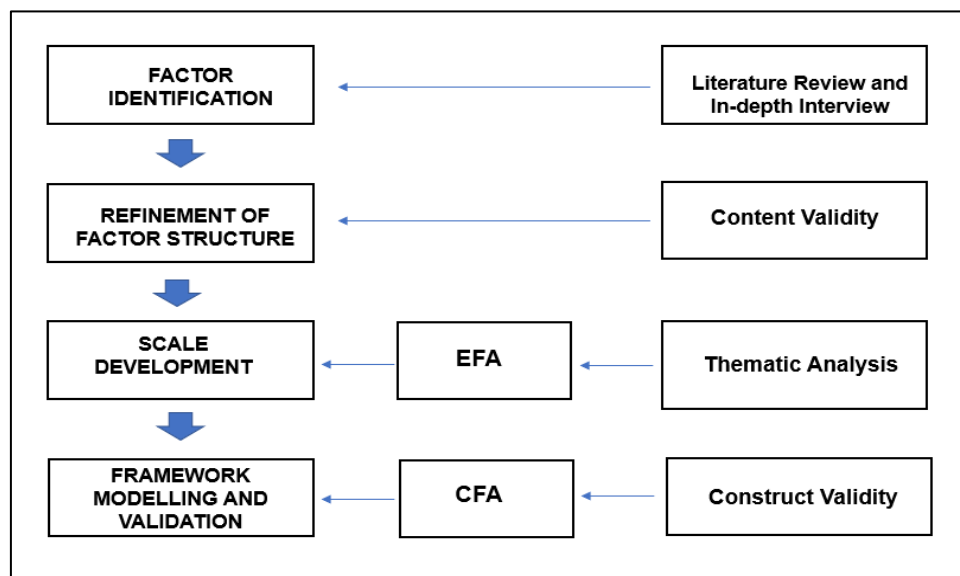


Figure 2: Research Process Flow

To analyze the collected data, a thematic analysis was conducted to explore the students' views on technical skills learning. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used to determine the factors of the technical skills learning and the best-fit model. This technique facilitated the identification and determination of the underlying factors that characterize students' attitudes toward technical skills learning. The EFA enabled comprehensive data exploration, revealing patterns, relationships, and latent constructs contributing to students' perspectives on this subject. In addition, confirmatory factor analysis will develop a model based on different parameters such as Chi-square, TLI, and RMSEA.

3. Results and Discussions

3.1 Views of Indigenous Students in Technical Skills Learning.

The researcher of the study utilized the Qualitative Interpretation Technique using the 6 Phases of Thematic Analysis by Braun and Clark (2006). *The views of Indigenous Students on Technical Skills Learning are: Harmonizing Traditional Culture and New Technologies, Personal Growth and Academic Development, and Employment and Entrepreneurship Readiness.*

3.2 Item Pool and Expert Opinion

The determination of the factors of technical skills learning started with the formulation of the item statements through the readings of the review of related studies and in-depth interviews with the research participants. The Item Pool of Statements (IPS) was content analyzed by the dissertation adviser and ten experts. These experts were chosen for their wide range of experiences in test development, teaching technical vocational and livelihood subjects, textual analysis and psychology, and counseling.

Shown in Table 2 is the number of items of the subscale of Technical Skills Learning in the three-phase item development. In phase 1, items were generated from the literature reviews and in-depth interviews with the research participants. With the help of the item writer, who is an expert in measurement and evaluation, 55 item statements were formulated.

This phase ensures the coherence, validity, and accuracy of each factor of Technical Skills Learning. In phase two, the items were checked by the research adviser to ensure the content validity and objectivity of the items. None of the items was deleted. The last phase is the experts' validation.

As shown in Appendix D, a total of 55 items and 48 items were retained with a coefficient above 0.80. Specifically, Table 1 presents indicators related to various aspects of teaching and learning, each measured by a specific number of items. *Harmonizing Traditional Culture and New Technologies Experimentation Resonant Relationships* measured through 20 items (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20), focusing on how students integrate modern technological advancements into society without losing or damaging the traditional customs, values, and practices that define a community's identity. It's about making old and new work together by using technology to support, preserve, and evolve cultural traditions, rather than replacing or erasing them. *Personal Growth and Academic Development* measured through 15 items (21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 and 35). Personal Growth refers to the continuous process of enhancing one's skills, knowledge, habits, and overall self-awareness to reach one's fullest potential. It encompasses various aspects of life, including emotional, intellectual, spiritual, and social dimensions.

Finally, *Employment and Entrepreneurship Readiness* is measured using 20 items, (36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, and 55), examining students' belief in their ability to succeed and their intrinsic motivation to learn. Each indicator is thoughtfully structured to represent key dimensions of the educational process.

Table 2: Tentative Number of Items of the Subscale of
Technical skills Learning in the Three Phase Item Development

Sub-scale	Number of Items		
	Phase 1 (Literature Analysis and in-depth Interview)	Phase 2 (Adviser's Revisions)	Phase 3 (Experts Validation)
1. Harmonizing Traditional Culture and New Technologies Experimentation Resonant Relationship	20	20	18
2. Personal Growth and Academic Development	15	15	12
3. Employment and Entrepreneurship Readiness	20	20	17

3.3 Construct Validity

3.3.1 Sampling Adequacy and Suitability Test Results

Tables 3 present the results of the exploratory factor analysis of active meaningful learning. Using the Kaiser-Meyer-Olkin measure of sampling adequacy ($KMO=0.7$) to measure the adequacy and suitability of the exploratory factor analysis involving 300 respondents. The findings show that the data is suitable for exploratory factor analysis since it surpassed the minimum requirement of 0.5. The finding also tells us that the data is enough to have a distinct factor (Kaiser, 1974).

The Bartlett's Test of Sphericity shows that the R-matrix is not an identity matrix. It also shows that we do have patterned relationships amongst the variables ($p<0.001$).

Table 3: Sampling Adequacy and Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.70
Bartlett's Test of Sphericity	Approx. Chi-Square	2960.869
	df	1128
	Sig.	0

Shown in Table 4 is the latent roots criterion of the extracted factors, depicting the percentage of Variance. The factor analysis results show that Factor 1 stands out as the most significant, with an eigenvalue of 8.641, accounting for 18.002% of the total variance. This means it represents the strongest underlying theme or construct in the data. Factor 2 follows, contributing 6.843% of the variance with an eigenvalue of 3.285, still meaningful but far less influential than Factor 1. Factor 3 explains 5.489% of the variance with an eigenvalue of 2.635, indicating a moderate but important contribution. Factors 4 and 5 explain 4.572% and 4.194% of the variance, with eigenvalues of 2.194 and 2.013, respectively, showing smaller but still notable influences. Factor 6 adds another 3.713% of the variance with an eigenvalue of 1.782, while Factor 7 accounts for 3.692% with an eigenvalue of 1.772. Factors 8 and 9 explain 3.301% and 3.077% of the variance, with eigenvalues of 1.584 and 1.477, respectively. Similarly, Factors 10 and 11 explain 2.99% and 2.88% of the variance, with eigenvalues of 1.435 and 1.383, respectively. Factors 12

and 13 each contribute between 2.684% and 2.404% of the variance, with eigenvalues of 1.288 and 1.154, respectively. Furthermore, finally, for Factors 14, 15 and 16 each contribute the variance of 2.252%, 2.148% and 2.118% with the eigenvalues of 1.081, 1.031 and 1.017 respectively.

Table 4: Latent Roots Criterion of the Extracted Factors Depicting the Percentage of Variance

Factor	Eigenvalue	% of Variance	Cumulative %
1	8.641	18.002	18.002
2	3.285	6.843	24.846
3	2.635	5.489	30.335
4	2.194	4.572	34.906
5	2.013	4.194	39.1
6	1.782	3.713	42.813
7	1.772	3.692	46.505
8	1.584	3.301	49.806
9	1.477	3.077	52.883
10	1.435	2.99	55.873
11	1.383	2.88	58.754
12	1.288	2.684	61.438
13	1.154	2.404	63.842
14	1.081	2.252	66.094
15	1.031	2.148	68.242
16	1.017	2.118	70.36

Figure 3 depicts the scree plot derived from the secondary Exploratory Factor Analysis (EFA) undertaken within this investigation. As delineated by Cattell (1966), the scree plot employs eigenvalues extracted from either the input or condensed correlation matrix. The plot manifests as a visual representation where eigenvalues are charted on the vertical axis while factors are delineated along the horizontal axis.

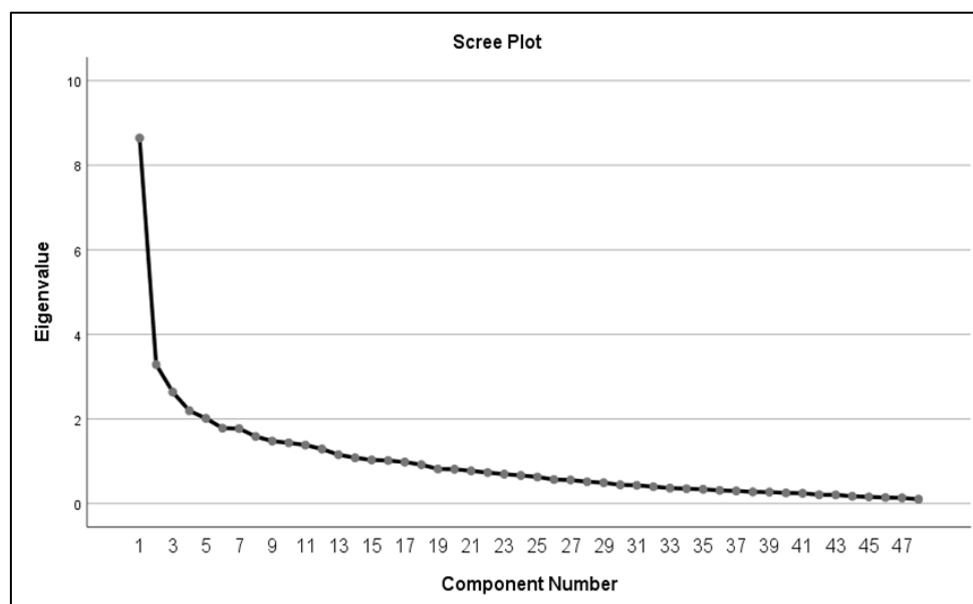


Figure 3: Scree Plot of Indigenous Peoples Technical Skills Development Model

Table 5: Factor Loading of Technical Skills learning.

Item Number	Factor Loading															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TEM40	0.801															
TEM 36	0.791															
TEM 34	0.712															
TEM 38	0.702															
TEM 37																
ITEM 12		0.781														
TEM 19		0.77														
ITEM 11		0.465														
TEM 18		0.444														
TEM 24		0.432														
ITEM 3																
TEM 39			0.771													
TEM 42			0.643													
TEM 33			0.495		0.474											
ITEM 8			0.431													
ITEM 9			0.43													
TEM 31				0.768												
TEM 35				0.697												
TEM 45				0.672												
TEM 46				0.418												
TEM 41																
TEM 21					0.684											
ITEM 4					0.655											
TEM 25					0.622											
TEM 23																
TEM 30						0.693										
TEM 15						0.68										
ITEM 7																
ITEM 5							0.794									
ITEM 2							0.556									
TEM 47							0.548									
TEM 17																
TEM 26								0.707								
TEM 28								0.662								
ITEM 10						0.416		0.511								
TEM 16									0.776							
TEM 29									0.501							
TEM 27									0.416							
ITEM 6										0.803						
TEM 44											0.624					
TEM 48											0.514					
TEM 32	0.422										0.459					
ITEM 1												0.742				
ITEM 13												0.465				
TEM 43													0.765			
TEM 20														0.789		
TEM 14															0.796	
TEM 22																0.774

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

Note: A Rotation converged in 24 iterations.

In Table 5, the researcher presents the factor loading and thematic analysis findings concerning the Indigenous Peoples Technical Skills learning. Following the exploratory factor analysis, the researcher identified a set of 48 items, which were then grouped into sixteen distinct factors or dimensions reflecting the different dimensions of Indigenous Peoples' Technical Skills learning. To ensure the reliability of our analysis, we systematically removed any items with factor loadings below 0.4, consistent with the rigorous criteria established by previous studies (Costello & Osborne, 2005). Additionally, the researcher eliminated any factors with fewer than three item statements

(MacCallum et al., 1999; Raubenheimer, 2004). As a result, the researcher identified seven distinct factors with 38 items that characterize the strategies utilized in Technical Skills learning.

Table 6 in the research findings presents a comprehensive thematic analysis of the item statements of technical skills learning derived from the exploratory factor analysis. Before the thematic analysis, the researcher deleted item statements that were not part of the factors. For Factor 1, the researcher deleted item number 37, for Factor 2, the researcher deleted item number 3, for Factor 4, the researcher deleted item number 41, for Factor 6, the researcher deleted item number 23, and for Factor 7 the researcher deleted item number 17. The first factor, identified as "*Career Readiness and Employability through TVL Training*," encompasses a total of 5 item statements (32, 34, 36, 38 and 40).

Table 6: Factor 1 - Career Readiness and Employability through TVL Training

Item Number	Item Statements	Factor Loading
40	I feel confident that I can apply for jobs related to my TVL training.	0.747
36	I have participated in government programs related to my TVL skills.	0.718
34	I have received guidance on jobs, apprenticeships, and further education after my TVL track.	0.631
38	I believe my skills will be recognized by employers after completing my TVL course.	0.536

Table 7: Factor 2 - Personal Growth and Practical Learning Experiences in Technical-vocational Education

Item Number	Item Statements	Factor Loading
12	I feel I belong when working with my classmates and teachers in technical activities.	0.781
19	I have realized the importance of learning skills beyond those taught at home.	0.77
11	I feel safe using technical equipment and machinery in practical lessons.	0.465
18	I have gained knowledge, skills, and valuable experiences through my education.	0.444
24	I learned to operate farm equipment and am happy to share this skill with my family.	0.432

Table 8: Factor 3 - Empowerment, Entrepreneurship, and Community-based Learning in Technical-vocational Education

Item Number	Item Statements	Factor Loading
39	I feel prepared to be self-employed or establish a small enterprise.	0.771
42	I will create opportunities for others through mentoring or entrepreneurship.	0.643
33	I know how to create a professional résumé and prepare for job interviews.	0.495
8	I learn best with mentorship from my community	0.431

	members.	
9	I am willing to train in technical skills and support pride in our indigenous identity and traditions.	0.43

Table 9: Factor 4 - Application and Value of Technical Skills for Real-world Impact and Entrepreneurship

Item Number	Item Statements	Factor Loading
31	I plan to use my technical skills to apply practical knowledge in solving real-world problems.	0.768
35	I have learned about entrepreneurship opportunities to help me start my own business.	0.697
45	I feel that my technical skills are valued and respected in my community.	0.672
46	I consider a skill meaningful when I can use it for work.	0.418

Table 10: Factor 5 - Bridging Technical Skills with Real-World Needs Through Culturally Relevant and Adaptive Learning

Item Number	Item Statements	Factor Loading
21	I see how my technical skills relate to real-world needs and challenges.	0.593
4	I learn faster when I can see the cultural relevance of the lessons. I adapt new methods that make my learning process challenging.	0.53
25	I adapt new methods that make my learning process challenging.	

Factor 6 is the Integrating practical learning with cultural relevance and innovation. Practical Learning means providing students with hands-on, skills-based experiences that mirror real-life tasks or workplace situations, equipping them with competencies for jobs, entrepreneurship, or community service, and encouraging learning by doing rather than just memorizing.

Table 11: Factor 6 - Integrating Practical Learning with Cultural Relevance and Innovation

Item Number	Item Statements	Factor Loading
5	I see how my technical skills relate to real-world needs and challenges.	0.794
2	I learn faster when I can see the cultural relevance of the lessons. I adapt new methods that make my learning process challenging.	0.556
47	I am encouraged to innovate by blending indigenous and modern technical skills.	0.548

Table 12: Factor 7 - Bridging Traditional Culture and Modern technical Learning in Indigenous Communities

Item Number	Item Statements	Factor Loading
26	When I began learning technical skills, I needed step-by-step instructions to complete tasks.	0.707
28	I know our traditional culture cannot change, but I hope our elders respect modern technology.	0.662
10	I believe technical training meets the needs of indigenous communities.	0.511

Table 13: Factor 8 - Empowering Indigenous Heritage Through Technical Mastery and Entrepreneurial Vision

Item Number	Item Statements	Factor Loading
16	I want to use my technical skills to build businesses that honor and promote indigenous traditions.	0.776
29	I believe mastering technical skills will help me reach my personal and career goals.	0.501
27	I believe it is challenging to sell indigenous technical products in mainstream markets.	0.416

Table 14: Factor 9 - Empowering Indigenous Talent: Fair Hiring, Skills Development and Professionalism for Career Success

Item Number	Item Statements	Factor Loading
44	I believe that employers treat IP applicants fairly in hiring processes.	0.624
48	I have attended skills training programs sponsored by our school.	0.514
32	I am trained in workplace professionalism, including punctuality, communication, and teamwork.	0.459

3.3.2 Measurement Model of Indigenous People's Technical Skills

Confirmatory Factor Analysis (CFA) is used to test whether the measurement model is consistent with the Exploratory Factor Analysis that was run in the previous section.

Table 15: Model Fit Indices

	X2	X2/df	IFI	CFI	TLI	RMSEA	PCLOSE
Model 1	1558.8	3.39	0.701	0.695	0.64	0.09	0.00
Model 2	545.83	3.17	0.826	0.823	0.786	0.085	0.00
Model 3	296.25	2.99	80.84	84.40	0.808	0.08	0.00
Model 4	198.36	1.83	0.946	0.945	0.918	0.052	0.332
Acceptable Values		<3.00	0.90	0.90	0.90	<0.08	>0.05
Good Fit Values	p<0.05		0.95	0.95	0.95	<0.08	>0.05

Before conducting a Confirmatory Factor Analysis (CFA), researcher consider several critical assumptions. First, regarding sample size, a minimum N of 300 is often preferred as larger sample sizes help achieve accurate parameter estimates and enhance model stability ([Goretzko et al., 2023](#)). Second, for distribution properties, CFA assumes multivariate normality; however, robust methods like diagonally weighted least squares

(DWLS) can handle ordinal data and modest violations of normality effectively ([Cheng-Hsien Li, 2016](#)).

The first attempt of the researcher is to delete factors with an interrelationship of more than 0.85. A value of more than 0.85 means the factor has an issue of multicollinearity (Hoyle, 2000); thus, the researcher one by one deleted those latent factors with a value of more than 0.85. For the modification, it can be observed in the final model that the interrelationships between latent factors passed the threshold of 0.5 - 0.85. This implies that the factors in terms of discriminant validity measure in the same direction as the other latent variables. Further, it shows the extent to which factors of effective learning are distinct and uncorrelated. The rule is that variables should relate more strongly to their own factor than to another factor (Hoyle, 2000).

Further, the researcher deleted item number 28, which the researcher believes is the deletion of factor 5, factor 8 and factor 9. The researcher did not measure that factor, thereby reducing its validity.

Shown in Figure 6 are the model fit indices of the meaningful learning (46 factors first-order). The obtained values were $\chi^2/df = 1.270$, GFI = 0.931, CFI=0.92, TLI = 0.90 and RMSEA= 0.030. All of the coefficients are fitted to the level of acceptance, thus the model is fit.

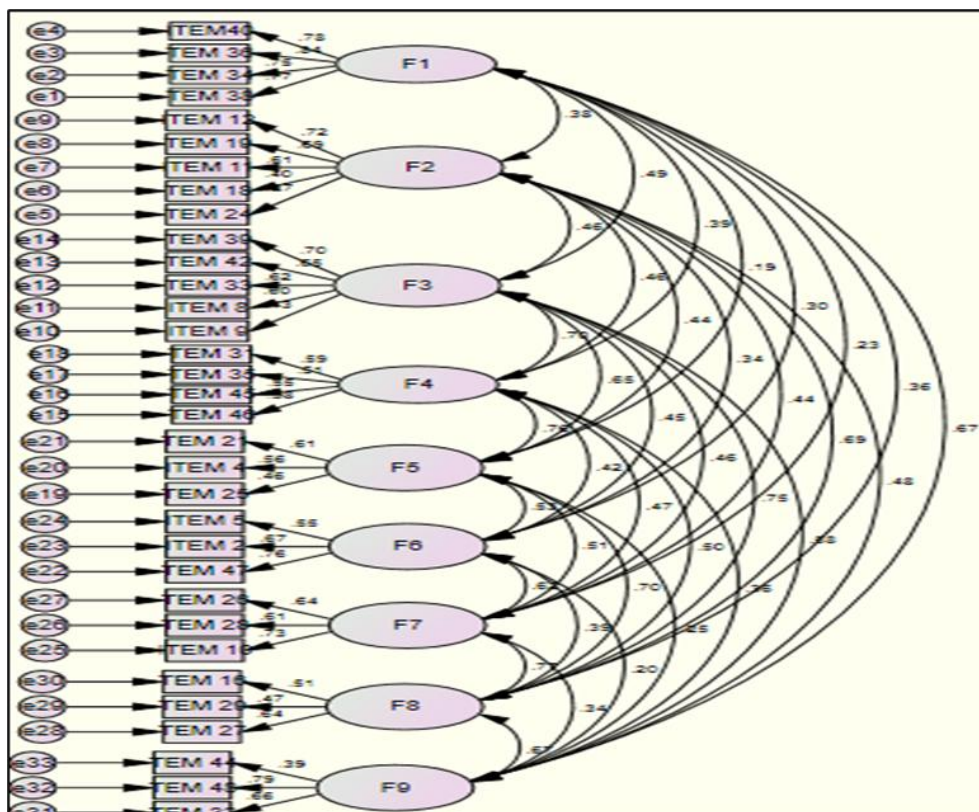


Figure 4: Model Fit Indices of the Technical Skills Learning (9 Factors First-order)

In the 6 factors first-order model, the factor 1- Career Readiness and Employability through TVL Training had four item statements (40, 36 34 and 38), factor 2- Personal growth and practical learning experiences in technical-vocational education had five item

statements (12, 19 11 18 and 24), factor 3 – Empowerment, entrepreneurship, and community-based learning in technical-vocational education had five item statements (39, 42, 33, 8, and 9). For factor 4 - Application and value of technical skills for real-world impact and entrepreneurship had four item statements (31, 35,45 and 46).

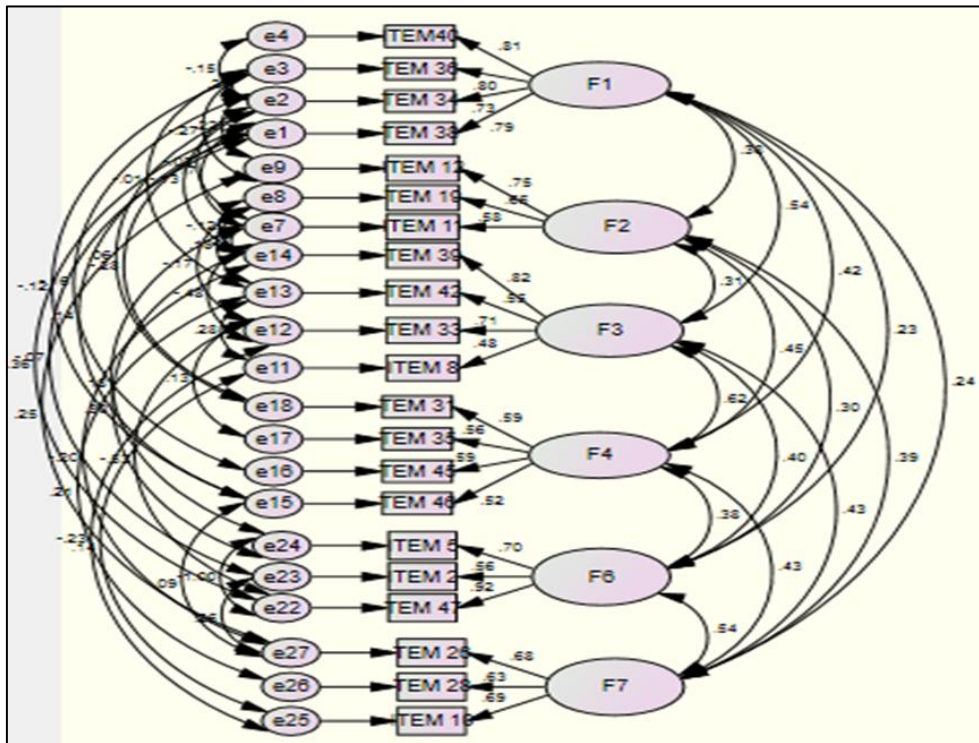


Figure 5: Model Fit Indices of the Technical Skills Learning (6 Factors First-order)

For factor 6 - Integrating practical learning with cultural relevance and innovation had three item statements (5, 2 and 47). Lastly, for factor 7 - Bridging traditional culture and modern technical learning in indigenous communities had three item statements (26,28 and 10).

Also, the Confirmatory Factor Analysis help us analyze the internal consistency and convergent validity of each construct. The results, outlined in Table 16, revealed that all item statements significantly contribute to different factors, as indicated by a p-value < 0.05. This implies that each item serves as an excellent measure of its corresponding indicator of technical skills learning.

Table 16: Results of Convergent Validity Testing

			Estimate	S.E.	C.R.	P
TEM38	<---	F1	1			
TEM34	<---	F1	1.029	0.09	11.412	***
TEM36	<---	F1	1.167	0.083	13.999	***
ITEM40	<---	F1	1.111	0.079	14.045	***
ITEM11	<---	F2	1			
TEM19	<---	F2	1.139	0.145	7.868	***
ITEM12	<---	F2	1.392	0.173	8.053	***
ITEM8	<---	F3	1			
TEM33	<---	F3	1.453	0.231	6.297	***
TEM42	<---	F3	1.38	0.167	8.263	***
TEM39	<---	F3	1.615	0.24	6.726	***
TEM46	<---	F4	1			
TEM45	<---	F4	1.065	0.163	6.522	***
TEM35	<---	F4	1.109	0.176	6.302	***
TEM31	<---	F4	1.352	0.205	6.603	***
TEM47	<---	F6	1			
ITEM2	<---	F6	0.631	0.107	5.902	***
ITEM5	<---	F6	0.825	0.103	8.031	***
ITEM10	<---	F7	1			
TEM28	<---	F7	0.912	0.108	8.461	***
TEM26	<---	F7	0.928	0.106	8.728	***

To ascertain convergent validity, the researcher meticulously examined all factors involved in the study. As depicted in Table 17, each latent construct, including Career Readiness and Employability through TVL Training, personal growth and practical learning experiences in technical-vocational education, empowerment, entrepreneurship, and community-based learning in technical-vocational education, application and value of technical skills for real-world impact and entrepreneurship, integrating practical learning with cultural relevance and innovation and bridging traditional culture and modern technical learning in indigenous communities had three item statements demonstrated statistical significance.

Table 17: Convergent/Discriminant Validity

			Estimate	S.E.	C.R.	P
F1	<-->	F2	0.078	0.018	4.351	***
F1	<-->	F3	0.097	0.019	5.085	***
F1	<-->	F4	0.073	0.017	4.4	***
F1	<-->	F6	0.064	0.018	3.471	***
F7	<-->	F1	0.051	0.017	3.067	0.002
F2	<-->	F3	0.037	0.011	3.335	***
F2	<-->	F4	0.052	0.012	4.25	***
F2	<-->	F6	0.054	0.013	4.014	***
F7	<-->	F2	0.055	0.013	4.199	***
F3	<-->	F4	0.062	0.014	4.57	***
F3	<-->	F6	0.063	0.014	4.575	***
F7	<-->	F3	0.054	0.013	4.154	***

F4	<-->	F6	0.058	0.013	4.448	***
F7	<-->	F4	0.052	0.013	4.127	***
F7	<-->	F6	0.104	0.016	6.429	***

3.3.2.1 Reliability Tests for Derived Dimensions

Thompson and Levitov in Matlock-Hetzel (2010) proposed that the quality of a test can be evaluated by computing its reliability, which refers to the consistency of results when administered to the same groups under the same conditions. Reliability is defined as the degree to which an assessment consistently measures what it is intended to measure (Airasian & Russell, 2001). Table 18 highlights the level of reliability of meaningful learning and its dimensions, with coefficients ranging from 0.639 to 0.855 and an overall reliability of 0.88. According to standards in educational assessments, a reliability value above 0.70 is indicative of a very good test (Annavaajhala, Dargel, Kuwahara, & Raza, 2010).

Table 18: Reliability Coefficients of the Technical Skills Learning and Its Dimensions

Sub-scale	Number of Items	Cronbach's Alpha
1. Career Readiness and Employability through TVL Training.	4	0.865
2. Personal growth and practical learning experiences in technical-vocational education.	3	0.726
3. Empowerment, entrepreneurship, and community-based learning in technical-vocational education.	4	0.737
4. Application and value of technical skills for real-world impact and entrepreneurship.	4	0.644
5. Integrating practical learning with cultural relevance and innovation	3	0.695
6. Bridging traditional culture and modern technical learning in indigenous communities.	3	0.701
Total Scale	21	0.856

Internal consistency measures, such as Cronbach's alpha, are widely used to evaluate reliability. Ferketich (1990) highlighted that high internal consistency indicates that test items measure a cohesive construct, enhancing the utility of the test.

3.3.3 Measure of Technical Skills Learning Among Indigenous Students

Table 19 presents the validated scale measuring technical skills learning among Indigenous students, categorized into six key dimensions: Career Readiness and Employability through TVL Training, personal growth and practical learning experiences in technical-vocational education, empowerment, entrepreneurship and community-based learning in technical-vocational education, application and value of technical skills for real-world impact and entrepreneurship, integrating practical learning with cultural relevance and innovation and bridging traditional culture and modern technical learning in indigenous communities.

Table 19: Scale to Measure of Technical Skills Learning among Indigenous Students

Career Readiness and Employability through TVL Training	
Item Number	Item Statement
40	I feel confident that I can apply for jobs related to my TVL training.
36	I have participated in government programs related to my TVL skills.
34	I have received guidance on jobs, apprenticeships, and further education after my TVL track.
38	I believe my skills will be recognized by employers after completing my TVL course.
Personal Growth and Practical Learning Experiences In Technical-Vocational Education	
Item Number	Item Statement
12	I feel I belong when working with my classmates and teachers in technical activities.
19	I have realized the importance of learning skills beyond those taught at home.
11	I feel safe using technical equipment and machinery in practical lessons.
18	I have gained knowledge, skills, and valuable experiences through my education.
24	I learned to operate farm equipment and am happy to share this skill with my family.
Empowerment, Entrepreneurship and Community-Based Learning in Technical-Vocational Education	
Item Number	Item Statement
39	I feel prepared to be self-employed or establish a small enterprise.
42	I will create opportunities for others through mentoring or entrepreneurship.
33	I know how to create a professional résumé and prepare for job interviews.
Application and Value of Technical Skills for Real-World Impact and Entrepreneurship	
Item Number	Item Statement
31	I plan to use my technical skills to apply practical knowledge in solving real-world problems.
35	I have learned about entrepreneurship opportunities to help me start my own business.
45	I feel that my technical skills are valued and respected in my community.
46	I consider a skill meaningful when I can use it for work.
Integrating Practical Learning With Cultural Relevance and Innovation	
Item Number	Item Statement
5	I see how my technical skills relate to real-world needs and challenges.
2	I learn faster when I can see the cultural relevance of the lessons.
47	I am encouraged to innovate by blending indigenous and modern technical skills.
Bridging Traditional Culture and Modern Technical Learning in Indigenous Communities	
Item Number	Item Statement
26	When I began learning technical skills, I needed step-by-step instructions to complete tasks.
28	I know our traditional culture cannot change, but I hope our elders respect modern technology.
10	I believe technical training meets the needs of indigenous communities.

The Career Readiness and Employability through TVL Training dimension emphasizes practical skills, industry alignment, and professionalism to ensure graduates are well-prepared for the workforce.

The Learning Personal Growth and Practical Learning Experiences in Technical-Vocational Education dimension highlights the value of effective learning in the classroom interaction, collaboration, and enjoyment in the learning process. These dimensions underscore the significance of learning at home and the importance of learning in the classroom and in industry-based settings.

The Empowerment, Entrepreneurship and Community-Based Learning In Technical-Vocational Education dimension shows how students relate better to technical skills learning when their voice and concerns are heard and put into priorities.

Additionally, the Integrating Practical Learning with Cultural Relevance and Innovation dimension confirms how students relate and learn better to technical skills when it connects their practical learning with cultural relevance.

Finally, the Bridging Traditional Culture and Modern Technical Learning in Indigenous Communities dimension underscores the process of integrating indigenous knowledge, practices, and traditions with contemporary technical education.

3.3.4 Learning in Technical Skills Among Indigenous Students

- **Career Readiness and Employability through TVL Training.** Effective teaching of technical skills tailored to Indigenous cultures should emphasize practical skills, industry alignment, and professionalism to ensure graduates are well-prepared for the workforce.
- **Personal Growth and Practical Learning Experiences in Technical-Vocational Education.** Experiential learning connects theoretical concepts to practical applications, allowing students to translate classroom knowledge into real-world experiences.
- **Empowerment, Entrepreneurship and Community-Based Learning In Technical-Vocational Education.** Stated above are key elements in Technical-Vocational Education and Training (TVET), shaping how individuals gain skills and contribute to society.
- **Application and Value of Technical Skills for Real-World Impact and Entrepreneurship.** Entrepreneurs equipped with technical skills can develop innovative products and services that address specific problems and fulfill customer needs, thereby creating value.
- **Integrating Practical Learning with Cultural Relevance and Innovation.** Cultural competence has become a vital focus in modern education, striving to foster inclusive classrooms that embrace diversity and ensure equal opportunities for every student.
- **Bridging Traditional Culture and Modern Technical Learning in Indigenous Communities.** Combining Indigenous knowledge with modern technology offers a powerful strategy for tackling environmental issues and advancing sustainable development.

4. Conclusion and Recommendations

The study comprehensively explored the views on technical skills among Indigenous high school students in Region XII. It successfully identified and validated the dimensions of technical skills learning, established a reliable dimension scale, and anticipated a best-fit model using rigorous procedural approaches, including Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Further, the results of CFA confirm the consistency of the measurement model based on the EFA findings, reflecting a robust internal structure for measuring technical skills learning. The final model identified six key latent dimensions as shown in Figure 6: Career Readiness and Employability through TVL Training, Personal Growth and Practical Learning Experiences in Technical-Vocational Education, Empowerment, entrepreneurship, and community-based learning in technical-vocational education, Application and Value of

Technical Skills for Real-World Impact and Entrepreneurship, Integrating Practical Learning with Cultural Relevance and Innovation. and Bridging Traditional Culture and Modern Technical Learning in Indigenous Communities.

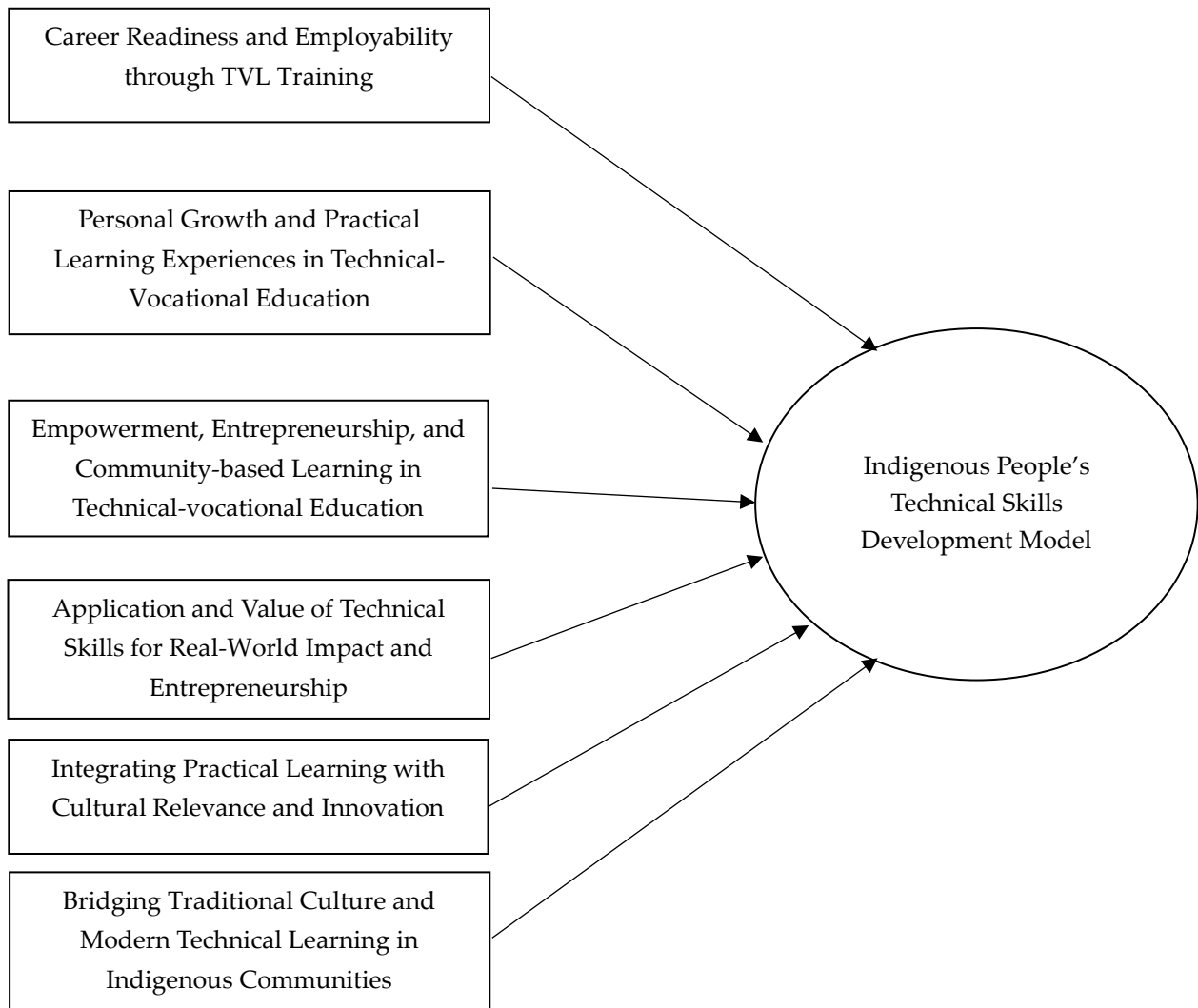


Figure 6: Measurement Model of Technical Skills Learning

The study underscores the importance of culturally relevant and student-centered technical skills learning approaches. The identified dimensions reflect the significance of career readiness and employability through TVL training, personal growth and practical learning experiences in technical-vocational education, empowerment, entrepreneurship and community-based learning, application and value of technical skills for real-world impact, and integrating practical learning with cultural relevance and innovation. and bridging traditional culture and modern technical learning in indigenous communities that fit the needs of Indigenous learners. These findings align with constructivist and experiential learning theories, which emphasize active engagement, cultural relevance, and practical applications as critical to learning success.

Collaboration with schools, teachers, and local governments is vital to promote culturally responsive education that fosters a sense of identity and belonging among

Indigenous students. Furthermore, the community may motivate and support indigenous students to value technical skills learning intended for them as a very important tool for personal and community development.

For schools and teachers, incorporating culturally relevant materials and proper technical skills learning specifically for indigenous students can bridge the gap between a mismatch of technical skills learning, not updated skills learning based on standards and students' lived experiences. Professional development opportunities may be provided to equip technical teachers with strategies for culturally responsive teaching and addressing the unique needs of Indigenous students. Schools may adopt interactive and hands-on learning approaches to foster collaboration and critical thinking, while also creating an inclusive and supportive learning environment where Indigenous students feel respected and valued.

For curriculum designers, a localized and place-based learning that draws from students' environments and daily lives can make learning more effective. The skills learning may emphasize real-life applications, using examples from activities like farming, weaving and budgeting, which are familiar to Indigenous students.

For parents, active involvement in their children's education is crucial. Parents may monitor progress, provide support at home, and collaborate with teachers to reinforce skills learning. By advocating for educational initiatives that incorporate Indigenous knowledge and practices, parents can help ensure their children's skills learning is culturally relevant. They can also relate technical skills to practical tasks at home, such as budgeting or solving real-life problems, to reinforce learning. Encouraging indigenous learners to value education and participate in school activities further enhances the support system for Indigenous students.

Additionally, future researchers are encouraged to conduct longitudinal studies to evaluate the long-term impact of culturally responsive technical education on Indigenous students' success. Expanding research to other subject areas and exploring the integration of Indigenous cultural contexts can further promote inclusive education. Investigating innovative teaching methods, such as the use of technology, can provide new insights into improving technical skills education. Research should also focus on policy analysis to assess the effects of educational policies on Indigenous students' outcomes and propose evidence-based recommendations. Lastly, engaging with Indigenous communities to co-create research initiatives ensures that studies are reflective of their needs, values, and aspirations.

Funding Information

No funding was involved.

Conflict of Interest Statement

We have no personal, financial, or other interest that could or could be seen to, influence the decisions or actions we are taking or the advice we are giving during my research for this.

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