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Skills Inventory of TVET Trainers towards Development of Skills Enhancement Program

Joan DV. Espina

National University, Philippines

ABSTRACT: *The study aimed to determine the skills inventory of TVET trainers toward developing the Skills Enhancement Program. It utilized a descriptive-correlational type of research. The respondents of the study were 191 selected TVET trainers in Bulacan who conducted assessment training in 2023. It used a stratified sampling method in choosing respondents. It utilized a validated instrument for the 4C 21st-century skills of trainers in assessing their critical thinking, communication, collaboration, and creativity skills. The results of the study were as follows: (1) Profile of Respondents, the participants had an average age of 42.79 years. The majority were male (62.8%) and held Bachelor's degrees (88%). Most trainers had five years or less of experience (52.4%). (2) Skills of TVET Trainers, Skills Proficiency: the trainers showed proficiency across the 4Cs learning skills: Critical Thinking, Communication, Creativity, and Collaboration. The overall proficiency levels in each skill area were consistent, demonstrating that the trainers possessed the necessary competencies for their roles. Particularly, trainers exhibited proficiency in critical thinking with a mean score of 3.24, communication had a mean score of 3.32, creativity with a mean score of 3.24, and collaboration had a mean score of 3.24. (3) Demographic Variables had no significant effects on any of the 4Cs skills. The skills enhancement program development should consider these nuances to maximize effectiveness and inclusivity.*

Keywords: TVET, 21st Century Skills, Creative thinking, Communication, Collaboration, Creativity

Introduction

Technical and Vocational Education and Training (TVET) is no longer a new term in today's changing world (Salleh et al., 2020). TVET is the postsecondary education sector, providing noncredit, technical middle-level skills training to produce skilled workers. According to Budhrani et al. (2018), attention to TVET is increasing worldwide as it can increase the productivity and income of the poor, enhance employability for the unemployed, and facilitate transfer to new occupations for those currently employed Technical Education and Skills Development Authority (TESDA) offers national leadership for the TVET system by implementing competency-based curriculum standards, training regulations, and assessment and certification processes to ensure a high-quality TVET delivery throughout the country (Budhrani et al., 2018). An individual's creative mind depends on the working environment, knowledge, and problem-solving skills (Wrahatnolo, 2018).

TVET plays a significant role in ensuring that the industry in general and the hospitality sector specifically, is adequately equipped with the required skills, however, this comes with certain challenges. There is also a general lack of personnel with expertise to drive TVET making it difficult to achieve desirable outcomes (Shereni, 2020). As stated in the findings of Abdullah et al. (2022), there was a different rank of employability skills between experienced and novice trainers. Also, there are more job chances when a knowledgeable and skilled workforce exists.

Research Questions

This study aimed to assess the skills inventory of TVET trainers towards the development of a skills enhancement program. Specifically, it sought answers to the following questions:

1. How might the profile of respondents be described in terms of:
1.1 age;
1.2 gender;
1.3 educational attainment; and
1.4 number of years as a trainer?
2. How might the level of the 4Cs learning skills as perceived by trainers be described in terms of:
1.1 critical thinking;
1.2 communication;
1.3 collaboration; and
1.4 creativity?
3. Were there significant effects between the profile of respondents and the 4Cs of 21st-century learning skills of TVET trainers?
4. What enhancement program could be developed to enhance the TVET trainers' skills?

Hypothesis of the Study

The null hypothesis was tested with a .05 level of significance:

The profile of respondents has no significant effect on level of 4Cs learning skills of TVET trainers.

Theoretical Framework

The study was theoretically anchored on Experiential Learning Theory (Kolb, 1984, as cited in McCarthy, 2016). This process transforms experience into knowledge, where grasping and transforming experience leads to the production of knowledge. The experiential learning model involves a cycle of educational encounters, essential for effective learning to occur. Experiential Learning Theory aims to be a holistic, adaptive learning process that integrates experience, perception, cognition, and behavior.

Experiential learning theory, developed by David Kolb, emphasized learning through experience and reflection. Experiential learning advocates for hands-on experiences, which are critical in technical vocational education. Trainers and students in technical fields often require practical skills and knowledge, and engagement in real-world tasks enhances their comprehension. They also gained concrete experience, a pivotal element. Students frequently benefit from direct participation in practical tasks, simulations, and real-world projects to acquire firsthand experience. The emphasis on practical skills, real-world application, and a continuous cycle of experience, reflection, and learning aligns experiential learning concepts naturally with technical vocational education.

Conceptual Framework

The research paradigm that guided this study was depicted as a schematic model shown in Figure 1.

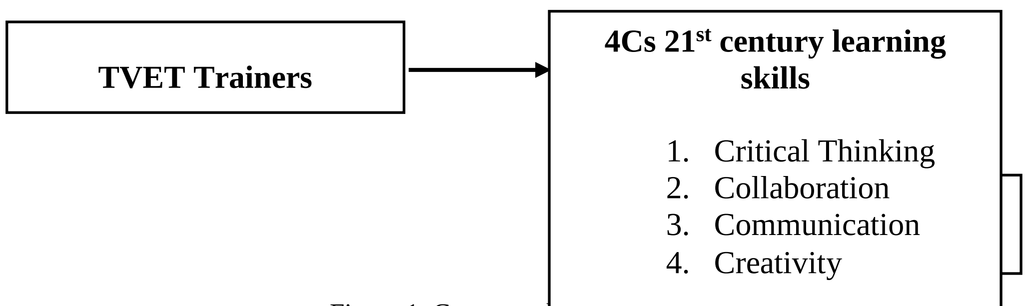

Figure 1. Conceptual Paradigm of the Study

As shown in the diagram, the conceptual paradigm of the study first identified the trainers. The demographic profiles of TVET trainers were analyzed. Next, the 4Cs of 21st-century learning skills were assessed for each trainer, including critical thinking, collaboration, communication, and creativity. Subsequently, the demographic profiles of the respondents were tested to determine if they showed significant effects on their skills. Following the skills assessment, an enhancement program was developed to further the skills of TVET trainers.

Methodology

Research Design

The study was a quantitative method in nature. It was based on the positivist paradigm, focusing on the scientific method and emphasizing the collection of new data from a large population and the analysis of that data. This method traditionally disregards individual emotions, feelings, or environmental context. The study particularly utilized a descriptive-correlational method.

According to Atmowardoyo (2018), it accurately describes real events. In the research, this conduct has been noted. Its goals include observing, characterizing, and recording an event's different aspects as it happens naturally. Since correlational research uses quantitative methods to show relationships between two or more variables, it is comparable to descriptive surveys. Using just one group of participants (for instance, students in the fifth grade) and two or more variables that the researcher does not change or control, it is nonexperimental. It is determined whether or not the variables are connected, as well as the direction and size of any such relationship. The goal of a correlational study is not to prove causation—that is, that a change in one variable causes a change in another. Rather, the principal objective of correlational research is to ascertain whether a relationship exists between utilizing quantitative statistical analysis to examine the variables.

Moreover, in gathering data, the survey questionnaire was utilized.

Sample and Sampling Design

The subject of the study was the trainers from the following training programs: (1) Agriculture-Forestry and Fishery, (2) Automotive and Land Transportation, (3) Construction, (4) decorative art, (5) electrical and electronics, (6) footwear and leather goods, (7) furniture and fixtures, (8) garments, (9) human health/health care, (10) heating, ventilation, air conditioning, and refrigeration, (11) information and communication technology, (12) maritime, (13) metals and engineering, (14) processed foods and beverages, (15) pyrotechnics, (16) tourism, (17) Utilities, and (18) Visual Arts. The Raosoft sample size calculator was used with a predetermined margin of error of 5% and a confidence level of 95% (Badrasawi et al., 2018). The sample size was 190 taken from the total of 363 trainers in 2023.

Moreover, the selection of respondents will be through a stratified sampling method. This is a sampling that involves choosing some group of items from the population based on classification and random selection. It involves separating the target population element into homogenous, mutually exclusive segments; from each segment simple random sampling is chosen. The selected sample from different strata is combined to have a single sample. Stratified sampling is the technique of probability sampling in which the characteristics of a precise variable are interpreted in the universe relative to this variable (Iliyasu & Etikan, 2021).

Research Instrument

It utilized a validated survey questionnaire to assess trainers' 4Cs 21st-century learning skills. The questionnaire was adopted from the study of Sumaya and Cruz (2023), entitled "Evaluating the outcomes of technical-vocational education and training towards developing skills for the tourism sector."

The first part of the survey questionnaire focused on the respondents' profile, including their age, gender, educational attainment, and number of years as a trainer.

The second part of the questionnaire assessed the critical thinking, collaboration, communication, and creativity skills of TVET trainers..

Data Gathering Procedure

The researcher prepared a letter to conduct the study. Her thesis adviser duly noted the letter and it was approved by the Graduate Studies dean of National University-Baliwag.

The researcher personally submitted it to the respective school respondents to ask permission to gather student data.

Upon approval of the school administrators to conduct the study, the researcher collected the accomplished rating forms of each trainer from each school.

The researcher collected the accomplished survey instruments to be checked, classified, tallied, tabulated, analyzed, and processed based on the research design in preparation for the oral/final presentation for dissertation evaluators/panelists later on.

Data Processing and Statistical Treatment

The data were collected, tabulated, and processed using Statistical Packages for Social Sciences (SPSS).

The study utilized descriptive statistics such as frequency, mean, and percentage. As described by Kaur et al. (2018), descriptive statistics summarize data in an organized manner by describing the relationship between variables in a sample or population. Calculating descriptive statistics represented a vital first step when conducting research and should always have occurred before making inferential statistical comparisons.

The trainer skills were quantified using the following scale:

Scale	**Range**	**Descriptive Rating**
4	3.26- 4.00	Advanced
3	2.51-3.25	Proficient
2	1.76-2.50	Basic
1	1.0-1.75	Novice

Ethical Considerations

The creation and implementation of specific ethical considerations in any thesis or dissertation were mandated by the Graduate Studies of National University-Baliwag Campus to ensure that ethical standards protected the interests of study participants. The researcher obtained institutional approvals from the Graduate Studies Department and the Technical Education Skills Development Authority (TESDA). Likewise, the researcher sought approval from the Research and Ethics Committee. The Research and Ethics committees were essential for maintaining high ethical standards, protecting research participants, ensuring the quality and integrity of research, and fostering public trust in scientific endeavors. Their role in reviewing, monitoring, and guiding research practices was critical to advancing knowledge in a responsible and ethically sound manner.

Therefore, the researcher followed all the comments and suggestions, and the provided ethical considerations were implemented for this research undertaking:The researcher adhered to the salient provisions of Republic Act 10173, otherwise known as the Data Privacy Act of 2012, which is generally the "free flow of information to promote innovation and growth" (Chapter 1, Section 2) while protecting the users' fundamental rights to privacy.

The dignity and well-being of teachers were protected. They would not be harmed or placed in an uncomfortable position.

The researcher obtained consent from the necessary persons, authorities, and channels before conducting the research, including essential information stated in the preceding portions of the paper. They were also informed that participating in the study is voluntary, ensuring no coercion or deception in participation. The research data remained confidential throughout the study.

Results and Discussions

Profile of Respondents

Table 1

Demographic Profile of the Respondents

Variable	N	Percentage
Sex		
Male	120	62.8%
Female	71	37.2%
Age		
Below 32.00	36	18.8%
33 - 42	52	27.2%
43 - 52	75	39.3%
53 - 62	15	7.9%
63 and above	13	6.8%

The mean age of 42.79 years suggests the sample comprises experienced individuals, likely influencing their perspectives and responses in the study. With a predominance of male participants (62.8%), potential gender-related differences should be considered in analyses and interpretations, possibly reflecting demographic realities or recruitment biases.

The distribution across age groups provides insights into the representation of different cohorts, facilitating exploration of age-related variations in responses and behaviors, including generational differences and career stages. The substantial proportion of participants in the 43 - 52 age group (39.3%) underscores the significance of mid-career professionals, offering valuable insights into skills enhancement programs.

However, the smaller percentages of participants in the 53 - 62 and 63 and above age groups indicate fewer older adults in the sample, cautioning against generalizing findings to these cohorts and recognizing potential limitations in understanding older individuals' perspectives.

The dataset's characteristics provide valuable insights into the composition of the study's participants. The mean age of 42.79 years indicates that the sample consists of individuals who are likely experienced and established in their respective fields. This demographic characteristic suggests that participants may possess a wealth of knowledge and expertise, potentially influencing their perspectives and responses in the study. Researchers should acknowledge the potential impact of participants' age on their engagement with the study materials and their understanding of the research questions.

The gender distribution in the sample is notable, with 62.8% identifying as male and 37.2% as female. This gender imbalance may reflect the demographics of the targeted population or biases in the recruitment methods used. It is crucial for researchers to consider potential gender-related differences in their analyses and interpretations, as gender can influence various aspects of behavior, cognition, and perception. Exploring gender-related response variations can provide a more comprehensive understanding of the phenomena under investigation.

Furthermore, categorizing participants into age groups provides additional context for analyzing the data. The distribution across age groups reveals varying levels of representation across different cohorts. When interpreting the study findings, researchers should be mindful of potential age-related differences in perspectives, experiences, and behaviors. Understanding how age may interact with other variables of interest can enrich the analysis and provide insights into the nuanced dynamics of the research domain.

Contrary to the result of the study of Illo (2018), where the findings indicate a higher female than male enrolment in community-based programs.

1. Skills Inventory of TVET Trainers

The skills inventory conducted among TVET (Technical and Vocational Education and Training) trainers provides a comprehensive assessment of critical thinking, communication, creativity, and collaboration skills. These skills are essential for trainers to effectively engage with students, foster learning, and prepare individuals for success in various technical fields. The analysis reveals consistent proficiency across all domains, indicating that TVET trainers possess the necessary competencies to fulfill their roles effectively.

Table 2

Descriptive Measures of the Critical Thinking Skills of TVET Trainers

Indicators	**Mean**	**Verbal Interpretation**
Asks general questions to learn information about the broad topic under investigation.	3.31	Proficient
Formulates questions related to the specific topic under investigation.	3.21	Proficient
Formulates clear and precise questions that challenge own beliefs and explore multiple angles of the topic under investigation.	3.20	Proficient
Formulate and refine thought-provoking inquiry questions, carefully phrasing them to influence the depth, quality, and value of the information obtained through the investigation.	3.24	Proficient
Describes the problem and/or stated goal(s) or objective(s) in their own words.	3.28	Proficient
Determines what prior Knowledge will be useful in solving the problem.	3.21	Proficient
Weighted Mean	**3.24**	**Proficient**

Critical Thinking Skills. Critical thinking skills got a weighted mean of 3.24 where trainers are considered proficient. The highest indicator got a mean score of 3.31 is the statement, *participants' ability to ask general questions to learn information about the broad topic under investigation*, this inidates a proficient level of performance. On the other hand, the least indicator got a mean of 3.20 which states that the trainers *formulates clear and precise questions that challenge own beliefs and explore multiple angles of the topic under investigation*, also, it indicates a proficient level of performance among TVET trainers.

Proficiency in critical thinking skills among TVET trainers is crucial for fostering a learning environment that encourages analytical reasoning and problem-solving abilities. A high level of critical thinking enables trainers to effectively guide students in understanding complex concepts, analyzing information, and making informed decisions. With strong critical thinking skills, trainers can promote a deeper understanding of the subject matter and prepare students to tackle real-world challenges in their respective fields.

Regarding critical thinking skills, participants demonstrated proficiency in various aspects, such as asking general and specific questions, formulating clear inquiries challenging their beliefs, and refining thought-provoking questions. These skills are vital for trainers to facilitate critical analysis, problem-solving, and independent inquiry among students. By encouraging critical thinking, trainers can foster a deeper understanding of the subject matter and promote higher-order cognitive skills essential for success in technical professions.

Similarly, Ismail et al. (2018) provided some data on general activities that help foster higher-order thinking skills as well as broad recommendations for teaching critical thinking and incorporating it into TVET educational procedures.

Table 3

Descriptive Measure of the Communication Skills of TVET Trainers

Indicators	**Mean**	**Verbal Interpretation**
Asks and responds to questions when prompted.	3.36	Proficient
Clarifies general or factual content by responding to/asking questions or contributing comments.	3.33	Proficient
Enhances conversation by contributing ideas, asking / responding to questions, and building upon or challenging others' comments.	3.32	Proficient
Synthesize multiple ideas from participants to develop a deeper understanding of the topic.	3.32	Proficient
Uses provided digital communication tools.	3.37	Proficient
Selects familiar digital tools to communicate a message.	3.30	Proficient
Uses appropriate digital tool(s) to clearly communicate a message in audio, visual, and/or print formats.	3.29	Proficient
Maximize impact of communication with others by using contemporary tools that are strategically aligned with desired results	3.29	Proficient

Identifies the context.	3.29	Proficient
Weighted Mean	**3.32**	**Proficient**

Communication Skills. In terms of communication skills, trainers are evaluated as proficient with a weighted mean of 3.32. The highest indicator got a mean of 3.37, states that *trainers uses provided tools*. While the lowest indicators were the following: *The trainers uses appropriate digital tool(s) to clearly communicate a message in audio, visual, and/or print formats*; *they maximize impact of communication with others by using contemporary tools that are strategically aligned with desired results*; and *identifies the context*. These all got a mean of 3.29 and interpreted as proficient.

Effective communication skills are essential for TVET trainers to convey information clearly, engage students in meaningful discussions, and facilitate learning experiences. Proficiency in communication enables trainers to create an inclusive and interactive learning environment where students feel comfortable expressing their ideas and asking questions. Furthermore, strong communication skills empower trainers to utilize various digital tools and platforms to enhance teaching and learning experiences, especially in today's technology-driven world.

Communication skills are equally important for TVET trainers to effectively convey information, engage students in discussions, and facilitate learning experiences. The analysis indicates proficiency in asking and responding to questions, clarifying content, enhancing conversations, and utilizing digital communication tools. These skills enable trainers to create an inclusive and interactive learning environment where students feel comfortable expressing their ideas and collaborating with peers.

Similarly,Van Laar et al. (2020) cited that communication skills are vital in the growing service sector and concern the ability to transmit information, ensuring that the meanings are effectively expressed by considering the audience and medium. One must effectively regulate one's needs and goals with those of the larger society to successfully navigate the current social world. Because of the interconnectedness of our global economy, employers demand people with communication skills. Likewise, Erdogan (2019) stated that communication and collaboration skills enable students to interact competently and respectfully with others, especially across cultures, in diverse and multinational workplaces and communities in our global and digital era.

Table 4

Descriptive Measures of the Collaborative Skills of TVET Trainers

Indicators	Mean	Verbal Interpretation
Sets goals for individual work related to the task.	3.25	Proficient
Explains the group's long-term goals.	3.27	Proficient
Describes the scope and relevance of the group's work.	3.23	Proficient
Provide leadership in defining the mission and vision for the work.	3.25	Proficient
States agreed-upon norms for collaboration.	3.30	Proficient
Explains how the norms support effective collaboration.	3.23	Proficient
Explains how different norms might be appropriate for different contexts and individuals.	3.24	Proficient
Overtly reinforce norms for collaboration when facilitating and/or participating in group work.	3.23	Proficient
States own opinions and ideas to group members.	3.25	Proficient
Contributes relevant ideas and opinions to support group goals.	3.25	Proficient
Shares concerns, insights, and resources with the group.	3.25	Proficient
Propose alternative ways of thinking about the task or topic to enhance the product or collaborative process.	3.24	Proficient
Requests general feedback.	3.30	Proficient
Requests general feedback pertaining to the established criteria of the task.	3.23	Proficient
Proactively solicits specific feedback on individual work in relation to group goals.	3.23	Proficient
Strategically seek and integrate targeted feedback from multiple audiences or contexts.	3.21	Proficient
Identifies own strengths and weaknesses in collaborating with others.	3.25	Proficient
Assesses individual and group performance in response to feedback and/or established criteria.	3.24	Proficient
Accurately reflects on the quality of the work; uses reflection and/or feedback to revise ideas or products.	3.23	Proficient
Analyze patterns and trends in individual and group collaboration.	3.24	Proficient
Weighted Mean	**3.24**	**Proficient**

Collaboration Skills. In collaboration skills, the trainers were evaluated as proficient and got a weighted mean of 3.24. The highest indicators. states agreed-upon norms for collaboration and requests general feedback, got a mean of 3.30 while the lowest indicator states that trainers strategically seek and integrate targeted feedback from multiple audiences or contexts. This got a mean of 3.21 and evaluated as proficient.

Collaboration skills are essential for TVET trainers to effectively work with colleagues, industry partners, and students to achieve common goals and objectives. Proficiency in collaboration enables trainers to establish clear goals, communicate expectations, and foster a supportive team environment. The analysis demonstrates proficiency in setting goals, explaining long-term objectives, establishing norms, sharing ideas/resources, seeking feedback, and assessing performance. These skills facilitate effective teamwork, mutual respect, and shared accountability within the TVET community, contributing to the overall success of training programs and initiatives.

According to Akinola et al. (2020), the interaction and collaboration between academic institutions and industries to facilitate learning, enhance functional curriculum, integrate higher institution staff into the world of work, face and tackle technological challenges, promote industrial manpower competency, and improve general standard of living, can be termed school-industry partnership It is the union of the industry with TVET institutions for the formulation of workable curriculum and smooth running of such institution in-order to ensure employable graduates are produced, industrial empowerment and sustainable development.

Table 5
Descriptive Measures of the Creativity Skills of TVET Trainers

Item	Mean	Verbal Interpretation
Identifies a problem or challenge that requires a creative solution.	3.24	Proficient
Describes aspects of the problem or challenge.	3.24	Proficient
Identifies the scope of the problem or challenge, including structures, constraints, and limitations.	3.26	Proficient
Reframe the problem or challenge, using a metaphor or analogy to yield a clear direction regarding how to approach the task.	3.24	Proficient
Articulates details or general ideas.	3.24	Proficient
Articulates specific ideas and relevant details.	3.23	Proficient
Clearly articulates ideas at a level of detail necessary for effective implementation.	3.23	Proficient
Articulate ideas and identify specific areas of ambiguity or possible obstacles.	3.23	Proficient
Asks questions about the task, process, or ideas.	3.24	Proficient
Seeks to extend understanding by questioning, trying new approaches, and/or considering new ideas.	3.23	Proficient
Seeks and considers unfamiliar ideas with an open mind.	3.23	Proficient
Seek out and explore new and contradictory ideas, unanswered questions, and complex situations or solutions.	3.26	Proficient
Summarizes or restates others' ideas; articulates own ideas to others.	3.23	Proficient
Combines own ideas with others' ideas.	3.24	Proficient
Makes connections between and builds upon others' ideas to generate new and unique insights.	3.23	Proficient
Synthesize ideas and capitalize on the different strengths and perspectives of individual group members to develop an original, cohesive product or performance.	3.25	Proficient
Identifies details about the target audience, including needs and interests, that will influence the final product or solution.	3.24	Proficient
Shapes original ideas into a product that is relevant to the target audience.	3.23	Proficient
Effectively shapes original ideas into a product that meets the needs or interests of the target audience.	3.25	Proficient
Consider multiple audience perspectives; adapt ideas to suit multiple audiences with varied needs and interests.	3.24	Proficient
Identifies own strengths and weaknesses in the product and/or process.	3.26	Proficient

Assesses the quality of the performance and creative process in response to feedback and/or established criteria.	3.21	Proficient
Accurately reflects on the quality of the work; uses reflection and/or feedback to revise ideas or products.	3.25	Proficient
Analyze patterns and trends in own creative process and product.	3.24	Proficient
Explains the relationship between effort and success.	3.28	Proficient
Sets goals for performance based on feedback and/or established criteria.	3.28	Proficient
Seeks out, selects, and uses resources and strategies to achieve goals for improving the creative process.	3.26	Proficient
Analyze patterns and prior performances to set new goals for creative thinking; revise goals in response to ongoing reflection.	3.25	Proficient
Weighted Mean	**3.24**	**Proficient**

Creativity Skills. Regarding creativity skills, TVET trainers were considered proficient and got a weighted mean of 3.24. The highest indicators were the following: ***e****xplains the relationship between effort and success and Sets goals for performance based on feedback and/or established criteria* with a mean of 3.28 and considered proficient. On the other, the lowest mean of 3.21 indicates that trainers *assesses the quality of the performance and creative process in response to feedback and/or established criteria*. However, they were also classified as proficient in this skills.

Creativity skills play a crucial role in TVET training as they enable trainers to develop innovative solutions to complex problems and adapt teaching methods to meet the diverse needs of students. The assessment highlights proficiency in identifying challenges, reframing problems, articulating ideas, synthesizing insights, and assessing performance quality. These skills empower trainers to foster creativity, experimentation, and critical reflection among students, preparing them to be adaptable and resourceful professionals in their respective fields.

Creative thinking is also seen in the form of the ability to find new relationships from a point of view that is different from before. The more critical thing is that creativity is the foundation or basis of the realization of educational innovation (Priyatni & As'ari, 2019).

Moreover, creativity is not an invariant product feature but depends on the time and sociocultural environment in which it is born. Still, within a certain time and group, people tend to agree on whether an idea can be considered more or less creative.

Differences in the Inventory of TVET Trainer's Skills.

Table 6

Descriptive Measures of the Differences of Ratings across Respondent Groups

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Critical Thinking Skills	21.696	4	5.424	0.940	.442
	(Combined)			Linearity	.343
	5.227	1	5.227		
	16.469	3	5.490		
	Within Groups		1073.770		
	Total	190			
Communication Skills	37.599	4	9.400	0.659	.621
	(Combined)			Linearity	.270
	17.490	1	17.490		
	20.109	3	6.703		
	Within Groups		2654.401		
	Total	190			
Creativity Skills	667.022	4	166.755	1.207	.309
	(Combined)			Linearity	.141
	301.786	1	301.786		
	365.235	3	121.745		
	Within Groups		25699.931		
	Total	190			
Collaboration Skills	444.755	4	111.189	1.569	.184
	(Combined)			Linearity	.198
	118.240	1	118.240		
	326.514	3	108.838		
	Within Groups		13182.617		

Total	**190**

Differences in terms of Age. For critical thinking skills, the analysis revealed no significant interaction effect between skills and age groups, F(4, 186) = 0.940, p = 0.442. Neither the linearity component (F(1, 186) = 0.905, p = 0.343) nor the deviation from linearity (F(3, 186) = 0.951, p = 0.417) was statistically significant, indicating that age did not have a significant impact on critical thinking skills.

Similarly, for communication skills, there was no significant interaction effect between skills and age groups, F(4, 186) = 0.659, p = 0.621. The linearity component (F(1, 186) = 1.226, p = 0.270) and the deviation from linearity (F(3, 186) = 0.470, p = 0.704) were also non-significant, suggesting that age did not significantly influence communication skills.

For creativity skills, the analysis showed no significant interaction effect between skills and age groups, F(4, 186) = 1.207, p = 0.309. Both the linearity component (F(1, 186) = 2.184, p = 0.141) and the deviation from linearity (F(3, 186) = 0.881, p = 0.452) were not statistically significant, indicating that age did not have a significant impact on creativity skills.

Likewise, for collaboration skills, there was no significant interaction effect between skills and age groups, F(4, 186) = 1.569, p = 0.184. The linearity component (F(1, 186) = 1.668, p = 0.198) and the deviation from linearity (F(3, 186) = 1.536, p = 0.207) were also non-significant, suggesting that age did not significantly influence collaboration skills.

The absence of significant interaction effects between skills and age groups across critical thinking, communication, creativity, and collaboration domains suggests that age did not significantly impact participants' skill levels (Critical Thinking: F(4, 186) = 0.940, p = 0.442; Communication: F(4, 186) = 0.659, p = 0.621; Creativity: F(4, 186) = 1.207, p = 0.309; Collaboration: F(4, 186) = 1.569, p = 0.184). This implies that skill development programs aimed at enhancing critical thinking, communication, creativity, and collaboration may be equally effective regardless of participants' age groups.

However, it is essential to acknowledge potential nuances that may not have been fully captured in this analysis. For instance, individual differences within age groups, such as varying levels of experience or educational backgrounds, could still influence skill development outcomes. Moreover, the specific design and implementation of skill development programs may play a crucial role in their effectiveness across different age cohorts.

Hence, while age itself may not emerge as a significant predictor of skill development outcomes in this study, further research could explore how other factors interact with age to shape skill acquisition and enhancement.

Differences in terms of Gender. There were no significant differences between males and females in critical thinking skills (t(189) = -0.135, p = 0.892), communication skills (t(189) = -1.275, p = 0.204), creativity skills (t(189) = -0.789, p = 0.431), or collaboration skills (t(189) = -1.162, p = 0.247). These results were consistent across both equal and unequal variances assumed conditions.

Cohen's d effect sizes for critical thinking (d = 2.41), communication (d = 3.77), creativity (d = 11.84), and collaboration (d = 8.49) skills indicated large differences between males and females. These effect sizes suggest that despite the lack of statistical significance, the magnitude of the differences between genders is substantial in all skill domains.

A t-test was conducted to compare the means of critical thinking skills scores between groups. Prior, Levene's test for equality of variances showed that the assumption of equal variances was met, both for the case where variances were assumed equal (F(1, 189) = 2.680, p = .103) and when not assumed equal (F(136.894) = -). The results indicated that there was no significant difference in critical thinking skills scores between groups when equal variances were assumed (t(189) = -0.135, p = .892, 95% CI [-0.75985, 0.66219]), as well as when equal variances were not assumed (t(136.894) = -0.132, p = .895, 95% CI [-0.77789, 0.68024]).

These findings suggest that there is no significant difference in critical thinking skills scores between the groups.

Critical Thinking Skills

Levene's Test for Equality of Variances	**F**	**Sig.**
Equal variances assumed	2.680	.103
Equal variances not assumed	-	-

t-test for Equality of Means	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**
Equal variances assumed	-0.135	189	.892	-0.04883	0.36045	(-0.75985, 0.66219)
Equal variances not assumed	-0.132	136.894	.895	-0.04883	0.36869	(-0.77789, 0.68024)

A t-test was conducted to compare the means of communication skills scores between groups. Prior to that, Levene's test for equality of variances indicated that the assumption of equal variances was met when variances were assumed equal (F(1, 189) = 1.921, p = .167), but the results were not available for the case when variances were not assumed equal. The results showed no significant difference in communication skills scores between groups when equal variances were assumed (t(189) = -1.275, p = .204, 95% CI [-1.82727, 0.39252]), as well as when equal variances were not assumed (t(139.764) = -1.255, p = .212, 95% CI [-1.84786, 0.41312]).
These findings suggest that there is no significant difference in communication skills scores between the groups.

Communication Skills

Levene's Test for Equality of Variances	F	Sig.
Equal variances assumed	1.921	.167
Equal variances not assumed	-	-

t-test for Equality of Means	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Equal variances assumed	-1.275	189	.204	-0.71737	0.56266	(-1.82727, 0.39252)
Equal variances not assumed	-1.255	139.764	.212	-0.71737	0.57180	(-1.84786, 0.41312)

Levene's test for equality of variances revealed that assuming equal variances, the assumption was met (F(1, 189) = 1.251, p = .265). However, the results for the case when equal variances were not assumed were not provided.

A t-test was conducted to compare the means of creativity skills scores between groups. The results indicated no significant difference in creativity skills scores between groups when equal variances were assumed (t(189) = -0.789, p = .431, 95% CI [-4.87522, 2.09025]), as well as when equal variances were not assumed (t(141.606) = -0.779, p = .437, 95% CI [-4.92488, 2.13990]).
These findings suggest that there is no significant difference in creativity skills scores between the groups.

Collaboration Skills

Levene's Test for Equality of Variances	F	Sig.
Equal variances assumed	2.791	.096
Equal variances not assumed	-	-

t-test for Equality of Means	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Equal variances assumed	-1.162	189	.247	-1.47195	1.26685	(-3.97094, 1.02704)
Equal variances not assumed	-1.137	137.245	.258	-1.47195	1.29478	(-4.03225, 1.08835)

The non-significant differences between males and females across critical thinking, communication, creativity, and collaboration skills, as indicated by the t-tests (Critical Thinking: t(189) = -0.135, p = 0.892; Communication: t(189) = -1.275, p = 0.204; Creativity: t(189) = -0.789, p = 0.431; Collaboration: t(189) = -1.162, p = 0.247), suggest that gender did not have a significant influence on participants' skill levels in these domains.

Despite the lack of statistical significance, the large effect sizes observed for critical thinking (d = 2.41), communication (d = 3.77), creativity (d = 11.84), and collaboration (d = 8.49) skills highlight substantial differences between males and females in these areas. These effect sizes suggest that while the differences may not reach conventional levels of statistical significance, they are nonetheless notable in magnitude.

However, it's important to interpret these findings cautiously. The absence of statistically significant differences could be attributed to various factors, such as sample size or measurement sensitivity. Additionally, effect sizes alone do not provide information about the direction or nature of the differences observed.

Creativity Skills

Levene's Test for Equality of Variances	**F**	**Sig.**
Equal variances assumed	1.251	.265
Equal variances not assumed	-	-

t-test for Equality of Means	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**
Equal variances assumed	-0.789	189	.431	-1.39249	1.76556	(-4.87522, 2.09025)
Equal variances not assumed	-0.779	141.606	.437	-1.39249	1.78687	(-4.92488, 2.13990)

Levene's test for equality of variances revealed that assuming equal variances, the assumption was met (F(1, 189) = 2.791, p = .096). However, the results for the case when equal variances were not assumed were not provided.

A t-test was conducted to compare the means of collaboration skills scores between groups. The results indicated no significant difference in collaboration skills scores between groups when equal variances were assumed (t(189) = -1.162, p = .247, 95% CI [-3.97094, 1.02704]), as well as when equal variances were not assumed (t(137.245) = -1.137, p = .258, 95% CI [-4.03225, 1.08835]).

These findings suggest that there is no significant difference in collaboration skills scores between the groups.

However, it's important to interpret these findings cautiously. The absence of statistically significant differences could be attributed to various factors, such as sample size or measurement sensitivity. Additionally, effect sizes alone do not provide information about the direction or nature of the differences observed.

In conclusion, while there may be substantial differences between males and females in critical thinking, communication, creativity, and collaboration skills, further research is needed to understand the underlying factors contributing to these differences and their implications. Additionally, examining contextual and individual factors could provide a more comprehensive understanding of gender-related variations in skill levels.

Differences in terms of Educational Attainment. An analysis of variance (ANOVA) was conducted to examine the relationships between Educational Attainment and Years as Trainer with four critical skills: Critical Thinking, Communication, Creativity, and Collaboration.

For Educational Attainment, there were no statistically significant differences found in Critical Thinking skills, Communication skills, Creativity skills, or Collaboration skills across different levels of education (Critical Thinking: F(3, 187) = 0.509, p = .677; Communication: F(3, 187) = 0.671, p = .571; Creativity: F(3, 187) = 2.074, p = .105; Collaboration: F(3, 187) = 1.076, p = .361).

Effect sizes (Eta squared) ranged from .008 to .032, suggesting small to moderate practical significance. While there were no statistically significant differences between skills across different levels of educational attainment, the effect sizes (Eta) suggest that educational attainment may have a small to moderate impact on creativity skills, with relatively smaller effects on critical thinking, communication, and collaboration skills. This indicates that while educational background may contribute to variations in creativity skills, other factors not considered in this analysis could also influence the development of critical thinking, communication, and collaboration abilities.

Educational Attainment	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Eta Squared**
Critical Thinking Skills	8.872	3	2.957	0.509	0.677	0.008
Communication Skills	28.656	3	9.552	0.671	0.571	0.011
Creativity Skills	849.059	3	283.02	2.074	0.105	0.032
Collaboration Skills	231.159	3	77.053	1.076	0.361	0.017

Differences in terms of Years as Trainer. Similarly, for Years as Trainer, there were no statistically significant differences found in Critical Thinking skills, Communication skills, Creativity skills, or Collaboration skills across different years of experience as a trainer (Critical Thinking: F(4, 186) = 0.311, p = .870; Communication: F(4, 186) = 0.290, p = .884; Creativity: F(4, 186) = 0.498, p = .737; Collaboration: F(4, 186) = 0.339, p = .851). Effect sizes (Eta squared) ranged from .006 to .011, indicating small effects. The effect sizes (Eta) indicate that years as a trainer may have a small effect on critical thinking, communication, creativity, and collaboration skills, suggesting that other factors not examined in this analysis may be more influential in shaping these skills among trainers.

Results suggest that, within the context of this study, educational attainment and years as a trainer may not significantly influence the development of critical skills. However, it is essential to consider the practical implications of these findings when designing training programs or interventions tailored to individuals with varying levels of education and experience as trainers.

Years as Trainer	Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Critical Thinking Skills	7.28	4	1.82	0.311	0.87	0.007
Communication Skills	16.67	4	4.167	0.29	0.884	0.006
Creativity Skills	279.567	4	69.892	0.498	0.737	0.011
Collaboration Skills	98.671	4	24.668	0.339	0.851	0.007

4. Proposed Skills Enhancement Program for TVET Trainers

Title : **Skills Mastery and Inclusive Training Program**
Objectives : To enhance the proficiency of TVET trainers in critical thinking, communication, creativity, and collaboration skills while promoting inclusivity and equality within the training environment.
Duration : 3 months (Every Saturday 8:00 AM to 5:00 PM)
Delivery: Blended Training (Face to Face and Online Training)

	Program Components	Activities
1.	**Skill Development Workshops**	*Conduct interactive workshops on the 4Cs skills (Critical Thinking, Communication, Creativity, Collaboration).*
		Utilize experiential learning techniques, case studies, and group activities to reinforce learning and skill application.
		Provide trainers with practical tools and strategies to effectively integrate these skills into their training programs.
2.	**Gender Sensitivity and Inclusion Training**	*Offer specialized training sessions addressing gender biases, stereotypes, and inclusivity in the workplace.*
		Facilitate discussions on creating a supportive and equitable training environment for all genders.
		Provide resources and guidance on promoting diversity and inclusion within training practices.
3.	**Advanced Skill Enhancement Sessions**	*Offer advanced training sessions focusing on refining and expanding trainers' critical thinking, communication, creativity, and collaboration skills.*
		Incorporate advanced techniques, case studies, and real-world simulations to challenge trainers and deepen their expertise.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

1. The Demographic Profile of Respondents

1.1 The mean age suggests that the sample comprises experienced individuals, likely influencing their perspectives and responses in the study.

1.2 With a predominance of male respondents, potential gender-related differences should be considered in analyses and interpretations, possibly reflecting demographic realities or recruitment biases.

1.3 The high percentage of bachelor's degrees indicates a well-educated sample.

1.4 The number of years of experience indicates a relatively young or inexperienced trainers.

2. TVET trainers demonstrated a high level of proficiency across all the assessed skills, indicating that they are well-equipped to engage in effective educational practices. This high competency level sets a strong foundation for implementing advanced training and development programs.

The data demonstrates that trainers are proficient across the critical 4Cs learning skills, with particular strength in communication. The low variability in proficiency levels suggests that the training program is effective in ensuring a uniformly skilled trainer cohort. This balanced proficiency enables the focus to shift towards advanced skill development and continuous professional growth, ensuring trainers remain effective and adaptable in their roles.

3. The analyses revealed no significant impact of age, gender, educational attainment, or years of experience on the proficiency levels in the 4Cs skills. This suggests that these demographic factors do not hinder a trainer's ability to perform effectively. However, the substantial effect sizes observed for gender differences, though not statistically significant, suggest there might be underlying differences in how skills are manifested or developed between male and female trainers.

Recommendations

Based on the findings and conclusions, the following are hereby recommended:

1. Implement skills enhancement programs broadly applicable across all demographic groups, given the uniform proficiency levels in critical skills. Implementing skills enhancement programs broadly applicable across all demographic groups, given uniform proficiency levels in critical skills, involves a comprehensive and inclusive approach.

2. Integrate specific training elements that address subtle differences in skills proficiency related to gender and educational background to enhance overall effectiveness.

To integrate specific training elements that address subtle differences in skills proficiency related to gender and educational background, you need to adopt a nuanced approach. This involves customizing certain aspects of the training programs while maintaining an inclusive core curriculum

3. Explore the qualitative impacts of gender on skill development and assess other factors, such as organizational culture and personal motivation, that could influence the effectiveness of training programs.

You can gain a deep understanding of how gender and other factors impact skill development, thereby enhancing the effectiveness of training programs and ensuring they are inclusive and equitable for all participants.

4. Continuously monitor and evaluate the effectiveness of training programs, making adjustments based on feedback and evolving needs of the trainers.

This ensures that your training programs are continuously monitored and evaluated effectively, allowing for ongoing adjustments that meet the evolving needs of participants and trainers

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