The Use of Content Validity Index to Determine Content Validity of Criteria for Sustainable Framework of TVET Teacher Education Program at Master's Level

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.91100182

Received: 19 November 2025; Accepted: 25 November 2025; Published: 04 December 2025

ABSTRACT

There has been report on the shortage of teachers all over the world, including TVET teachers. As main producer of TVET teacher, TVET Teacher Education programs has to be revamp in order to ensure its sustainability and durability in facing modern TVET challenges. This study aims to measure the content validity of the criteria for sustainable TVET Teacher Education program at Master's Level. A Content Validity Index (CVI) was used as main analysis method to measure the content validity. Eight personnel from TVET and teacher education sector in Malaysia public universities and industry were selected as experts in this study to evaluate on a 36 criteria of sustainable TVET Teacher Education program questionnaire. Based on the analysis, all criteria show an excellent I-CVI value of 1.000 indicating that all are relevant to the sustainable TVET Teacher Education program at Master's level with S-CVI analysis of 0.896 showing strong content validity. Overall, this finding has produced a new set of criteria for sustainable TVET Teacher Education program at Master's level. The strong content validity indicating the readiness of this set of criteria to be further validated by experts of different stakeholders so that a firm validated sustainable TVET Teacher Education program at Master's level can be developed for future endeavors.

Keywords: TVET, Teacher Education, CVI, Sustainability, Postgraduate

INTRODUCTION

In any countries, either developed or developing, recognized teachers as one of the professions that contributes towards the quality of its citizen. Therefore, it can be said that teachers are the roots of nations' talent quality and carrying vast responsibility not only in academic aspect, but also in overall aspect including skills and attitude. TVET teachers for instance are believed to have the responsibility in delivering industry-relevant training, maintaining current knowledge of technologies, assessing student competencies, fostering soft skills, and promoting lifelong learning. They also collaborate with industry partners to ensure curriculum alignment with labour market needs [1]. These all to ensure the TVET future talent of the nations are fit with the ever-changing industrial development in working sector. That is why, TVET teachers are now evolving from knowledge transmitters to guides, focusing on innovative teaching methods, cultivating students' professional skills, comprehensive qualities, and innovative spirits, while integrating interdisciplinary knowledge and advanced tools like information technology to meet diverse learning needs [2].

As any other teacher education program, TVET teachers are produced specifically from TVET teacher programs whereby the curriculum development of the program is developed according to the exclusive requirement of TVET teachers. This includes the integration of both academic and skill training with direct involvement from the industries itself. This is differed from other academic teacher training as the contribution and involvement of industry player is compulsory for TVET Teacher Education program. Previous research had included strong industry partnerships, and innovative teaching methods, all aimed at establishing sustainable, high-quality training systems tailored to local contexts as part of core component in TVET teacher education program globally together with well-structured pre- and in-service training, targeted pedagogical and domain-specific training [3].

Not only that, [4] also had concluded that professional development is essential for enhancing the competencies and self-efficacy of novice TVET teachers.

Effective TVET teacher education programs should incorporate industry collaboration to align curricula with current job market demands, emphasize innovation and technology, and focus on practical skills training to better prepare graduates, ultimately addressing the shortage of skilled workers in the workforce [5]. This includes emphasizing problem-based learning, blended learning, and work-integrated learning to create engaging educational environments that foster essential competencies such as digital literacy, green skills, and entrepreneurship [1]. Additionally, programs should prioritize the recruitment of industry-experienced professionals as educators, ensuring they possess both practical expertise and pedagogical knowledge to effectively prepare students for the evolving job market [6], [7]. Furthermore, addressing funding challenges is crucial too, as adequate resources are necessary to upgrade training facilities and equipment, thereby aligning educational offerings with modern industry standards [8]. By integrating these elements, TVET Teacher Education programs can cultivate a skilled workforce capable of meeting current and future labour demands [9]. Therefore, this study was done in order to validate the criteria of sustainable TVET Teacher Education program at Master's level. By this, the right and important criteria can be identified thus can become tools in validating the existing program to ensure its sustainability success and quality.

LITERATURE REVIEW

The key responsibilities and duties of a TVET teacher encompass a multifaceted approach to education that integrates theoretical knowledge with practical skills. Primarily, TVET teachers are tasked with guiding students to master essential scientific and technological concepts while fostering creativity and practical abilities necessary for the workforce. They also play a crucial role in shaping students' worldviews and values, ensuring a holistic educational experience [10]. Furthermore, TVET teachers must engage in continuous professional development to adapt to evolving industry demands, which includes participating in both pre-service and in-service training programs [11], [12]. This ongoing development is vital for enhancing their teaching effectiveness and professional identity, ultimately contributing to the production of skilled graduates who meet labour market needs [12], [13]. Additionally, TVET teachers are expected to act as facilitators, motivators, and mentors, thereby promoting a supportive learning environment that encourages student independence and social skills [13].

Core components of TVET teacher education programs globally encompass several critical elements aimed at enhancing the quality and relevance of training. These include well-structured service training, which integrates pedagogical and content training tailored to industry needs [3]. A strong and dynamic curriculum is essential, emphasizing competency-based approaches that align with real-world applications and industry standards, thereby equipping learners with necessary skills [14]. Continuous professional development is vital, ensuring that teachers remain updated with evolving labour market demands and pedagogical practices [15]. Additionally, strong institutional leadership and partnerships with industry are crucial for fostering effective training environments and enhancing teacher competencies [3]. Overall, these components collectively contribute to the sustainable development of TVET systems, addressing both educational and economic objectives [16].

METHODOLOGY

Content Validity Index is one of the analysis techniques used to assess the relevancy, clear and essential of a criteria list, based on expert judgment. In this study, eight experts have been identified beforehand based on their expertise in the field of TVET, teacher education and industry sector. Several criteria of experts have been set for expert selection including;

i. Has more than five (5) years of professional experience in a relevant field, such as Technical and Vocational Education and Training (TVET) or Teacher Education.

ii. Currently holds a managerial or leadership position within a related institution (e.g., university, polytechnic, skills training centre, or ministry/agency involved in TVET or education).

iii. Possesses at least a Master's degree in TVET, Education, or a closely related field.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

The use of expert panels to evaluate assessment items contributes to the robustness of the CVI, which improved the overall validity of the instruments used in various educational settings [17]. This systematic approach not only enhances the credibility of the assessments but also offers consistency among evaluators or the experts, thereby increasing inter-rater reliability and effectively leading to more trustworthy educational outcomes [18].

As recommended by [19], 8-12 experts are suitable for content validation evaluation. Upon selected, experts were given with online survey for data collection. The instrument used were a set of questionnaires with item related to the criteria for sustainable TVET Teacher Education program at Master's level. A 4-point Likert scale was used to measure the relevancy of each item as it is able to avoid a neutral midpoint value [20]. The scales are 1= not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant.

To assess the content validity, two analyses were used, namely Item-Level Content Validity Index (I-CVI) and average Scale-Level Content Validity Index (S-CVI/Ave). To calculate I-CVI, the total number of experts giving rating of 3 or 4 were divided by the total number of experts. For above six experts, the value should not be less than 0.78 [21]. Item with value near to 0.78 need to be reviewed while item with low I-CVI need to be deleted [19]. On the other hand, to calculate the S-CVI/Ave, the total items that were scored as relevant (I-CVI >.78) divided by the total number of items. The recommended value for S-CVI/Ave is 0.90 [20].

The instrument used in this study consist of 36 items related to the criteria for sustainable TVET Teacher Education program at Master's Level. The criteria were identified in the earlier phase of this study through systematic literature review. There are eight domains studied in this study. Each domain consists of several elements related to the criteria for sustainable TVET Teacher Education program at Master's level. The domains are Advanced Sustainable Curriculum, Transformational Leadership in TVET, Sustainable Research and Innovation, Capacity Building of Master's degree TVET educators, Digital and Technological Integration, Stakeholder Engagement and Partnership, Policy and Advocacy in TVET, and Sustainable Institutional Management. The structure of the instrument is shown in Table 1.

The instrument was converted into digital instrument, which is the Google Form, for online survey involving eight experts. The data collection process begins with identifying the experts and getting their consensus to participate in this study. Upon agreement, experts were given the online survey instrument by email and asked to answer the survey within a week of time. Gentle reminder was given after three days of first email followed by email of appreciation for every response. After that, the analysis of CVI begin with eight returns Google Form from eight experts. The data were analyzed using Microsoft Excel to have better formula calculation.

Table 1 The Structure Of The Instrument

Domain	No Element/Item
Advanced Sustainable Curriculum	5
Transformational Leadership in TVET	6
Sustainable Research and Innovation	6
Capacity Building of Master's degree TVET educators	5
Digital and Technological Integration	4
Stakeholder Engagement and Partnership	4
Policy and Advocacy in TVET	3
Sustainable Institutional Management	3
Total	36

RESULT

An I-CVI was calculated for each item as shown in Table 1. To further evaluate the items, a modified kappa statistic (K) was used to adjust any chance of agreement between experts. It is important to calculate the kappa value since high CVI can occurred by chance. By referring to [19], the good score of Modified Kappa is between 0.60- 0.74 while greater than 0.75 is excellent. To kept an item, it needs to have the value of I-CVI of above 0.78 with kappa score greater than 0.75. item with lower value for both I-CVI and kappa need to be revised ore removed. Furthermore, to measure the level of content validity of the overall criteria, S-CVI/Ave was calculated by averaging all the I-CVI scores of all the items. The S-CVI value calculated to be 0.896 meaning that the criterion has a strong content validity.

From the analysis, all 36 criteria achieved an Item-Level CVI (I-CVI) of 1.00 indicating all experts agreed on the relevancy of the criteria to be in the sustainable TVET Teacher Education program at Master's Level. The probability of chance agreement for these criteria is (Pc): 0.003906. it means that there is only a 0.39% chance that all eight experts would agree by luck. Since the chance is extremely low, the Modified Kappa values become very high giving the value of Modified Kappa (κ) for all items are 1.000.

Overall, based on the threshold recommended by [21], for eight experts the minimum acceptable I-CVI is 0.88. As in this study, all items met this threshold, achieving perfect agreement (I-CVI = 1.00). The overall S-CVI/Ave of 0.896 indicates strong content validity. The modified Kappa value of 1.00 for all criteria signifies excellent agreement beyond chance. Table 2 shows the 36 items with I-CVI value and Modified Kappa.

Table 2: Value Of I-Cvi And Modified Kappa

Item	I-CVI	k	Evaluation
Advanced Sustainable Curriculum			
1. Outcome-based learning should be one of the core principles in this framework.	1	1	Excellent
2. Sustainability elements such as SDG integration should be incorporated into curriculum design.	1	1	Excellent
3. Transdisciplinary approaches should be part of the curriculum design.	1	1	Excellent
4. Technology should be actively used to enhance the curriculum	1	1	Excellent
5. Including a capstone project will help Master's degree TVET educators apply what they've learned in real-world settings.	1	1	Excellent
Transformational Leadership in TVET			
6. The framework should prepare Master's degree TVET educators to engage in policy development and discussions.	1	1	Excellent
7. Strategic thinking should be key leadership skills in the program.	1	1	Excellent
8. Decision-making should be key leadership skills in the program.	1	1	Excellent
9. Ethical leadership needs to be emphasized in the framework.	1	1	Excellent

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

10. Master's degree TVET educators should be equipped to manage and lead change effectively.	1	1	Excellent
11. Educational governance should be covered as a leadership responsibility.	1	1	Excellent
Sustainable Research and Innovation			
12. Master's degree TVET educators should engage in applied research that addresses real issues in TVET.	1	1	Excellent
13. The research agenda should be aligned with industry needs and challenges.	1	1	Excellent
14. Master's degree TVET educators should be encouraged to use action research in their practice.	1	1	Excellent
15. Master's degree TVET educators should be encouraged to use case studies in their practice.	1	1	Excellent
16. The framework should support innovation of research outcomes.	1	1	Excellent
17. The framework should support commercialization of research outcomes.	1	1	Excellent
Capacity Building of Master's degree TVET educators			
18. Coaching should be part of Master's degree TVET educators' development.	1	1	Excellent
19. Mentoring should be part of Master's degree TVET educators' development.	1	1	Excellent
20. Reflective practice should be encouraged to improve teaching.	1	1	Excellent
21. Master's degree TVET educators need strong skills in curriculum design and development.	1	1	Excellent
22. Mastery of educational technology (EdTech) should be a core competency.	1	1	Excellent
Digital and Technological Integration			
23. Master's degree TVET educators should know how to use data analytic to improve teaching and learning.	1	1	Excellent
24. Understanding AI is essential for modern TVET Teacher Education program.	1	1	Excellent
25. The AR/VR tools should be incorporated into TVET teaching and learning processes.	1	1	Excellent
26. Using Learning Management Systems (LMS) should be part of TVET teaching practice.	1	1	Excellent
Stakeholder Engagement and Partnership			

27. The framework should support collaboration between government, industry and academia.	1	1	Excellent
28. The framework should have an internationalization perspective and connections.	1	1	Excellent
29. The framework should involve CSR projects that benefit the community.	1	1	Excellent
30. The alumni network should be part of the TVET ecosystem.	1	1	Excellent
Policy and Advocacy in TVET			
31. Master's degree TVET educators should understand the current policy landscape in TVET.	1	1	Excellent
32. The framework should address the national skills development agenda.	1	1	Excellent
33. There should be a strong link between Master's TVET Teacher education programs and labour market needs.	1	1	Excellent
Sustainable Institutional Management			
34. Master's degree TVET educators should be familiar with strategic resource planning and management.	1	1	Excellent
35. Quality assurance systems should be part of institutional development.	1	1	Excellent
36. Risk and crisis management should be included to prepare institutions for uncertainty.	1	1	Excellent

DISCUSSION

The aim of this article is to measure the content validity of the criteria for sustainable TVET Teacher Education program at Master's level involving eight experts in TVET and teacher education sectors. The content validity of the Criteria for sustainable TVET Teacher Education program at Master's Level was determined using the CVI process outlined by [19] that includes two measurement, I-CVI and the overall content validity (S-CVI). Overall, all criteria show excellent relevant to the sustainable framework and the S-CVI meets the criterion of 0.90 recommended by [19] indicating the overall criteria has strong content validity. Based on this finding, it can be concluded that the eight domains proposed in this study is relevant to be included in the sustainable TVET Teacher Education program at Master's level.

As aforementioned, the eight domains of sustainable TVET Teacher Education program at Master's level as studied in this article comprises of Advanced Sustainable Curriculum, Transformational Leadership in TVET, Sustainable Research and Innovation, Capacity Building of Master's degree TVET educators, Digital and Technological Integration, Stakeholder Engagement and Partnership, Policy and Advocacy in TVET, and Sustainable Institutional Management. All these domains can be found discussed well in terms of its important to the TVET Teacher Education. It is undeniable how each of the domains can successfully influence the sustainability of the program based on the past research and this has been further validated by the experts in person through this study. For instance, [22] had clearly stated that TVET teacher education programs can address the skilled workers shortage by enhancing curriculum design to include experiential and industry-based learning, investing in modern training facilities, and ensuring continuous teacher training to align with evolving workforce demands and industry standards. This is inline with the domain of Stakeholder Engagement and Partnership which focusing on the role of the stakeholder including the industries. Study by [23] also had supported this by stated that TVET teacher education programs need to align the competencies with industry standards, enhance faculty qualifications, improve course organization, integrate relevant skills, and foster a

supportive learning environment, thereby addressing the shortage of skilled tradespeople in the workforce. Furthermore, effective collaboration between vocational education institutions and industry partners is essential for aligning curricula with current and future job market demands [24].

To further compare the finding in this study to existing TVET teacher education framework, the existing TVET teacher education frameworks primarily emphasize traditional pedagogical approaches and often lack alignment with industry demands, resulting in gaps in teacher qualifications and competencies [25]. In contrast, this study finding advocate for a more flexible, competency-based model that integrates labor market components, emphasizes continuous professional development, and utilizes qualified teacher-trainers skilled in adult learning [26]. Additionally, the reforms aim to address the bureaucratic nature of current standards, which can marginalize professional knowledge, by promoting a more context-sensitive understanding of teaching practices. Furthermore, the finding in this study suggests incorporating broader competencies, such as digital pedagogical skills, to better prepare instructors for the evolving global workforce [27]. In all, the reforms seek to enhance the quality and relevance of TVET teacher education, ensuring that educators are equipped to meet contemporary educational and industry needs.

Overall, improving TVET Teacher Education program in regards of its sustainability is crucial to ensure future TVET teachers are competent as skilled educators with both pedagogical and industrial skills. As according to [24], vocational education teachers need for training are uniformly high across various demographics, indicating systemic issues rather than group-specific challenges. It is important to revisit national training frameworks to better align with the demands of future curriculum and labour market requirements. Nevertheless, TVET teacher themselves must have the initiative to further developed themselves in order to stay relevant to the industry. By having professional development that can enhance their competencies and self-efficacy, even a novice TVET teachers can address the challenges in modern TVET setting [4].

CONCLUSION

All 36 criteria demonstrate strong content validity and excellent expert agreement. No revisions are required for any of the criteria. To date, there is still no TVET Teacher Education program at Master's level that focus on the sustainability element. The criteria will then be further validated by the TVET Teacher Education program lecturers from public universities in Malaysia. Once the criteria have been validated, it will be published as new contribution to the body of knowledge that will benefit all the stakeholders especially in Malaysia.

ACKNOWLEDGMENT

This research was supported by the Ministry of Higher Education (MOHE) Malaysia through the Fundamental Research Grant Scheme Early Career (FRGS-EC/1/2024/SS109/UPSI/03/6).

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