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Assessing polytechnic program objectives after two decades: Development and validation of a qualitative evaluation instrument

Noaryanti Mohd Noor[1], Adi Irfan Che Ani[2*], Normah binti Abdullah[3], Rabeah Md Zin[4], Afaq Hayder Chohan[5]

[1]*Department of Polytechnic & Polytechnic Education, Ministry of Higher Education, Putrajaya, Malaysia.*
[2]*Department of Architecture, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia.*
[3]*Politeknik Sultan Salahuddin Abdul Aziz Shah, Malaysia.*
[4]*Department of Architecture & Built Environment, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia, Bangi, Malaysia.*
[5]*Department of Architecture, Ajman University, UAE.*

Corresponding author: Adi Irfan Che Ani (*Email: adiirfan@ukm.edu.my*)

Abstract

This study presents the development and validation of a structured interview instrument designed to evaluate the long-term effectiveness of Malaysian Polytechnic programs after two decades of implementation. The instrument aims to assess key program outcomes, including employability, skills acquisition, graduate satisfaction, community engagement, and program improvement. A panel of six experts evaluated the instrument using the Content Validity Index (CVI) and Content Validity Ratio (CVR) to ensure item clarity, relevance, and construct alignment. Findings indicated that the majority of items attained excellent content validity, with I-CVI scores of 1.00 for 19 out of 24 items, reflecting unanimous agreement among experts. These included demographic questions and items related to job relevance, skills development, and program improvement. However, several items failed to meet the minimum I-CVI threshold of 0.78, signaling the need for revision or exclusion. Despite this, the overall instrument demonstrated acceptable scale-level validity, with an S-CVI/Ave of 0.82 and an S-CVI/UA of 0.79. The results affirm the potential of the instrument as a reliable tool for assessing polytechnic program outcomes and underscore the value of expert involvement in the instrument development process. The study contributes to the field of educational assessment by offering a validated framework for program evaluation that can support evidence-based improvements in technical and vocational education policy and practice.

Keywords: Content validity index, Educational assessment, Employability, Instrument validation, Polytechnic education, Program outcomes.

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1. Introduction

1.1. Background and Significance

The success of Polytechnic programs in Malaysia is a critical factor in achieving the nation's educational and economic goals. Ensuring the quality of these programs requires a comprehensive evaluation of their ability to meet their stated aims and objectives. One key aspect of this evaluation is developing a content-validated interview instrument that can accurately assess the alignment between program aims and the experiences and perspectives of students and faculty.

Previous research has explored the implementation of Communicative Language Teaching in polytechnics, highlighting the potential of this approach in developing students' communicative skills, an essential employability skill in the country [1]. Furthermore, a qualitative study on factors contributing to international students' satisfaction with their institutional experiences in Malaysia has revealed the importance of constructivist approaches, teaching styles, campus experiences, facilities, and career preparation in shaping students' perceptions of educational quality.

Polytechnics in Malaysia were established to provide affordable vocational education that meets the demands of the workforce. Over the past 20 years, these institutions have aimed to enhance graduates' employability, encourage lifelong learning, and support local industries [2]. However, comprehensive tools are lacking to evaluate whether these programs meet their stated goals. This research proposes a content-validated interview instrument to assess the effectiveness of Polytechnic programs in achieving their intended aims.

1.2. Research Purpose and Objectives

The purpose of this study is to develop a validated interview instrument that captures the core aims of Polytechnic programs, which will be assessed through success metrics like job placement rates, graduate satisfaction, and employer feedback. Specifically, the objectives are to identify the key program aims and objectives of Polytechnics through a review of relevant literature and stakeholder consultations, design and pilot-test a semi-structured interview protocol to assess the alignment between program aims and student and faculty experiences, and evaluate the content validity of the interview instrument through expert review.

1.3. Importance of Content Validity Index

Content validity is a critical aspect of instrument development, ensuring that the instrument accurately reflects the construct of interest. The Content Validity Index (CVI) is widely recognized for ensuring an instrument's content aligns with its intended purpose, especially in educational and health research [3]. By using the CVI, we aim to refine interview questions, ensuring they adequately represent the intended constructs. To develop the content-validated interview instrument, this study will employ a multi-step process.

1.4. Research Questions

The study seeks to answer the following research questions:

- What are the core aims of Polytechnic programs, and how can they be measured effectively?
- How does the CVI method contribute to ensuring the reliability and validity of the interview instrument?

2. Literature Review

2.1. Evaluation of Polytechnic Outcomes

Research on polytechnic outcomes often focuses on employment rates, student satisfaction, and alignment with industry needs [4]. Studies have shown that successful Polytechnic programs typically produce graduates who are readily employable and possess practical skills [5]. This suggests evaluating the extent to which Polytechnic programs meet their stated aims, such as enhancing employability and supporting local industries, which is critical [6].

The importance of student and faculty perspectives in assessing program quality is well-documented. Incorporating the voices of key stakeholders allows for a comprehensive evaluation that can identify areas for improvement and ensure programs are responsive to the needs of the communities they serve.

One study found that the objectives of community service courses were identified through a review of the literature and stakeholder workshops, then validated by having students and faculty rate the importance of each objective [7]. This approach demonstrates the value of combining multiple data sources to develop a comprehensive understanding of program quality.

2.2. Instrument Development and Content Validity

Instrument development for educational assessment relies on ensuring questions are relevant, clear, and representative of the construct being measured [8]. The CVI process is often used in this context to enhance content validity by having experts evaluate each item, providing a quantitative measure of content relevance [9].

A recent study on developing a 21st-century skills assessment illustrates the importance of using a multimethod approach, including literature reviews, expert evaluation, and pilot testing, to establish content validity. Similarly, a study on developing performance assessment instruments for measuring students' scientific thinking skills emphasized the need for a Content Validity Ratio (CVR) value of 1.00 on all developed target skills to declare the instrument valid [1].

These examples highlight the rigor required in designing valid and reliable instruments, especially when measuring complex constructs such as program quality and student learning outcomes.

3. Methodology

3.1. Research Design

This study adopts a qualitative approach, utilizing semi-structured interviews to gain comprehensive insights from alumni and employers on program outcomes. CVI will be used to validate the interview protocol, ensuring the questions accurately capture the core aims of Polytechnic programs.

3.2. Instrument Development

- Item Generation: Questions were developed based on the aims of Polytechnics and input from Literature reviews and documentation reports [10].
- CVI Panel: A panel of education experts, employers, and alumni was assembled to assess the questions' clarity and relevance using a 4-point Likert scale [9].

Instrument development is a process of measuring the achievement of the goals of a Polytechnic program after 20 years of graduating students. A survey questionnaire has been designed as an instrument. Although there are various recommendations regarding the optimal number of experts, most researchers agree that at least 5 to 10 experts should be involved [11].

Table 1.
Summary of Key Constructs for measuring the achievement of a Polytechnic program after 20 years.

Dimension	Definition	Reference
Employability and Job Placement	Employability, Job Outcomes, and Practical Skills: The extent to which programs equip graduates with the necessary skills and competencies for employment.	Felstead et al. [12]
Skills Acquisition and Practical Application	Acquiring skills and applying them in practical settings: the degree to which programs provide opportunities for students to develop and apply skills relevant to their field.	Moldovan [13]
Graduate Satisfaction and Personal Development	Graduate satisfaction and holistic personal growth: students' overall satisfaction with the program and perceptions of how it contributed to their personal and professional development.	Mtawa et al. [14]
Community Engagement and Contribution	The extent to which programs engage with and contribute to the local community: programs' impact on the surrounding community, including responsiveness to local needs and involvement in community initiatives.	Brown et al. [15]
Program Improvement	The extent to which programs engage with and contribute to the local community, including their responsiveness to community needs and involvement in initiatives.	Bridgstock and Jackson [16]

The interview instrument will employ a structured approach, utilizing closed-ended questions. These questions will help ensure that the interviews systematically cover essential topics, facilitating data analysis and comparison across respondents [17].

Table 2.
Instrument Items measuring the achievement of a Polytechnic program after 20 years.

Dimension	Question No.	Item Instrument
Demographic Question	A1	"What is your age range?"
	A3	"What is your gender?"
	A3	"In which year did you graduate from the Polytechnic program?"
	A4	"What was your field of study at the Polytechnic?"
	A5	"What is your current employment status?"
	A6	"In which region are you currently living?"
	A7	"How many years of work experience have you acquired since graduating?"
	A8	"In which sector are you currently employed?"
Employability and Job Placement	B1	"Are you currently employed or self-employed?"
	B2	"How relevant is your current job to the skills and knowledge you gained in your Polytechnic program?"
	B3	"How long did it take for you to secure a job after graduation?"
	B4	"Have you experienced career advancement since graduating from the program?"
Skills Acquisition and Practical Application	C1	"How well did the Polytechnic program prepare you for the skills needed in your job?"
	C2	"Rate the effectiveness of the program's hands-on or practical training in preparing you for the workforce."
	C3	"Did you participate in an internship as part of your Polytechnic program?"
	C4	"Which skill areas were most emphasized in your program?" (Select all that apply)
Graduate Satisfaction and Personal Development	D1	"How satisfied are you with the education you received from your Polytechnic program?"
	D2	"To what extent did the program contribute to your personal and professional growth?"
	D3	"Did the program encourage you to pursue further education?"
Community Engagement and Contribution	E1	"Since graduating, have you been involved in community or volunteer activities?"
	E2	"To what extent did the program prepare you for engaging with your community?"
Program Improvement	F1	"Which of the following aspects of the program do you believe were its strongest points?" (Select all that apply)
	F2	"Do you believe there are specific areas of the program that need improvement?"
	F3	"Do you think the curriculum was relevant to the current demands of the job market?"

3.3. CVI Process

Experts rated each question's relevance and clarity, and questions scoring below 0.78 on the CVI were revised or removed [3]. The validated instrument will be pilot-tested with a small sample of stakeholders to further refine the protocol before implementation. Figure 1 explains the CVI process implemented in program development [18].

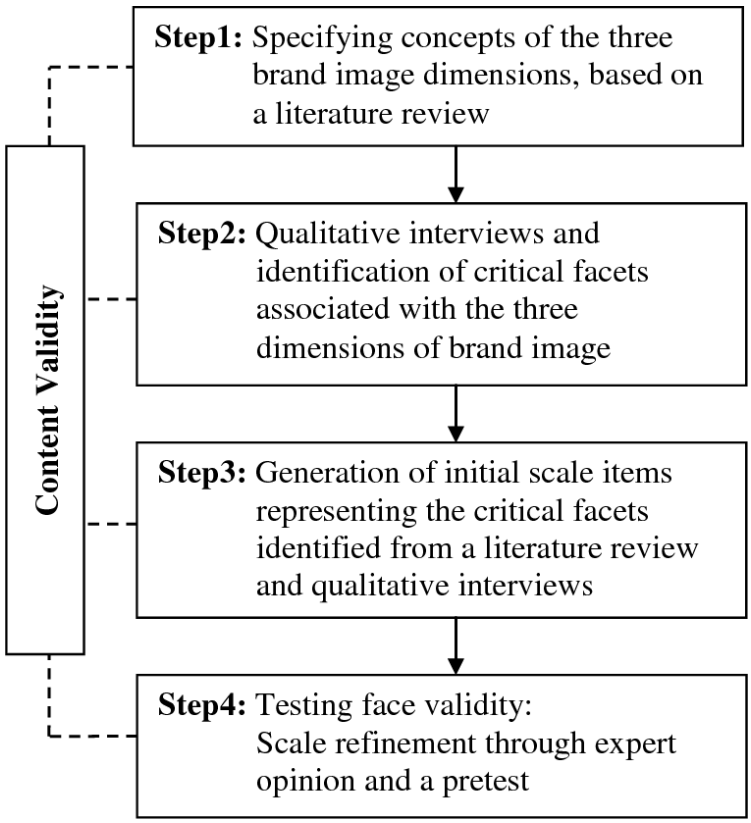

Figure 1.
Four Steps of CVI Assessment Cho [18].

Table 2 shows that the methodology of this study is divided into two main phases: development of measurement items and validation. Each phase is carefully designed to ensure that the instruments produced are valid, reliable, and relevant in the context of measuring the achievement of Polytechnic program goals after 20 years of graduating students.

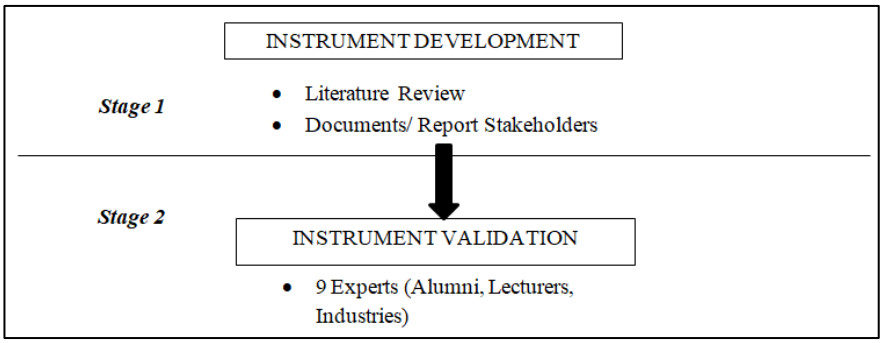

Figure 2.
The methodology of the Study.

3.4. Selection of Expert Panel

To develop an instrument to measure the achievement of Polytechnic program goals after 20 years of graduating students, selecting appropriate experts to evaluate and provide insights is critical. This selection is based on their expertise in related fields [19]. The number of selected experts plays an important role in determining the content validity of effective content validation [20]. Based on this consideration, this study has chosen to involve nine experts.

According to Polit and Beck [3], a higher CVI value is needed when the number of experts is smaller to ensure strong content validity. Table 3 shows the recommended CVI scale values based on the number of experts involved in the content validation process.

Table 3.
Number of Experts and CVI Scale Values.

Experts	CVI Value
2-4	1.00
5-7	0.83
8-10	0.78
>10	0.75

Source: Polit and Beck [3].

The number of experts enables a comprehensive assessment while maintaining process efficiency [21]. More importantly, it meets the threshold value required for CVI, which is an important measure in instrument validation [22].

4. Analysis and Discussion

Based on Table 4 provided by Yusoff [21], there are three main indices used to assess content validity: I-CVI, S-CVI/Ave, and S-CVI/UA. Each of these indices plays an important role in ensuring that the instrument developed is valid and reliable.

Table 4.
Definitions and Formulas of I-CVI, S-CVI/Ave, and S-CVI/UA.

CVI Index	Definition	Formula
I-CVI	The proportion of content experts who rate the item as relevant with a score of 3 or 4.	I-CVI = (number of agreed items)/(number of experts)
S-CVI/Ave (level scale)	The average I-CVI scores for all items on the scale or the average proportions evaluated by all experts. The relevant proportion is the average of the relevance ratings by individual experts.	S-CVI/Ave = (total I-CVI scores)/(number of items) S- CVI/Ave = (total relevance ratings)/(number of experts)
S-CVI/UA (level scale)	The proportion of items on the scale that achieve relevance ratings of 3 or 4 by all experts. A universal agreement score (UA) is assigned as 1 if the item reaches 100% approval; otherwise, the UA score is 0.	S-CVI/UA=(total UA scores)/ (number of items

Source: Yusoff [21]

In the context of this study, which involves nine experts, the I-CVI for each item will be calculated based on how many experts gave a score of 3 or 4 on the 4-point scale used. For example, if four out of six experts rate an item as relevant (score 3 or 4), the I-CVI for that item is 5/6 = 0.83. Items with an I-CVI of 0.83 or higher are considered to have good content validity and should be retained in the instrument [23].

Although the S-CVI/UA provides a more conservative measure, it may be difficult to achieve for a long or complex instrument such as the one developed in this study [24]. The instrument development and validation study for measuring the achievement of a Polytechnic program after 20 years was carefully conducted, involving content validity assessment by a panel of six experts on the instrument, containing 15 items.

This instrument includes various constructs represented by question codes such as B1-B4 (Employability and Job Placement), C1-C4 (Skills Acquisition and Practical Application), D1-D3 (Graduate Satisfaction and Personal Development), E1-E2 (Community Engagement and Contribution), F1-F3 (Program Improvement), which aim to measure various aspects of the achievement of a Polytechnic program after 20 years.

In this study, the selection of experts from various fields ensured a comprehensive assessment of the developed instrument, covering technical, psychological, and practical aspects. The interview instrument was used to assess the polytechnic program aims after 20 years of achievements [10]. The involvement of these six experts facilitated a balance between diverse perspectives and the efficiency of the assessment process. It also adhered to the recommended CVI scale values, thereby ensuring the content validity of the developed instrument [24].

The data collected from expert assessments were analyzed using Microsoft Excel 2019. To maintain confidentiality, the expert identities were replaced with numerical codes. The analysis involved calculating the CVR for each item and the CVI for the entire instrument [3]. These values provide a quantitative picture of the level of validity of the instrument from the expert perspective.

Based on the results of the CVR and CVI analyses, items that achieved the specified level of validity were retained in the final instrument. Items that did not meet the criteria were either modified based on expert feedback or removed from the instrument. This process ensured that the final instrument contained only valid and relevant items for measuring the Interview Instrument to Assess Polytechnic Program Aims after 20 years of achievements.

Table 5.
Lawshe Table for Minimum Content Validity Ratio.

Number of Panels	Minimum Value
5	0.99
6	0.99
7	0.99
8	0.75
9	0.78
10	0.62
11	0.59
12	0.56
13	0.54
14	0.51
15	0.49
20	0.42
25	0.37
30	0.33
35	0.31
40	0.29

Source: Lawshe [25]

The validation process of this instrument involves two main methods, namely CVR and CVI. CVR is calculated using the formula CVR = (Ne - N/2)/(N/2), where Ne is the number of content experts who rated the item as "important" and N is the total number of content experts [25]. CVR values can range from -1 to 1, with -1 indicating that no experts rated the item as important, and 1 indicating that all experts rated the item as important. The minimum acceptable CVR value depends on the number of experts involved. For example, for 8 experts, the minimum CVR value required is 0.75, while for 15 experts, the minimum value is 0.49 [25].

Next, CVI is divided into two types, namely individual item content validity (I-CVI) and scale-wide content validity (S-CVI) [26]. I-CVI is calculated by dividing the number of experts who rated an item as relevant or clear (scale 3 or 4) by the total number of experts. S-CVI is determined by taking the average of all 45 instrument items. To achieve acceptable content validity, the I-CVI should be 0.83 when there are five to seven experts, and at least 0.78 if there are six or more experts [3, 24]. For S-CVI, a value of at least 0.80 indicates acceptable content validity, while a value of 0.90 or higher is considered excellent [27].

In the process of instrument improvement, items with CVR or I-CVI values below acceptable levels were recommended for revision or deletion. The entire instrument was assessed based on the S-CVI, with the target of achieving a value of 0.90 or higher for excellent content validity. After assessing the dimensions and items in the Interview Instrument to Assess Polytechnic Program Aims After 20 Years of Achievements, the appointed experts were asked to independently score each item. This process is critical to ensure the content validity of the developed instrument [27].

The experts will use the provided rating scale, as shown in Table 3. This scale is specifically designed to measure the relevance of each item in the context of the Interview Instrument to Assess Polytechnic Program Aims after 20 years of achievements. Experts' assessment is a critical step in establishing the validity of an instrument and ensuring that it accurately measures the intended constructs [28]. The process involves thoroughly reviewing the instrument's items, clarity, and relevance to the study's objectives. The subsequent analysis, which may include calculating a Content Validity Index, will provide quantitative evidence supporting the instrument's suitability for assessing the outcomes of polytechnic programs [29]. The use of a content validity session, coupled with pre-testing among practitioners, is paramount to ensuring the constructs of the study are valid [30]. The integration of expert feedback and empirical testing strengthens the instrument's validity and reliability, enhancing the credibility of the research findings [30].

Table 6.
Content Validity Assessment by Expert Panel.

Question No.	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Contract No.	I-CVI	Categories	UA
A1	1	1	1	1	1	1	6	1.0	Relevant	1
A2	1	1	1	1	1	1	6	1.0	Relevant	1
A3	1	1	1	1	1	1	6	1.0	Relevant	1
A4	1	1	1	1	1	1	6	1.0	Relevant	1
A5	1	1	1	1	1	1	6	1.0	Relevant	1
A6	1	1	1	1	1	1	6	1.0	Relevant	1
A7	1	1	1	1	1	1	6	1.0	Relevant	1
A8	1	1	1	1	1	1	6	1.0	Relevant	1
B1	1	1	1	1	1	1	6	1.0	Relevant	1
B2	1	1	1	1	1	1	6	1.0	Relevant	1
B3	1	1	1	1	1	1	6	1.0	Relevant	1
B4	0	0	0	0	0	0	0	0.0	Irrelevant	0
C1	0	0	0	0	0	0	0	0.0	Irrelevant	0
C2	1	1	1	1	1	1	6	1.0	Relevant	1
C3	0	0	0	0	0	0	0	0.0	Irrelevant	0
C4	1	1	1	1	1	1	6	1.0	Relevant	1
D1	1	0	0	1	1	1	4	0.7	Irrelevant	0
D2	1	1	1	1	1	1	6	1.0	Relevant	1
D3	1	1	1	1	1	1	6	1.0	Relevant	1
E1	0	0	0	0	0	0	0	0.0	Irrelevant	0
E2	1	1	1	1	1	1	6	1.0	Relevant	1
F1	1	1	1	1	1	1	6	1.0	Relevant	1
F2	1	1	1	1	1	1	6	1.0	Relevant	1
F3	1	1	1	1	1	1	6	1.0	Relevant	1
Proportion of Relevance	0.83	0.79	0.79	0.83	0.83	0.83				
Average items for 5 experts		0.82								
Total I-CVI	19.7									
S-CVI/Ave: (Total I-CVI / Total Items)	0.82									
Category	Accepted									
Total UA	19.0									
S-CVI/UA: (Total UA / Total Items)	0.79									
Category	Accepted									

Based on Table 6, out of the 24 items evaluated by the expert panel, a large majority were rated as relevant by all six experts, achieving an I-CVI score of 1.00. These items include all demographic items (A1–A8) and several indicators under program outcome dimensions such as B1, B2, C2, C4, D2, D3, E2, and all items under "Program Improvement" (F1–F3). The unanimous ratings for these items suggest strong agreement among experts regarding their content relevance, clarity, and alignment with the intended evaluation constructs.

One item D1 achieved an I-CVI of 0.67, slightly below the threshold of 0.78, indicating moderate expert disagreement regarding its relevance or clarity. Conversely, four items B4, C1, C3, and E1 received an I-CVI of 0.00, indicating a complete lack of agreement on their relevance. These items were rated as irrelevant by all panel members and may suffer from poor wording, misalignment with the instrument's objectives, or conceptual ambiguity. Their presence poses a risk to the overall construct validity of the instrument.

Despite the high I-CVI scores for the majority of items, the scale-level validity indices reflect an overall acceptable result. The S-CVI/Ave was calculated at 0.82, and the S-CVI/UA was 0.79, both of which surpass the minimum thresholds of 0.80 and 0.78, respectively, as recommended in content validation literature [3, 24]. These values indicate that, as a whole, the instrument exhibits good content validity and expert consensus.

The validation process therefore reveals both strengths and areas for improvement. While most items are deemed valid and appropriate, a few outliers significantly reduce the consistency and reliability of the instrument. These low-scoring items should be reviewed for content clarity, theoretical alignment, and construct coverage. Eliminating or revising them based on expert feedback can enhance the overall validity of the tool.

The majority of the instrument demonstrates strong content relevance, as evidenced by high I-CVI scores. The overall content validity, as measured by S-CVI/Ave and S-CVI/UA, is acceptable, supporting the instrument's readiness for pilot testing with minor revisions. A second round of expert review post-revision is recommended to confirm improvements in the low-performing items and further strengthen the scale's validity.

5. Conclusion

This study aimed to develop and validate a structured interview instrument to assess the extent to which Malaysian Polytechnic programs have fulfilled their intended objectives after two decades of implementation. Using a rigorous methodological framework grounded in the Content Validity Index (CVI) and Content Validity Ratio (CVR), the research engaged six experts to evaluate the instrument's clarity, relevance, and representativeness across key dimensions, including employability, skills acquisition, graduate satisfaction, and program improvement.

The findings demonstrated that a majority of items achieved excellent content validity, with I-CVI scores of 1.00, indicating full agreement among all experts. These items spanned across demographic questions (A1–A8), job relevance and skills application (B1, C2, C4), graduate development (D2, D3), community contribution (E2), and all items under program improvement (F1–F3). One item (B2) achieved an acceptable I-CVI of 0.83. These results confirm the strong alignment of these items with the constructs they were designed to measure.

However, several items, including B4, C1, C3, D1, and E1, fell below the minimum I-CVI threshold of 0.78, with scores ranging from 0.00 to 0.67. These results suggest significant concerns related to content clarity, construct misalignment, or ambiguity in item framing. Nonetheless, the overall scale-level validity was found to be acceptable, with an S-CVI/Ave of 0.82 and S-CVI/UA of 0.79, both exceeding widely accepted benchmarks in the validation literature.

Despite the presence of a few underperforming items, the study successfully establishes the foundational validity of the instrument, highlighting its potential as a diagnostic tool for evaluating long-term educational outcomes in Malaysian polytechnics. The inclusion of expert judgment was pivotal in identifying strengths and weaknesses within the instrument and emphasized the necessity for iterative refinement in educational assessment tool development.

Looking ahead, targeted revisions of the low-performing items are recommended, followed by a second round of expert validation involving a more diverse panel to enhance generalizability. These steps will further ensure the instrument's reliability and applicability across a variety of polytechnic settings and stakeholder groups.

In conclusion, this study makes a significant contribution to the field of educational evaluation and instrument development by presenting a validated framework for systematically assessing Polytechnic program achievements. It supports the movement toward evidence-based policymaking in technical and vocational education and provides practical insights for policymakers, institutional leaders, and curriculum designers aiming to optimize program quality and alignment with national workforce objectives.

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