



VALIDATION OF A FLIPPED LEARNING FRAMEWORK IN PHYSIOTHERAPY: A CONTENT VALIDITY APPROACH

Physiotherapy

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ABSTRACT

Introduction: Content validity is the extent to which a measurement tool represents the measured construct and is considered essential evidence to support the validity of a measurement tool such as a Multiple-Choice Questionnaire (MCQ), Lecture PowerPoint presentation, etc. for research. Since content validity is vital to ensure overall validity, content validation should be performed systematically based on evidence and best practices. **Methodology:** We have developed a tool to examine the content validity of the blended learning approach for students' perception which contains 4 domains: Student's Knowledge and Academician's perspective towards Multiple Choice Questions, Faculty response for the Flipped Classroom Module for Community Physiotherapy (FCMCP) Module, Students Knowledge, comprehension towards the lecture, Students Knowledge, Informative towards online literature. We have been validated by 4 senior experts with more than 10 years of experience in Community Physiotherapy. Domain determination, sample generation instrument formation, and then content validity index was performed. Changes suggested by the experts were made. **Result:** Content validity index (I-CVI), scale for content validity index (S-CVI/Ave), and content validity ratio were implemented for content validity. Three dimensions (relevance, receptiveness of item, clarity) having 36 items were identified. The overall content validity index ranges from 0.94 to 0.91, respectively hence they have been appropriate. **Discussion:** It is well perceived from the above result the MCQs, Lecture ppt, Module and online literature are all appropriate for the flipped classroom study. Since they found to be gold standard in all the four domains. **Conclusion:** All the four domains were found to be appropriate for the flipped classroom.

KEYWORDS

Content Validity, Domain, MCQ, Module, Flipped Classroom.

INTRODUCTION

Various studies in research are done for investigating new tools, measuring scales, methods and material for upgrading themselves. There are no limitations or boundaries for any professionals like medical, nursing or allied to do research for academic and clinical practice.⁽¹⁾

Recently there is increase in the research in the field of physiotherapy in both academic and clinical practices. These will be helping them in their knowledge and treating their patient with new methods what they have got result from their studies and have help in upgrading themselves. Methods, materials and measurements tool -scales are used in research which need to be develop or framed with the revised version for better results.⁽²⁾ Many researchers do new researches in their own field to invent new treatment protocols for which they require scales, tools, instruments etc. which can be in the form questionnaires, and scales created by researchers are common methods for measuring factors. While constructing such new questionnaire, scales, tools etc we need to know whether the constructed item is a reliable source for the participants for whom it has been constructed, so to know this information it is important to know its validity.⁽³⁻⁴⁾ Therefore, the validity and dependability of a new tool should be considered when developing it. Thus, "validity" must be applied to any newly created tool. Validity plays a crucial role in selecting an appropriate instrument for a research study.

It is important to know how and where validity and reliability plays a role in research. Validity which is defined as the ability of an instrument to measure the properties of the construct under study, is a vital factor in selecting or applying an instrument. It is determined as its three common forms, including content, construct and criterion related validity. 3 Validity is not the property of the scores achieved by an instrument used for a specific purpose on a special group of respondents. So an each study where instrument is used should be validated for evidences. Content Validity is defined as the ability of selected items to the variables of the construct in the measure. This validity addresses the degree to which items of an instrument sufficiently represent the content domain. In addition, it can provide information on representativeness and clarity of the items and help to

improve an instrument through achieving recommended from the expert.⁽⁴⁻⁵⁾

This present is the phase 2 part of the main study i.e. validation of materials used for the flipped classroom. A self-made Multiple-choice questionnaire was framed, use of a lecture power-point presentation, flipped classroom module for community physiotherapy. Two topics were selected randomly from community physiotherapy syllabus from women's health; lecture was prepared and keeping in mind the lecture the 20 multiple choice questions were frame according to the student's intellectual capacity and level of understanding. A module was also frame on the basis of the objectives of the study. Few you tube videos were selected which were matching the topic selected and also articles were selected which were covering the details about the topic in it.⁽⁴⁻⁷⁾

Evaluation of content validity helps the researcher to provide reliable evidence to ensure the inclusion of all the important aspects and key concepts in the evaluation of the subject matter, as well as the acceptability of all the components of the tool in the view of the expert panel.⁽⁴⁾ In this process, it is of paramount importance to assess the reliability, face validity, and content validity of tool both qualitatively and quantitatively, with the centralized role of the target group in developing the research tool. The content validity evidence can be represented by the content validity index (CVI)⁽⁶⁾, for instances, several recent studies established the content validity using CVI to support the validity of an assessment tool. Based on the evidence, this paper describes the best practice to quantify content validity of an assessment tool using CVI.

The aim of this study was designed to evaluate the content validity of Validation of learning Approach in Flipped Classroom in Physiotherapy Education, which are divided in 4 domain which as follows: Students Knowledge and Academician's Perspective.

Content Validation Procedure

The following are the six steps of content validation:

- Preparing content validation form
- Selecting a review panel of experts

- (c) Conducting content validation
- (d) Reviewing domain and items
- (e) Providing score on each item
- (f) Calculating CVI

Each step will be elaborated in the subsequent subchapters.

Step 1: Preparing Content Validation Form

First step was to create the content validation form in the content validation process, which guarantees that the review panel of experts will understand the task and have clear expectations. All instruction is mentioned as to avoid any query to the experts.⁽⁶⁾

Rate the level of relevance, level of representativeness of item measuring the overarching, the level of clarity for each item on a scale of 1-4, with 4 being the most representative, essential. To verify the validity of scale, it is essential to grade the items of the instrument with a chart based on four-point Likert scale including absolutely essential (score 4), essential-Some revision (score 3), needs some revision (score 2), (score 2), and not important at all Complete revision (score 1).

Table: 1

Relevance	Representativeness of item in measuring the overarching construct	Clarity
1 = not relevant	1 = item is not representative	1 =not clear
2 = item need some revision	2 = item needs major revisions to be representative	2 = item need some revision
3 =relevant but need minor revision	3 = item needs minor revisions to be representative	3 = clear but need minor revision
4 = very relevant	4 = item is representative	4 = very clear

Step 2: Selecting a Review Panel of Experts

Four reviewers assessed for the content validity of the assessment tool e.g. Multiple-choice question, Lecture power point, module, online videos. The expertise was selected according to their experience i.e. having 10 plus years of experience in teaching field and from Community physiotherapy department as the topic are relevant to community physiotherapy. Experts were selected who fulfilled the criteria and were ready to be the part of the study. A request letter was signed from the experts for being a part of the study for giving their expert opinion. It can be concurred that for content validation, the minimum acceptable expert number is two, however most of recommendations propose a minimum of six experts and above. Considering the recommendations⁽⁴⁻⁵⁾ and the author's experience, the number of experts for content validation should be at least 6 and does not exceed 10.⁽⁶⁻⁸⁾

Step 3: Calculating CVI

There are two forms of CVI, in which CVI for item (I-CVI) and CVI

Items	Relevance (1, 2,3,4)				If scale 3 or 4 then rate 1 otherwise 0				Experts in agreement	I-CVI	UA	Interpretation
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 1	Expert 2	Expert 3	Expert 4				
Q1	4	4	4	3	1	1	1	1	4	1	1	Appropriate
Q2	4	4	4	1	1	1	1	0	3	0.75	0	Need for Revision
Q3	4	4	4	1	1	1	1	0	3	0.75	0	Need for Revision
Q4	4	4	4	4	1	1	1	1	4	1	1	Appropriate
Q5	4	4	4	4	1	1	1	1	4	1	1	Appropriate
Q6	4	4	4	4	1	1	1	1	4	1	1	Appropriate
Q7	4	4	4	4	1	1	1	1	4	1	1	Appropriate
Q8	4	4	4	4	1	1	1	1	4	1	1	Appropriate
Q9	4	4	4	2	1	1	1	0	3	0.75	0	Need for Revision
Q10	4	4	4	2	1	1	1	0	3	0.75	0	Need for Revision
Proportion relevance					1	1	1	0.6	S-CVI/Ave	0.9		
Average proportion of items judged as relevance across 4 experts					0.9				S-CVI/UA		0.6	

Step 4: Calculation I-CVI and S-CVI/Ave for Domain 1 for Relevance

The Table is Explain Below:
6 out of 10 items (Q1, Q4–Q8) had perfect agreement (I-CVI = 1.00) and were deemed appropriate. 4 items (Q2, Q3, Q9, Q10) scored I-CVI = 0.75 with at least one expert rating <3, indicating need for revision. The UA (Universal Agreement) was achieved only in items where all experts agreed (I-CVI=1.00).

Experts 1–3 consistently rated all items as relevant. Expert 4 rated only 60% of items as relevant, indicating variability in expert perception.

for scale (S-CVI). Two methods for calculating S-CVI, in which the average of the I-CVI scores for all items on the scale (S-CVI/Ave) and the proportion of items on the scale that achieve a relevance scale of 3 or 4 by all experts (S-CVI/UA) (6). The definition and formula of the CVI indices are summarised in Table 2. Prior to the calculation of CVI, the relevance rating must be recoded as 1 (relevance scale of 3 or 4) or 0 (relevance scale of 1 or 2) as shown in Table2. To illustrate the calculation of different CVI indices, the relevance ratings on item scale by ten experts are provided in Table 3. To illustrate the calculation for the CVI indices (refer to Table 2), the following are examples of calculation based on the data provided in Table 3.

Table 2:

CVI Index	Definition	Formula
I-CVI (Item-level Content Validity Index)	The proportion of content experts giving the item a relevance rating of 3 or 4.	I-CVI = (Number of experts who rated item 3 or 4) / (Total number of experts)
S-CVI/Ave (Scale-level Content Validity Index – Average Method)	The average of the I-CVI scores for all items on the scale, or the average of the proportion relevance judged by all experts. The proportion relevant is the average relevance rating by individual experts.	S-CVI/Ave = (Sum of I-CVI scores for all items) / (Number of items) or S-CVI/Ave = (Sum of proportion relevance ratings) / (Number of experts)
S-CVI/UA (Scale-level Content Validity Index – Universal Agreement Method)	The proportion of items on the scale that achieve a relevance rating of 3 or 4 by all experts. A UA score is 1 if all experts agree; otherwise, it is 0.	S-CVI/UA = (Sum of UA scores) / (Number of items)

Table 1: Calculation of CVI, I-CVI, S-CVI/Ave and S-CVI/UA (6)

Index CVI	Formula	Source
CVI (content validity index)	CVI = $\frac{\text{Total score of each expert}}{\text{Total actual score}}$	Hashimah et al. (2018)
I-CVI (item-level content validity index)	I-CVI = $\frac{\text{agreed item}}{\text{number of experts}}$	Yusoff (2019)
S-CVI/Ave (scale-level content validity index based on the average method)	S-CVI/Ave = $\frac{\text{Total score of ICVI}}{\text{Total items}}$	
S-CVI/UA (scale-level content validity index based on the universal agreement method)	S-CVI/UA = $\frac{\text{Total score of UA}}{\text{Total items}}$	

The overall scale shows acceptable content validity (S-CVI/Ave = 0.90), indicating that most items are rated as relevant by the expert panel.

However, S-CVI/UA = 0.60 suggests limited universal expert agreement; ideally, this should be ≥ 0.80 for high-quality tools. Items Q2, Q3, Q9, and Q10 scored lower and should be revised for clarity, relevance, or alignment with the construct. Additional expert feedback may be sought, especially from Expert 4, to understand reasons for lower ratings and improve content agreement.

DISCUSSION

Domain	Relevance I-CVI	Representativeness of item I-CVI	Clarity I-CVI
Domain 1	0.9	0.87	0.9
Domain 2	0.94	0.94	0.94
Domain 3	0.93	0.93	0.91
Domain 4	0.8	0.75	0.75

Based on the expert evaluations, the questionnaire demonstrates varying levels of content validity across its four conceptual domains. The Item-Level Content Validity Index (I-CVI), which indicates the degree of agreement among experts on the relevance, representativeness, and clarity of individual items, was used to assess this validity.

Domain 1 showed strong expert agreement on relevance (0.90) and clarity (0.90), suggesting the items are well-designed and easy to understand. However, the slightly lower representativeness score (0.87) indicates that some minor refinements could further enhance the domain's comprehensiveness, ensuring it fully captures all aspects of the intended concept.

Domain 2 exhibited excellent content validity, achieving perfect agreement (0.94) across all three dimensions. The consistency of these high scores highlights that the items in this domain are not only relevant and clearly presented but also accurately represent the underlying concept, requiring no further modifications.

Domain 3 also demonstrated strong content validity, with high I-CVI scores for relevance (0.93), representativeness (0.93), and clarity (0.91), all exceeding the acceptable threshold of 0.78 for four or more experts. This suggests that the domain is well-aligned with the concept it aims to measure and effectively communicates its intended meaning. However, the slightly lower clarity score suggests that a few items might benefit from minor rephrasing to improve readability and ensure complete understanding.

Domain 4, however, showed the lowest I-CVI scores, with relevance at 0.80, representativeness at 0.75, and clarity at 0.75. These scores are below the optimal benchmark of 0.90 and fall particularly short for representativeness and clarity, indicating a need for revision. Expert feedback likely highlighted issues with ambiguity and the alignment of items with the intended concept in this domain, suggesting a need for careful review and revision to improve its content validity.⁽⁸⁻¹⁰⁾

CONCLUSION

Content validity is vital to ensure the overall validity of an assessment, therefore a systematic approach for content validation should be done based on the evidence and best practice. This paper has provided a systematic and evidence-based approach to conduct a proper content validation.

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