Validation and Reliability of Hidden Informal Curriculum Assessment Tool In Pakistani Preceptive

Faisal Hanif, Rehan Ahmed Khan*, Rahila Yasmeen*

Department of Microbiology, Army Medical College Rawalpindi/National University of Medical Sciences (NUMS) Pakistan, *Department of Medical Education, Riphah International UniversityRawalpindi Pakistan

ABSTRACT

Objective: To establish construct validity of the Hidden Informal Curriculum Assessment Tool(HICAT) among Pakistani medical students.

Study Design: Quantitative Instrument validation study

Place and Duration of Study: Army Medical College, National University of Medical Sciences, Rawalpindi, Pakistan from Jan to Jun 2023.

Methodology: Data collection for was done using manually printed forms, with a minimum of thirty participants per session. A total of 271 participants were involved. The first phase of the study involved response process validity, Six individuals—four medical students and two teachers—reviewed the HICAT tool. feedback on clarity, relevance, and comprehensibility of the items was obtained. A mix of verbal probing and think-aloud techniques was used to assess content validity. The tool was revised to reduce bias by mixing positive and negative items. The participants rated the items on a five-point scale.The second phase focused on data collection from 3rd, 4th, and 5th-year students. After the collection of data, analysis was done by doing a Confirmatory factor analysis.

Results: After rerunning confirmatory factor analysis, items that had low loading in each component were removed, and modification indices were established to obtain a goodness-of-fit model. In summary, the construct validity analysis of the HICAT tool resulted in the removal of one item from positive traits and three items from negative traits, leaving a total of sixteen items.

Conclusion: The HICAT tool demonstrates satisfactory construct validity in the Pakistani culture and context for assessing the hidden informal curriculum among medical educational institutions.

Keywords: confirmatory factor analysis, construct validity, HICAT tool, Hidden curriculum.

INTRODUCTION

The hidden curriculum is unwritten, unplanned content that influences medical students positively and negatively.[1] Identifying hidden curricula might improve medical students' academic performance, and is also essential for their professional and emotional development. Hafferty defined the hidden curriculum as "a set of influences that function at the level of organizational structure and culture".[3]

Hidden and Informal Curriculum Assessment Tool, adapted from Prof. Paul McGurgan's research, was designed to quantify the often-unspoken aspects of the educational experience. It assesses students' experiences with the hidden curriculum, including both beneficial and harmful influences, encompassing professional standards, patient-doctor interactions, role modeling, and more.[2]

The construct validity of an instrument refers to

its ability to accurately measure the intended concept or trait.[4,5] This validity can be demonstrated through various methods, including the Multi-trait-Multi-method Matrix (MMTM), structural equation modeling, and factor analysis. Confirmatory Factor Analysis (CFA) is a technique that allows researchers to test hypotheses about the relationships between observed variables and underlying constructs, and also provides a straightforward interpretation of model fit indices, making it easier to assess the validity of the instrument.[6]

Hidden curricula play an integral role in shaping students' experiences and perceptions within medical education. Despite its significance, the assessment of hidden curricula remains a challenge, particularly within the context of Pakistani medical educational institutions. This study aims to validate the Hidden Informal Curriculum Assessment Tool (HICAT) in the Pakistani cultural context, ensuring its construct validity and suitability for assessing the learning environment in our medical institutions, thereby enabling its effective application in our setting. This

Correspondence: Dr Faisal Hanif, Department of Microbiology, Army Medical College Rawalpindi Pakistan

will help to facilitate the assessment of Hidden curricula among medical educational institutions. Validity and reliability are the development of solid evidence to show that the test's proposed use is consistent with how results are interpreted with the concept or construct the test is assumed to measure. HICAT will serve as a valuable resource for medical schools to evaluate and benchmark their hidden curriculum, enabling them to pinpoint areas of excellence and identify areas for improvement, ultimately fostering a more effective and supportive learning environment.

METHODOLOGY

The study was conducted at Army Medical College, National University of Medical Sciences, Rawalpindi, Pakistan from January to June 2023. The study design was a Quantitative Instrument validation study.

Ethical review board approval was taken from Army Medical College, Rawalpindi (vide ERC ID 259). Permission was taken from the Principal inventor of the HICAT questionnaire via email to use this tool and to establish its construct validity. Based on the recommended ratio of at least 10 participants per measured variable, a sample size of 250 was calculated for this study, ensuring robust and authentic findings. However, data was collected from 271 participants. Probability (purposive) sampling technique was used. Throughout the research process, complete anonymity, confidentiality, and privacy of participants was ensured. No incentives or compensation were offered to any participants in exchange for their involvement.. The study was conducted as per the following flow chart. (Figure-1).
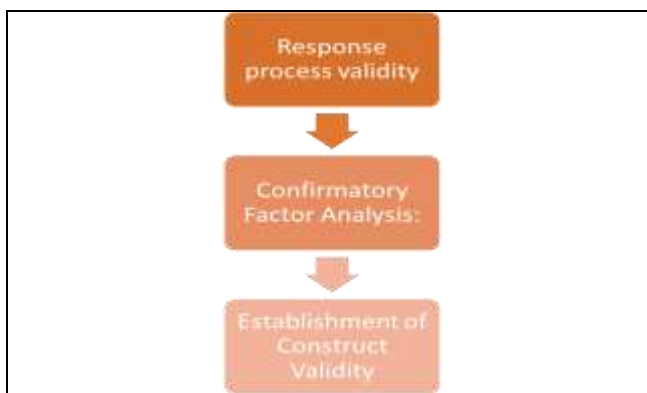

Figure-1: Study Process

Inclusion Criteria: The study included participants enrolled in BDS and MBBS program, who had atleast completed one clinical rotation in any subject.

Exclusion Criteria: Students who had not started their clinical rotation, incomplete responses were excluded from the study.

Manual printed forms were used to collect data from a group of a minimum of thirty participants at one time. The study participants included 143 female and 128 male students respectively. Among 271 participants 44 were from BDS and 227 were from MBBS. Among medical students, 113 were from 3rd year, 105 were from 4th year 53 participants were from 5th year. All Students have completed a minimum of one clinical rotation in any subject.

The first phase was to do response process validity. It was done in a student room at Army Medical College. The tool was presented for response process validity in front of four medical students and two teachers of Army Medical College. They were asked to fill out the HICAT questionnaire and provide feedback on the clarity, relevance, and comprehensibility of each item. The purpose was to assess how well respondents understood the items of HICAT. It ensured that the items were clear, meaningful, and interpreted by respondents as intended. All items were discussed one by one to inquire about any confusion or ambiguity they encountered. It is a twenty-questionnaire tool and has ten positive and ten negative items. Both verbal probing and think-aloud techniques were used to check the content validity index. After almost forty minutes of discussions, it was decided that both positive and negative items would be mixed to decrease the bias. The students have to give responses by selecting one of the five options (Always, quite frequently, occasionally, very rare, or not at all)

The second phase was of the data collection comprised of a collection of data from students of Army Medical College, Rawalpindi as per inclusion and exclusion criteria and it was entirely done in students of 3rd,4th, and 5th year of Medical College, National University of Medical Sciences. The third phase of the study was done by compiling the data in SPSS version 26 and AMOS version 26. Data analysis was done by doing a factor analysis of the gathered data. Confirmatory factor analysis was done on two factors as per the Principal inventor of the HICAT tool with positive and negative traits. Before deleting items considered unnecessary, the parameters of confirmatory factor analysis were also taken into account.[9] Using AMOS 26, we created visual models and conducted statistical analyses. The KMO measure

of sample adequacy (0.906) indicated that our sample size was sufficient. The highly significant Bartlett's test of sphericity ($p<0.001$) was likely due to the large sample size. Our results showed that the data was suitable for factor analysis, as the calculated value exceeded the recommended threshold. After refining the tool by removing poorly loading items and re-running the confirmatory factor analysis (CFA), we found high reliability indices for the positive trait domain (Cronbach α=0.94) and negative trait domain (Cronbach α=0.71). Moreover, the overall reliability of the modified tool was acceptable (Cronbach α=0.77).

AMOS 26 software was used for Confirmatory Factor Analysis. The initial model designed pertinent to two factors and their relevant items is reflected below in Figure-2. As per the initial design, the HICAT tool has two constructs including the positive and negative traits of the hidden curriculum and each construct has ten items.
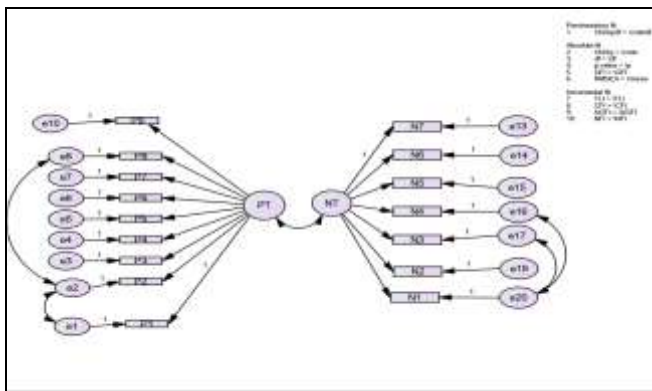

Figure-2: Initial Confirmatory Factor analysis design

We refined the tool by eliminating items with weak associations (poor loadings) within each factor and re-running the confirmatory factor analysis (CFA). This process allowed us to compute modification indices and achieve a well-fitting model with improved goodness of fit indices, ensuring a more robust and accurate representation of the underlying factors.(Figure-3).

Positive Trait Items

I have observed high professional standards in my learning environments

I have observed positive patient-doctor consultations

I have encountered health professionals; I consider positive role models

I felt supported during my placements

I have observed patients being treated as unique individuals

I have observed health professionals educating patients about their condition

I have witnessed health professionals going out of their way to assist colleagues

I was inspired to develop my doctor-patient skills

I have observed health professionals dealing with complex cases in a positive manner

Negative Trait Items

I have felt humiliated by a supervisor/instructor

I felt disadvantaged because of my ethnic background

I have witnessed discriminatory attitudes in learning environments

I felt disadvantaged because of my gender

I was troubled by the experiences I encountered during my placements

I have encountered health professionals I consider negative role models

I have observed poor interprofessional teamwork

Items deleted after construct Validity (CFA)

I have witnessed staff acknowledging their limitations

I heard judgmental remarks about a patient in the clinical workplace

I was asked to undertake a task I was not confident to perform unsupervised

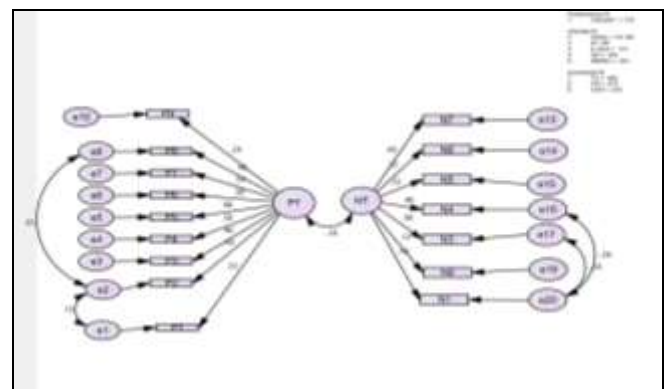I needed to compete with other medical students

Figure-3: Final Confirmatory Factor analysis design

DISCUSSION

The construct validity of HICAT is grounded in the attitudes, values, and behaviors crucial for professional growth, professional identity

Table-I: Table of Covariances

Plugin		Unobserved Variables	Observed Variables	Positive Traits	Negative Traits	Observed Variables	Unobserved Variables	Plugin	
0.10	e1-e2	e1= 0.78	P1= 1.00			N1=1.09	e20= 0.79	-0.28	< 0.001
		e2= 0.55	P2= 1.38			N2=1.74	e19=10.81		
		e3= 0.53	P3= 1.20			N3=1.61	e17= 1.61		
		e4= 0.41	P4= 1.49			N4=1.89	e16= 3.76	-0.49	< 0.001
		e5= 0.38	P5= 1.76	0.10 -0.06	0.27	N5=1.30	e15= 3.86		
		e6= 0.62	P6= 1.71			N6=1.57	e14= 0.56		
		e7= 0.78	P7= 1.82			N7=1.00	e13= 0.88		
0.15	e2-e8	e8= 0.73	P8= 1.53						
		e9= 2.21	P9= 1.17						

development, socialization, moral development, and learning. These values, attitudes, and beliefs are implicitly transmitted and embedded within the cultural fabric of the educational setting, often outside the conscious awareness and intention of both students and teachers.[12,13]

Table-II: Fit Indices

NAME	VALUE
Chi-sq/df	1.133
Absolute Fit	
Chi-Sq	112.180
Df	99
p-value	0.172
GFI	0.951
RMSEA	0.22
Incremental Fit	
TLI	0.969
CFI	0.975
AGFI	0.933

Table-III: Covariances, Estimates And Correlation Estimates

	Estimates	S. E	C.R	Correlation Estimates
PT<---->NT	-0.056	0.019	-2.888	-0.342
e16<---->e20	-0.493	0.152	-3.244	-0.287
e1<---->e2	0.096	0.042	2.285	0.146
e17<---->e20	-0.277	0.100	-2.757	-0.328
e 2<---->e 8	0.148	0.148	3.324	0.233

Various tools were reviewed before finally deciding to construct the validity of the HICAT questionnaire. The tool developed by Yazdani *et al.*, was named a comprehensive model of hidden curriculum management in medical education.[13] The model involves a three-stage process for synthesizing and developing a coherent framework: identifying and clarifying key concepts, conducting a comprehensive literature review to inform and refine these concepts, and systematically organizing and integrating the concepts into a logical and concise representation, ensuring a clear and effective model. The hidden curriculum management tool explains numerous factors that affect the hidden curriculum including the educational environment, human and learners' knowledge, and formal curriculum. These factors were not sufficient to assess the hidden curriculum. A study conducted by Australian educationists.[14] sought to promote critical reflection and facilitate discussion to evaluate the hidden curriculum using the Critical Reflection Tool (CRT) model. Although the guidelines for using the tool were not rigidly prescriptive, in many cases, the CRT was completed individually or by the Indigenous health unit, deviating from the recommended whole-school approach, which limited its effectiveness. It was not a good tool to access the hidden curriculum.[15] This study employed a Q-methodology approach called REVIEW (Reflecting & Evaluating Values Implicit in Education in the Workplace), which involved a systematic process of reflecting and evaluating fifty statements that represented the perceived values and beliefs embedded in a specific clinical culture, providing insights into the implicit values and norms that shape professional practices and learning in the workplace. It helped to access the hidden curriculum assessment in a clinical workplace about the culture of that workplace. However, it was difficult to implement in the clinical workplace.

A research study aimed to create a robust and dependable instrument for assessing and evaluating the hidden curriculum in bachelor's degree-level nursing education institutions, providing a valuable tool for educators and administrators to measure and understand the implicit values, beliefs, and cultural norms that shape nursing education and professional

development.[16] Additionally, Confirmatory Factor Analyses were conducted, and the results showed a high Cronbach's alpha reliability coefficient of 0.912, indicating a robust and reliable tool. This scale is suitable for assessing formal program outcomes, which should align with each other to ensure that nursing students' graduation outcomes meet the intended goals and standards.

A recently published pilot study conducted by Rauf *et al.*, on the development and validation of a questionnaire about hidden curriculum in medical institutes.[17] The study aimed to develop and validate a questionnaire that uncovers characteristics of hidden curricula in undergraduate medical education and was based on previously conducted qualitative research.[18] A 33-item version was refined by using exploratory factor analysis (EFA) and finally, three main factors emerged including faculty-student accountability and equal opportunity, communication, stakeholder relationships, evidence-based reforms, and student-centeredness and empowerment. These constructs collectively assessed hidden curricula in medical institutes. The study identifies three main constructs related to accountability, communication, and student-centeredness, while HICAT might encompass a wider range of factors, including values, beliefs, and attitudes. The tool by Rauf *et al.*, was fit more to identify hidden curriculum among medical students, while HICAT was designed to assess hidden curriculum during clinical rotations. Overall, both studies contribute to the understanding of hidden curricula, offering insights into the complex interplay of factors shaping medical education beyond formal curricula.

A study conducted in Peshawar aimed to assess the hidden curriculum of undergraduate medical students by HICAT. It was a survey and not aimed to develop the construct validity of the tool.[19]

The developers of HICAT introduced a rating scale to assess the frequency of occurrence of twenty specific questions, utilizing a modified Likert scale. This scale enables the measurement of both the frequency of exposure to positive and negative aspects of the hidden and informal curriculum, providing a comprehensive understanding of the learning environment. This HICAT validation study showed, that all absolute fit indices including RMSEA, GFI, ChiSq, *p*-value, and df were within the normal limit.[20] It's important to note that these fit indices are not independent of each other, and it's advisable to consider multiple fit indices together rather than relying on a single index. Ultimately, the interpretation of fit indices was considered in conjunction with other factors such as theoretical significance, model complexity, sample size, and the specific research context.

HICAT can assess students' perceptions of the values, attitudes, and beliefs that emerge from the hidden curriculum.[21] These factors shape students' perceptions and behaviors. The positive items generally align with factors that contribute to a positive learning environment and student experiences, while the negative items correspond to aspects that could hinder positive learning experiences. This alignment allows us to use the HICAT tool to systematically assess how these factors influence the hidden curriculum within the medical education context.

Further studies are required to Compare the performance and psychometric properties of the HICAT tool with other existing assessment tools for measuring the hidden curriculum in medical education.

ACKNOWLEDGMENT

LIMITATION OF STUDY

The limitation of this study was the collection of DATA from one institute only. If the data from other institutions had been collected, the results could have been improved.

CONCLUSION

The HICAT tool demonstrates satisfactory construct validity in the Pakistani culture and context for assessing the hidden informal curriculum among medical educational institutions. The questionnaire has acceptable reliability. In summary, the construct validity analysis of the HICAT tool resulted in the removal of one item from positive traits and three items from negative traits, leaving a total of sixteen items.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

FH & RAK: Conception, study design, drafting the manuscript, approval of the final version to be published.

RY: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity

of any part of the work are appropriately investigated and resolved.

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