

Content Validation and Content Validity Index Calculation for Teacher Innovativeness Instrument among Henan Private Universities in China

Du Wei¹, Bity Salwana Alias^{2*}, Jamalul Lail Bin Abdul Wahab³

^{1,2*,3}Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Malaysia.

^{2*}Faculty of Education, Universiti Kebangsaan Malaysia, 43000 Bangi, Malaysia.

*Corresponding Author: Bity Salwana Alias, Email: bity@ukm.edu.my

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Abstract:

This paper aims to assess teacher innovativeness among Henan private universities in China with a valid measurement, the content validity index (CVI). Content validity is essential for substantiating the accuracy of an assessment tool such as questionnaires, particularly in the context of research. In this process, content validity was ensured through use of an expert panel approach comprising five individuals with expertise in the studied field. Therefore, teacher innovativeness in private universities, which consists of openness to change, creativity, risk-taking propensity, and flexibility to educational changes, was analyzed and tested using CVI. This research included five expert panels in the field of educational management in China and a 4-point relevance rating scale that has already been proven to have high efficacy was used in this study. There are two types of CVIs: the Scale-level Content Validity Index (S-CVI) and the item-level Content Validity Index (I-CVI). Items scoring less than 1.00 on the I-CVI or less than 0.9 on the S-CVI were removed. The researcher found that the constructs of teacher innovativeness, including openness to change, creativity, risk-taking propensity, and flexibility, demonstrated strong content validity in assessing the extent of teacher innovativeness among Henan private universities in China. After this stage, further research on construct validity and reliability tests with the current scale is recommended. The results further confirm its suitability, indicating that this scale is applicable for researchers exploring studies that focus on teacher innovativeness within the context of private universities.

Keywords: Content Validation, Content Validity Index, Teacher Innovativeness, Instrument, Henan Private Universities.

1. Introduction

In today's rapidly evolving educational landscapes, the concept of teacher innovativeness is increasingly recognized as a critical component for advancing educational quality and fostering sustainable development within institutions (Zainal & Matore, 2019). Teacher innovativeness refers to the ability of educators to adopt new ideas, implement novel strategies, and engage in creative problem-solving to enhance their teaching effectiveness and adapt to the ever-changing educational environment (Almusawi & Durugbo, 2024). As educational institutions strive to meet the demands of the 21st century, teachers are expected not only to impart knowledge but also to cultivate an environment that encourages critical thinking, creativity, and lifelong learning (Nacaroglu, & Mutlu, 2023). This capacity for innovativeness among teachers is particularly crucial in private universities,

where there is often a need for differentiation and competitive advantage (Ersozlu et al., 2024).

The measurement of teacher innovativeness, however, presents challenges that are both methodological and conceptual. Accurate measurement tools are essential for capturing the true extent of innovativeness among teachers, as well as for guiding policy and practice within educational settings (Morad et al., 2021). Valid measurement instruments allow researchers to make meaningful interpretations about the data collected, ensuring that conclusions drawn from such research are sound and applicable (Haynes, Richard, & Kubany, 1995). Accordingly, content validity, which refers to the degree to which an instrument fully represents the construct being measured, is foundational to ensuring the overall validity of educational research (Polit & Beck, 2006).

The use of the Content Validity Index (CVI), which evaluates both item-level (I-CVI) and scale-level (S-CVI) validity, has emerged as a rigorous method for assessing content validity. This approach incorporates expert judgment to ascertain the relevance and clarity of items, thus ensuring that the instrument accurately measures the intended construct (Lynn, 1986). In this study, the CVI was employed to validate an instrument specifically designed to assess teacher innovativeness in private universities in Henan, China. This setting presents unique challenges and opportunities due to its distinct educational policies, cultural context, and organizational dynamics.

This research aims to advance understanding of teacher innovativeness in a specific geographic and educational context, thus contributing to broader discussions on effective educational practices and innovations. By focusing on private universities in Henan, this study provides insights that are particularly relevant to similar institutional settings across China and beyond, where educational innovation is increasingly prioritized. The findings from this research not only underscore the importance of using validated assessment tools but also pave the way for further investigations into strategies that enhance teacher innovativeness in private and possibly public educational institutions.

2. Literature Review

In exploring the themes of teacher innovativeness and content validity within educational assessments, this literature review synthesizes findings from relevant scholarly works, examining the conceptual foundations and methodological tools applied in these areas.

2.1 Teacher Innovativeness

Teacher innovativeness has become a key area of inquiry in educational research. It is broadly defined as the capability and willingness of educators to adopt new methodologies, technologies, and thinking paradigms to enhance teaching and learning processes. According to Usmanov (2024), teacher innovativeness involves creativity, pedagogical skills, and a proactive attitude towards educational improvement. Innovativeness in teaching is critical in fostering an engaging learning environment that can adapt to the rapidly changing demands of 21st-century education (Vidergor, 2023).

Scholarly studies have identified various factors contributing to teacher innovativeness, including individual traits like openness to experience, as well as external factors such as institutional support and professional development opportunities (Bahru et al., 2023). Research by Graciano (2023) emphasizes the importance of a supportive organizational culture in promoting innovativeness, suggesting that teachers are more likely to innovate when they perceive their environment as open to

change and risk-taking.

2.2 Content Validity in Research

Content validity is a fundamental component of test and measurement accuracy in educational research. It refers to the extent to which an assessment measures all aspects of the construct it intends to measure without extraneous elements. As Haynes, Richard, and Kubany (1995) outline, content validity is a process of ensuring that the test items are representative of the entire domain of the construct being assessed.

The process of establishing content validity often involves expert judgment and a systematic comparison of test items against the defined construct (Lynn, 1986). This ensures that the test is comprehensive and that each component aligns with the theoretical framework underpinning the construct. Content validity is not statistically derived but is substantiated through qualitative evaluation and interface with theoretical considerations.

2.3 Content Validity Index (CVI) and Its Components

The Content Validity Index (CVI) is a quantitative measure used to assess content validity, primarily in scale development. It involves a systematic approach to evaluating the relevance and clarity of test items, typically through expert assessment. Computation of the CVI allows for a more objective validation method in the development of educational assessments, making it crucial for ensuring the instrument's validity. The I-CVI (Item-level Content Validity Index) refers to the proportion of experts who agree that a particular item is essential or relevant to the construct. Polit and Beck (2006) suggest that an I-CVI of 0.78 or higher is indicative of good content validity. Calculation involves having multiple experts evaluate each item, with scores often ranging from 1 (not relevant) to 4 (extremely relevant). The S-CVI (Scale-level Content Validity Index) is the average of the I-CVIs across all items or the proportion of items that received a high relevance rating by experts. There are two commonly used methods to compute S-CVI: S-CVI/Ave (average rating across items) and S-CVI/UA (proportion agreement among items). Both methods have been supported in literature as effective means to aggregate item-level content validity into an overarching measure for the entire scale (Polit, Beck & Owen, 2007).

In sum, the confluence of research on teacher innovativeness and content validity frameworks underscores the importance of both conceptual and methodological clarity. As educational assessments grow increasingly complex and diverse, leveraging tools like the Content Validity Index ensures robust validation processes aligning with educational goals and outcomes.

3. Methodology

Content validity pertains to how accurately a measurement captures the concept that seeks to be assessed (Sekaran & Bougie, 2013). As mentioned by Polit and Beck (2006), determining content validity primarily relies on judgment and involves two different stages. The scale's originator initially strives to boost content validity by undertaking domain analysis and careful conceptualization before formulating items. After this stage, additional efforts are made to evaluate the scale's content validity via expert evaluation. Therefore, teacher innovativeness, which consists of Openness to Change, Creativity, Risk-taking Propensity and Flexibility, was analyzed and tested using CVI. The procedure

for content validation in this study has six steps based on Yusoff (2019). These stages include (1) drafting the content validation form, (2) choosing a panel of experts for review, (3) performing content validation, (4) examining items and domains, (5) assigning scores to items, and (6) calculating the CVI.

3.1 Drafting the Content Validation Form

Each expert reviewer should possess a functional understanding of the research, encompassing definitions, hypotheses to be examined, and the overall objectives for instrument utilization. A review of the instrument may become disjointed or misguided if expert reviewers are not familiar with the conceptual foundation of the study (Davis, 1992). This is why the content validity form is compulsory. The relevance rating scale endorsed by Davis (1992) was employed to assess content validity in the current research. The researcher prepared the validation form including the research purpose, definition, and measurement of the scale, for the expert reviewers, as shown in Figure 1

Assessment Guide of Content Validation

This inventory consists of teacher innovativeness with four dimensions, Openness to change, Creativity, Risk-taking Propensity and Flexibility among Henan private university of China. The items of the instrument will be provided on a 5-point Likert scale ranging from 1 strongly disagree to 7 strongly agree for the respondents after this process. Kindly offer an expert evaluation of the relevance of each item to the specified domains being measured. The evaluation should rely on the definitions and pertinent terminology outlined in the text. Please aim for objectivity and constructive comments in your review, utilizing the provided relevance rating scale.

Degree of relevance:

1=The item does not pertain to the measured domain
 2=The item is moderately related to the measured domain
 3=The item is highly relevant to the measured domain
 4=The item is extremely relevant to the measured domain

Please write the corresponding expert's consent level (1 to 4) in the space below "Expert Comments"

Figure 1 Content Validation Evaluation

Apart from the assessment criteria, this study addresses teacher innovativeness among Henan private university of China, encompassing four dimensions: openness to change, creativity, risk-taking propensity, and flexibility. Teacher Innovativeness will be measured using the "Individual Innovation Scale (IIS)" adapted from Kılıçer and Odabaşı (2010) who designed the original instrument based on Hurt et al. (1977). All the items are shown in Table 1. There are 20 items and four dimensions: "Openness to Change" includes 4 items (T1 to T4). "Creativity" includes 7 items (T5 to T9). "Risk-Taking Propensity" includes 4 items (T10 to T15). "Flexibility" includes 5 items (T16 to T20).

Table 1 Form for content verification that represents the measured constructs

Code	Tested items	Expert's Consent Level				Expert Comments
Openness to Change						
T1	I enjoy trying new ideas.	1	2	3	4	
T2	I enjoy trying new ideas.	1	2	3	4	

T3	I am receptive to new ideas.	1	2	3	4	
T4	I feel that I am an influential member of my peer group for change.	1	2	3	4	
Creativity						
T5	I frequently improvise methods for solving a problem when an answer is not apparent.	1	2	3	4	
T6	I consider myself to be creative and original in my thinking and behavior.	1	2	3	4	
T7	I am an inventive kind of person.	1	2	3	4	
T8	I find it stimulating to be original in my thinking and behavior.	1	2	3	4	
T9	I usually give a new spin on a question that my colleagues often ask me for advice or information.	1	2	3	4	
Risk-Taking Propensity						
T10	I am challenged by ambiguities and unsolved problems.	1	2	3	4	
T11	I am challenged by unanswered questions.	1	2	3	4	
T12	I enjoy taking part in the leadership responsibilities of the group I belong to.	1	2	3	4	
T13	I am generally reckless about accepting new ideas.	1	2	3	4	
T14	I am reckless of new inventions and new ways of thinking.	1	2	3	4	
T15	I trust new ideas very much, and it doesn't depend on whether the vast majority of people around me accept them.	1	2	3	4	
Flexibility						
T16	I am aware that I am usually one of the first people in my group to accept something new.	1	2	3	4	
T17	I am willing to adopt new ways of doing things regardless of whether or not I see them being useful to the people around me.	1	2	3	4	
T18	I tend to feel that the new way of living and doing things is the best way.	1	2	3	4	
T19	I don't have to see other people using new innovations before I consider them.	1	2	3	4	
T20	I often find myself trusting new ideas.	1	2	3	4	

Note(s): T = Teacher innovativeness

3.2 Choosing a Panel of Experts for Review

Considering that the respondents in this study were teachers of Henan private universities in China, this research employed five experts from three private universities in Henan province of China. The criteria for choosing experts include having relevant work experience in the same field (Rubio et al., 2003). The experts were required to meet specific criteria, including holding a master's degree, having the rank of associate professor, and possessing significant experience in the field of educational management/administration. An expert panel is designed to assess the components of the instrument and assign ratings according to their relevance and representation within the content domain (Davis, 1992). Panel experts are asked to evaluate the clarity and relevance of instrument items concerning the underlying construct by the definitions of the construct and its dimensions, using a 4-point ordinal scale. The details of the experts for assessing teacher innovativeness are outlined in Table 2.

Table 2 Relevance of objectives of teaching subjects at the university

No.	Domain expert	Organization	Experience
1	Associate Professor	Zhengzhou Sias University	13years
2	Associate Professor and Doctor	Zhengzhou Sias University	18 years
3	Associate Professor	Zhengzhou University of Finance and Economics	16 years
4	Professor and Doctor	Henan Kaifeng University of Science and Technology and Media	30 years
5	Professor	Henan Kaifeng University of Science and Technology and Media	28 years

Note(s): Experience in this study refers to the years engaged in educational management/administration.

3.3 Performing Content Validation

This study adhered to a synchronous content validity approach by providing experts with a preprepared form for their evaluation. As mentioned by Yusoff (2019), the non-face-to-face method proves highly effective when there is a well-organized follow-up system in operation to enhance both the response rate and efficiency during expert validation. In the initial stage of this study, the researcher provided an invitation letter to evaluate the instrument via email and WeChat. Upon consenting to undertake the review, the researcher furnished a cover letter that was combined with the evaluation form for teacher innovativeness. The email also needs to include a comprehensive explanation for the review, scoring, and evaluation of the instruments (Davis, 1992).

3.4 Examining Items and Domains

According to Yusoff (2019), the experts should be assigned the responsibility of comprehensively assessing both the items and their domain before assigning scores to each item. They are urged to provide either verbal or written feedback to improve the relevance of items to the specified domain.

Every comment received is carefully considered during the refinement of both the domain and its respective items. The researcher provided contact numbers and email addresses to minimize the likelihood of any misunderstandings during the completion of the evaluation form.

3.5 Assigning Scores to Items

The content validity assessment employed a 4-point relevance rating scale, which asked experts to rate each item for relevance: 1 = not relevant, 2 = moderately relevant, 3 = highly relevant, 4 = extremely relevant. Utilizing a 4-point scale eliminates the neutral midpoint option, compelling experts to make a more definitive judgment about each item's relevance (Zamanzadeh et al., 2015). This scale is noted for enhancing the precision of experts' ratings and reducing central tendency bias.

Five experts were solicited for their subjective assessments of the instruments and sent to the researcher once they were. After that, the researcher provided the survey form and comment form to the expert panel for the upcoming session. All members of the expert panel were tasked with evaluating the relevance and clarity of the indicators employed in the study instrument using the scoring technique depicted in Figure 1, along with offering open comments in the specific form as

shown in Table 1. Based on the criteria of Davis (1992), if the result of the relevance scale is 1 or 2, it can be recorded as 0, or if the relevance scale's result is 3 or 4, it can be regarded as 1. This indicates that a rating of 3 to 4 is considered the appropriate item.

3.6 Calculating the CVI

The Item-Content Validity Index (I-CVI) was calculated by dividing the number of experts giving a rating of either 3 or 4 by the total number of experts. An I-CVI of 0.78 or higher was used as an acceptable threshold for item retention, following Lynn's recommendations. Simultaneously, the Scale-Content Validity Index (S-CVI) utilized both the S-CVI/Ave (average score of I-CVIs for all items) and the S-CVI/UA (universal agreement) methods to assess the scale's overall validity (Polit & Beck, 2006). An S-CVI/Ave of 0.90 or above was deemed satisfactory.

Lynn (1986) stated that many researchers calculate two categories of CVIs to assess research objectives. The first is the I-CVI, which is calculated by assessing the percentage of experts assigning a rating of 3 or 4 and dividing this by the overall number of experts (Polit & Beck, 2006). The second type relates to the S-CVI, which represents the percentage of items in an instrument receiving a rating of either 3 or 4 from a total number of content experts (Polit et al., 2007). Polit et al. (2007) presented widely acknowledged guidelines regarding the acceptable I-CVI concerning the number of experts. They recommended that when the panel has three to five experts, the threshold of the I-CVI is 1.00, signifying unanimous agreement among all experts on the content validity of the item. Therefore, any item with an I-CVI value below 1.00 needed to be removed from this questionnaire because this study employed five experts. Table 3 outlines the criteria for the acceptable cutoff value.

Table 3 Comparison between total experts and the cutoff value

Number of experts	Acceptable CVI	References
3 to 5 experts	Should be 1	Polit et al. (2007)

At least 6 experts	A minimum of 0.83	Polit et al. (2007)
6 to 8 experts	A minimum of 0.83	Lynn (1986)
More than 8 experts	A minimum of 0.78	Lynn (1986)

4. Findings and Discussion

This research explored the validity of four dimensions of teacher innovativeness among Henan private university in China: openness to change, creativity, risk-taking propensity, and flexibility. Agreement on an item among the experts was established by consolidating the assessment scores given by all the experts for that particular item. The I-CVI is calculated using the formula I-CVI and can be calculated by agreed-upon items divided by several experts (Polit & Beck, 2006). The S-CVI is the total I-CVI score (Polit et al., 2007). There are two approaches for calculating the S-CVI: the S-CVI/UA (universal agreement), which has a minimum reasonable value of 0.80 (Davis, 1992), and the S-CVI/Ave, which has a minimum reasonable value of 0.90 or higher (Polit et al., 2007). Polit and Beck (2006) suggested that the S-CVI/Ave method is better because the universal agreement is excessively stringent, especially in the presence of a sizable number of experts on the validation panel. In detail, the experts' evaluations are presented in Table 4, Table 5, Table 6 and Table 7.

Table 4 The relevance rating on the scale of the item for openness to change

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert in Agreement	I-CVI	UA
T1	1	1	1	1	1	5	1	1
T2	1	1	1	1	1	5	1	1
T3	1	1	1	1	1	5	1	1
T4	1	1	1	1	1	5	1	1
						S-CVI/Ave	1	
	1	1	1	1	1	S-CVI/UA		1
Proportion relevance: Average proportion of items judged as relevant across the five experts							1	

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

Table 5 The relevance rating on the scale of the item for creativity

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert in Agreement	I-CVI	UA
T5	1	1	1	1	1	5	1	1
T6	1	1	1	1	1	5	1	1

T7	1	1	1	1	1	5	1	1
T8	1	1	1	1	1	5	1	1
T9	1	1	1	1	1	5	1	1
						S-CVI/Ave	1	
	1	1	1	1	1	S-CVI/UA		1
Proportion relevance: Average proportion of items judged as relevant across the five experts							1	

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

Table 6 The relevance rating on the scale of the item for risk-taking propensity

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert in Agreement	I-CVI	UA
T10	1	1	1	1	1	5	1	1
T11	1	1	1	1	1	5	1	1
T12	1	1	1	1	1	5	1	1
T13	1	1	1	1	1	5	1	1
T14	1	1	1	0	1	4	0.8	0
T15	1	1	1	1	1	5	1	1
						S-CVI/Ave	0.97	
	1	1	1	0.83	1	S-CVI/UA		0.83
Proportion relevance: Average proportion of items judged as relevant across the five experts							0.97	

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

Table 7 The relevance rating on the scale of the item for flexibility

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert in Agreement	I-CVI	UA
T16	1	1	1	1	1	5	1	1
T17	1	1	1	1	1	5	1	1
T18	1	1	1	1	1	5	1	1
T19	1	1	1	1	1	5	1	1

T20	1	1	1	1	1	5	1	1
						S-CVI/Ave	1	
	1	1	1	1	1	S-CVI/UA		1
Proportion relevance: Average proportion of items judged as relevant across the five experts							1	

Note(s): I-CVI = agreed-upon/number of experts; UA = universal agreement; S-CVI = the sum of the I-CVI

As illustrated in Table 4, Table 5, Table 6, and Table 7, teacher innovativeness was calculated in four dimensions: openness to change, creativity, risk-taking propensity, and flexibility. The evaluation showed that the S-CVI/Ave above 0.80 met the criterion requirements; thus, the scale reached the desired level of content validity. However, only one item (T14) needs to be deleted since the I-CVI score is under the threshold of 1.00. After deleting this item, the I-CVI also reached a satisfactory level. This means that the constructs of teacher innovativeness, including openness to change, creativity, risk-taking propensity, and flexibility, demonstrated strong content validity in assessing the extent of teacher innovativeness among Henan private universities in China.

Ensuring the overall validity of an assessment is highly important, and content validity plays a crucial role in this regard. This research presented an evidence-based and systematic method for performing a thorough content validation. Empirical data from expert scores in the assessment of educational management among Henan private universities in China have been demonstrated as the basis for calculating CVI using this instrument, providing a foundation for subsequent research. Furthermore, after this stage of expert evaluation, future research should employ EFA (Exploratory Factor Analysis) to explore the reliability and validity of the instrument that was measured in the current study.

While this study has made valuable contributions, it is essential to acknowledge its limitations. First, teacher innovativeness is dynamic, requiring periodic updates to research instruments. This study focused only on four dimensions of teacher innovativeness: openness to change, creativity, risk-taking propensity, and flexibility. The future studies may explore additional dimensions. Geographically, the current study specifically involved experts from private university within Henan Province, China, which limits its generalizability. Subsequent research could incorporate participants from both public universities and colleges, extending the study to diverse regions. Additionally, relying solely on a self-administered online survey in this study may have led to certain biases. Future investigations might benefit from a hybrid approach, combining online and offline self-administered surveys for a more comprehensive understanding. Finally, as this study exclusively involved private university teachers in one country, further research could broaden its scope to include university teachers from different countries and consider cultural variations.

5. Conclusion

This study was conducted to evaluate a newly developed instrument designed to measure teacher innovativeness in private universities located in Henan, China. The research focused on confirming the appropriateness of various items within the instrument to assess teacher innovativeness across four critical dimensions: openness to change, creativity, risk-taking propensity, and flexibility. By

rigorously testing this instrument, the study affirmed its validity through the calculation of the Content Validity Index (CVI). This scale has proven to be a reliable tool for administrators aiming to identify specific areas that require further development. By pinpointing these areas, educational leaders can create targeted professional development programs tailored to enhance faculty capabilities. This approach not only aims to foster a culture of innovation among teachers but also facilitates broader institutional innovation, thereby supporting a dynamic and adaptable educational environment (Aithal & Maiya, 2023). The study holds significant implications by contributing to the body of literature on teacher innovativeness in the specific context of private universities in China. This research fills a critical gap, as previous studies often overlooked these dimensions within this context. By offering a validated instrument, the study provides future researchers with valuable tools that can enhance the quality of their data, ensuring higher levels of validity and reliability in subsequent investigations. This work not only aids in advancing the academic discourse on innovativeness among educators but also equips researchers and practitioners with practical means to assess and improve teacher capabilities effectively, thus bolstering educational outcomes in the region.

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Ethical Considerations

This research was approved by the Research Ethics Committee of Universiti Kebangsaan Malaysia (Approval Ref: JEP-2024-1134).

Conflict of Interest

The authors declare no conflicts of interest.

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