Construct Validation of a Learning Resources Rubric [LRR]: A Modified Delphi Study

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Abstract

This study delivers a comprehensive exploration of the construct validation of the LRR, employing a Modified Delphi study coupled with Confirmatory Factor Analysis and Structural Equation Modeling to analyze data. Through rigorous analysis involving 576 expert instructional designers, the study achieves consensus on the LRR's multifaceted indicators, evidenced by high I-CVI values, confirming their relevance, appropriateness, and robustness. The combination of quantitative and qualitative data, including surveys, focus groups, and online document analysis, establishes the rubric's validity and points to areas for refinement. Grounded in alignment with three well-established deeper learning theories (Generative Learning Theory, Cognitive Flexibility Theory, and Reflection Theory) and the RIDLR working group's mission, this study solidifies the LRR as a crucial tool for assessing learning resources, offering significant insights for both theoretical understanding and practical application.
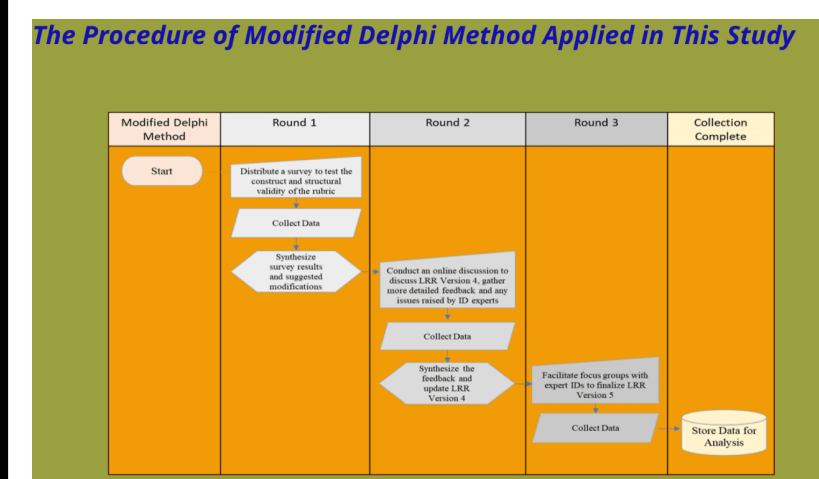
Purpose

In the burgeoning digital education landscape, instructional designers (IDs) are met with the dual challenge of navigating an ever-expanding arsenal of learning resources and the complexities of integrating emerging technologies with pedagogical theories. The nuanced understanding required to effectively apply these theories in designing learning resources that foster deeper learning remains a significant hurdle, exacerbated by the absence of specialized rubrics aimed at aiding IDs in this critical task. Addressing this gap, the Learning Resource Rubric (LRR) was conceived as a comprehensive tool to streamline the selection and creation of learning resources, promoting not just engagement but profound learning experiences.

This study embarked on a three-round modified Delphi process to rigorously evaluate the LRR's construct validity, structural validity, and usability, building upon initial validations with novice instructional designers (NIDs) (Wang & Koszalka, 2023) and adhering to an adapted validity framework (Company et al., 2015; DeVellis, 2021).

Methods

This study unfolds the complexity of educational research by employing a convergent mixed-methods approach, intricately weaving together quantitative rigor and qualitative depth. With this dual-lens, we delve into the nuances of construct and structural validity, harmonizing the perspectives of seasoned expert instructional designers (IDs) to create a symphony of insights (Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004).

The Procedure of Modified Delphi Method Applied in This Study

*The Online Delphi Design Process for This Study*

The figure above outlines the sequential multi-stage Modified Delphi method employed in this study. This is the testament to the rigorous iterative process that underpins this study,
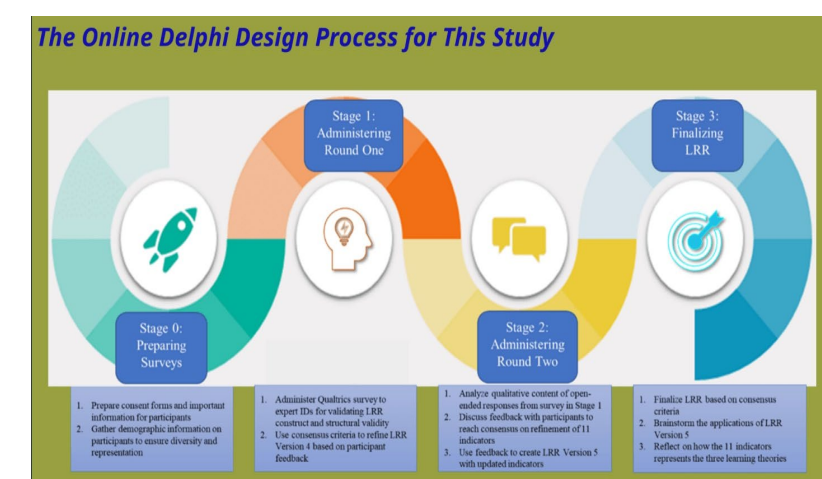
The cyclical flow of this Delphi design, presented in the figure above, showcases the three stages of the approach: from preparation and consent, through the administration of tools to finalization of LRR.

Data Sources and Materials

Sequential Participant and Data Selection

The Online Delphi Design Process for This Study
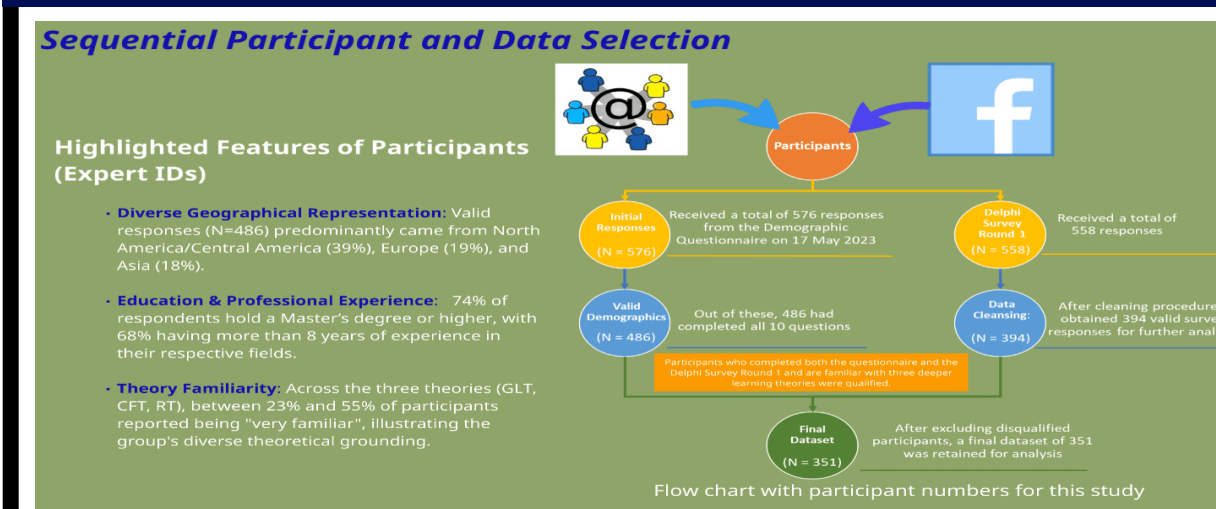
To attain a deep understanding of three learning theories, this study meticulously determined the required sample size for a thorough validation process. See the left figure. Heeding the counsel of Comrey and Lee (1992) and affirmed by Kline (2016), researchers established a baseline of 300 participants for a robust Confirmatory Factor Analysis (CFA). The complexities of Structural Equation Modeling (SEM) further bolstered our resolve for a comprehensive and varied sample.
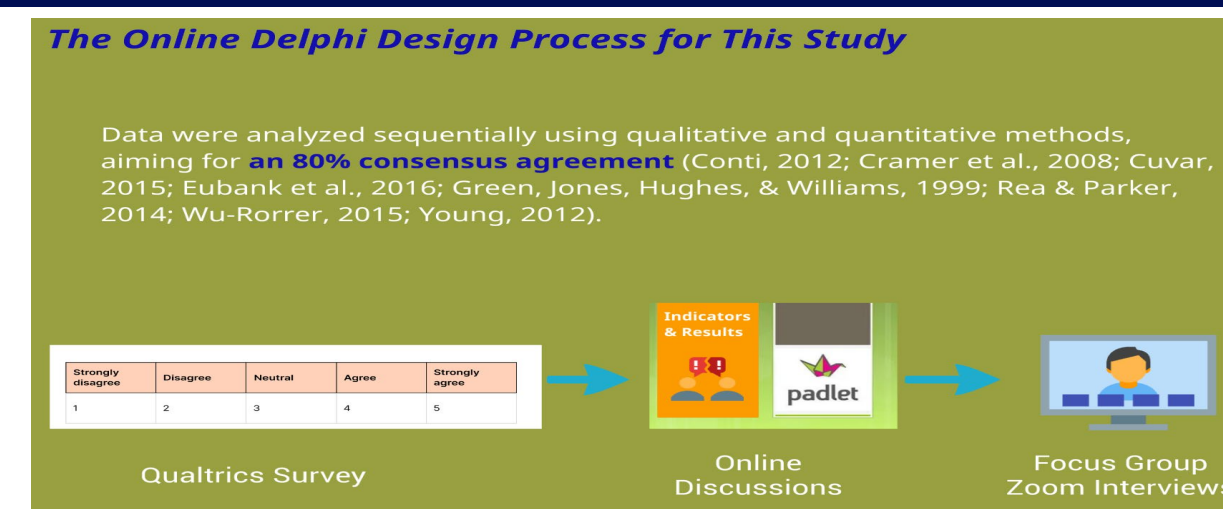
Instrumental to this study were the questionnaires—central to the figure above—crafted with precision to gauge 11 indicators reflective of the deep learning theories, each item soliciting responses on a 5-point Likert scale. The digital currents of an Instructional Sciences Program alum listserv and an online community of Instructional Designers carried these questionnaires far and wide, while snowball sampling cast an even broader net, following by discussions and interviews.

Results

Demographic Questionnaire Results

In a survey with 576 responses, 486 were valid, completing all 10 questions. This survey of 486 valid responses from instructional design professionals revealed a broad age, geographic, and professional distribution, with the largest age group being 40-49 years old, significant representation from North America/Central America, and a majority working in higher education or possessing advanced degrees. Key findings include a high level of experience in the field, with 42% having 17-25 years of experience, and varied familiarity with learning theories, notably a 55% high familiarity with Cognitive Flexibility Theory.

Consensus Achievement

The Modified Delphi study successfully reached a consensus among 351 expert IDs on the LRR's multifaceted indicators, with participants who reported having less than 8 years of work experience in the field of instructional design and those who indicated unfamiliarity with any of the three deeper learning theories were excluded from the analysis. This exclusion was necessary as these participants may not possess the necessary expertise to evaluate the alignment of the indicators with the deeper learning theories. High I-CVI values affirming their relevance, appropriateness, and robustness.

Factor Analysis Insights

Through CFA and SEM, the study provided a detailed exploration of the interplay between various LRR factors, establishing convergent and divergent validity. The CFA was conducted using SPSS AMOS 23 software. The evaluation of the CFA model fit was assessed using various indices. The evaluation of the CFA model fit indicates a good fit of the evaluation model, with a significant P-value of 0.099 (>0.05) and favorable values for CMIN/DF (2.317<3) and RMR (0.008<0.05). The CFI value of 0.996(>0.9) demonstrates an excellent fit, and the RMSEA value of 0.061 indicates a good fit of the model. These findings support the significant alignment of the indicators with the three deeper learning theories.

Potential Redundancy

his section encapsulates the reliability analysis for Section 3 of the Delphi Survey Round 1, focusing on the relevance and appropriateness of 11 indicators from the rubric for measuring quality learning resources. In this study, if the value of Cronbach's Alpha is high—generally anywhere between 0.70 and 0.95—it's a good sign that the questions in the survey are really getting to the heart of the same idea. This makes the responses to these questions more reliable, as they all contribute to a collective understanding of the underlying concept being measured. The rigorous analysis also pointed to areas within the LRR where potential redundancy existed, suggesting opportunities for further refinement and adaptation.

Alignment with Theories

The focus group interviews also provided insights into their decision-making processes during the completion of Delphi Survey Round 1.They highlighted the importance and/or concerns of each category in promoting deeper learning outcomes. The alignment of the LRR with the three deeper learning theories, confirmed its theoretical grounding and relevance to contemporary educational paradigms.

Conclusion

The scientific and scholarly significance of this study is manifold.

Theoretical Contributions:

By grounding the LRR in established learning theories, the study contributes to a richer theoretical understanding of learning resource assessment and design. By identifying whether a learning resource can effectively prompt learners to reach a deeper level of content understanding, this study advances the existing literature and provides a theory-based rubric that can guide instructional designers in their decision-making processes.

Practical Implications:

The validation of the LRR paves the way for its practical application in various educational contexts. Instructional designers, educators, librarians and curriculum developers can leverage the validated rubric for a more informed and effective selection, creation, and evaluation of learning resources.

Methodological Strength:

The combination of the Modified Delphi study with CFA and SEM showcases a robust methodological approach that can inspire future studies. The integration of quantitative and qualitative methods adds depth and reliability to the findings.

Potential for Further Research:

The study not only validates the LRR but also uncovers areas for further refinement and research, nurturing ongoing scholarly discourse on learning resource design and evaluation.

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