Content validity of quality test instrument used for the user interface design of THK-ANEKA-based countenance evaluation application

D G H Divayana¹, I P W Ariawan² and A Adiarta³

¹Department of Information Technology Education, Universitas Pendidikan Ganesha,
²Department of Mathematics Education, Universitas Pendidikan Ganesha,
³Department of Electrical Education, Universitas Pendidikan Ganesha

¹Corresponding Author’s Email : hendra.divayana@undiksha.ac.id

Abstract. The quality of the user interface design determines the success of the functionality of an application greatly. Therefore, the user interface design needs to be tested using a valid set of test instruments to obtain good quality. These valid instruments are obtained by performing instrument content validity. Considering that, this research intended to determine the content validity of test instrument that used to test the quality of user interface design the Countenance evaluation application based on the basic concept of Accountability, Nationalism, Public Ethics, Anti-Corruption (ANEKA) and Tri Hita Karana (THK). This research used an instrument development approach. Subjects that were involved in testing the validity of instrument content were two experts, consisting of an education evaluation expert and an informatics expert. The tool was used in data collection was a questionnaire consisting of 20 items related to the quality of the user interface design. The results showed the validity of the contents of the instruments was in the good category with a validity value of 0.75.

1. Introduction

An evaluation application is said to be of quality if it can be easily accessed and operated, as well as its functionality runs according to the instructions given by its users. The initial effort to realize the evaluation application so that it runs optimally is to ensure the right user interface design. The accuracy of the user interface design of the evaluation application can be ensured by testing the user interface design. However, the instrument used to test the user interface design should undergo instrument testing. Therefore, validation should be conducted to ensure the validity of the instrument. However, the research results that were conducted in 2018 by Divayana et al., [1] indicated that there are still invalid instruments used to test the user interface design of THK-ANEKA-based Countenance evaluation application.

Based on the problem occurred in the field, then testing the instrument contents validity using the Gregory formula to obtain a valid instrument can be the solution. Referring to the existing problems, then the problem formulation of this research was how is the process of calculating the user interface design of THK-ANEKA-based Countenance evaluation application using the Gregory formula?

This research was based on the results of several previous studies. The study conducted by Retnawati in 2016 [2] indicated the instrument contents validity of the Self-Regulated Learning (SRL) using Gregory formula and Aiken formula. The limitations of Retnawati research were the data
compilation and tabulation stages as a series of *Gregory* formula calculation processes were not explained yet. Previous studies conducted by Gustia and Irwan in 2018 [3] and also Putri and Irwan in 2018 [4] indicated the similarities with this research in relation to validation. The difference lies in the validated object. Retnawati’s studied the validated object was the instrument quality test design of the user interface of an evaluation application, while Gustia and Irwan’s research as well as Putri and Irwan’s focused on the validation process of the Mathematics learning media. The research that was conducted by Antrakusuma, Masykuri, and Ulfa in 2017 [5] also showed validation that it is the same as the focus of this study. The difference lies in the research object, where in this study the object under study was about the quality test instrument of the user interface design, while the research object of Antrakusuma, Masykuri, and Ulfa was the *Android* module. Research that was conducted by Vakili and Jahangiri in 2018 [6] showed the similarities with this research in terms of instrument content validation, while the difference lies in the formula which was used to test the instrument validity. This study used the *Gregory* formula, while the research by Vakili and Jahangiri used the Content Validity Ratio (CVR) formula. Research that was conducted by Lestari, Rusilowati, and Handayani in 2018 [7] indicated there were the content validation results in an instrument development, but the calculation process to get the content validation results had not been explained in detail.

2. Method

The method used in this study was the instruments development. The focus of the instrument development stage in this research was on the instrument content validity stage. The stages of the instrument content validity test in this study consists of: 1) trial of two experts on instrument items, 2) tabulating data from the expert trials results, 3) performing validity calculations using the *Gregory* Formula, 4) instrument analysis by interpreting the calculations results using the matrix table to classification of instrument content validation. The *Gregory* formula could be shown in equation (1) [2], while the classification of instrument content validation can be seen in Table 1 [8].

\[
\text{Content Validity} = \frac{D}{A + B + C + D} \quad (1)
\]

Notes:

- A = cell that showed disagreement between the two assessors
- B and C = cell that showed differences in views between assessors
- D = cell that showed valid agreement between the two assessors

| Table 1. The Instruments Content Validation Classification. |
|---------------|----------------|----------------|----------------|----------------|
| Validation Category | Very High Validity | High Validity | Medium Validity | Low Validity |
| Validity Score Range | 0.80 < r_{xy} ≤ 1.00 | 0.60 < r_{xy} ≤ 0.80 | 0.40 < r_{xy} ≤ 0.60 | 0.20 < r_{xy} ≤ 0.40 | 0.00 < r_{xy} ≤ 0.20 |

3. Results and Discussion

Based on the instrument development stages that was described above, the results were as the followings.

3.1 The Experts Testing Results against Instrument Validity

Number of items of quality test instruments the user interface design of *THK-ANEKA*-based *Countenance* evaluation application was 20 items. The number of experts which were involved in carrying out the instrument content validity test was two experts, including education experts and
informatics experts. The results of expert trials on the validity of instrument contents can be seen in Table 2.

**Table 2. The Experts Trial Results towards Instrument Validation.**

| Items | Expert-1 | Expert-2 |
|-------|----------|----------|
|       | Irrelevant | Relevant | Irrelevant | Relevant |
| Score 1 | Score 2 | Score 3 | Score 4 | Score 1 | Score 2 | Score 3 | Score 4 |
| 1     | - | - | - | √ | - | - | - | √ |
| 2     | - | - | - | √ | - | - | - | - | √ |
| 3     | - | - | - | - | - | - | - | - | - | √ |
| 4     | - | - | √ | - | - | - | - | - | - | - | √ |
| 5     | - | - | - | - | - | - | - | - | - | - | - | √ |
| 6     | - | - | √ | - | - | - | - | - | - | - | - | - | √ |
| 7     | - | - | - | √ | - | - | - | - | - | - | - | - | - | √ |
| 8     | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 9     | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 10    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 11    | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 12    | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 13    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 14    | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 15    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 16    | - | - | - | √ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 17    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 18    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 19    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |
| 20    | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | √ |

3.2 *Compilation of Expert Test Results on Instrument Content Validation*

Based on the data in Table 2, data compilation was then performed to find out the number of “Irrelevant” and “Relevant” ratings from each expert on each item. The compilation data of expert test results on the content validity from each item of the quality test instruments the user interface design of *THK-ANEKA*-based *Countenance* Evaluation application can be seen in Table 3.

**Table 3. The Compilation Data of Expert Test Results.**

| Expert-1 | Expert-2 |
|----------|----------|
| Irrelevant (Score 1 - 2) | Relevant (Score 3 - 4) | Irrelevant (Score 1 - 2) | Relevant (Score 3 - 4) |
| 12, 13, 15, 18, 20 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 16, 17, 19 | 12, 13, 15, 18, 20 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 16, 17, 19 |

3.3 *Cross Tabulation of Expert Trial Results*

The data in Table 3 was then entered into a “2*2” cross tabulation. The “2*2” cross tabulation form can be seen in the following Table 4.

**Table 4. Cross Tabulation of Content Validation Results from Both Experts.**

| Expert-1 | Expert-2 |
|----------|----------|
| Irrelevant (Score 1 - 2) | Relevant (Score 3 - 4) |
3.4 Content Validity Calculation Result
Based on the data in Table 4, the instrument content validity was calculated using the Gregory Formula. The results of the calculation of the content validity of the quality test instruments the user interface design of THK-ANEKA-based Countenance evaluation application could be shown as follows.

D Content Validity = -------------------------
A + B + C + D

15

Content Validity = ------------------------- = 0.75
5 + 0 + 0 + 15

3.5 Instrument Analysis
From the content validation calculation results of 0.75 and based on classification of the instruments that were shown in Table 1, then the quality test instruments the user interface design of THK-ANEKA-based Countenance evaluation application was classified as high validation. This was due to the validation value of its contents in the range 0.60 < rxy ≤ 0.80.

This study results had answered the limitations of previous research that was conducted by Retnawati by showing the process of compiling data and tabulating data before entering the content validation calculation process using the Gregory formula. The results of this study had also answered the limitations of Lestari, Rusilowati and Handayan’s research by showing the calculation process from instrument contents validation in detail step by step.

Although the results of this study had shown the contents validation result of the instrument in good overall classification, but several obstacles were found in this study including: 1) the study had not shown the contents validation results of instrument involving more than two experts in the test; 2) the study had not shown the results of validation for each instrument.

4. Conclusion
The overall content validity for the quality test instruments the user interface design of THK-ANEKA-based Countenance evaluation Application was classified as high. This was indicated by the existence of 15 highly relevant instruments, so that in general the instrument could be used as a measurement tool for testing the user interface design. Future works can be done to overcome the obstacles in this study by using the Aiken formula to calculate the validity of each item by involving more than two experts.

Acknowledgments
The researchers express their deepest thanks to the General Director of Higher Education of the Republic of Indonesia, Rector of the Universitas Pendidikan Ganesha, and Head of the Research and Community Service Institute of the Universitas Pendidikan Ganesha which had provided moral encouragement in the form of enthusiasm and material in the form of funding for this research as evidenced by the research grant contract number 144/UN48.16/LT/2019.
References

[1] Divayana D G H, Ariawan I P W, Adiarta A, Suwendra I W and Sundayana I M 2018 Initial concept of countenance model based on aneka-tri hita karana in evaluating computer learning quality and students’ character J. Theor. Appl. Inf. Technol. 96(24), pp. 8145–8159.

[2] Retnawati H 2016 Proving content validity of self-regulated learning scale (The comparison of Aiken index and expanded Gregory index) Res. and Eval. in Educ. 2(2), pp. 155-164.

[3] Gustia M and Irwan 2019 The validity of learning devices with generative learning models to improve mathematical problem-solving ability The 3rd International Conference on Mathematics, Sciences, Education, and Technology, 4–5 October 2018, Padang, Indonesia, IOP Conf. Ser.: J. Physics: Conf. Ser. 1317, pp. 1–6.

[4] Putri W F and Irwan 2019 Validity of learning devices mathematical based on quantum teaching and learning model for improving critical thinking The 3rd International Conference on Mathematics, Sciences, Education, and Technology, 4–5 October 2018, Padang, Indonesia, IOP Conf. Ser.: J. Physics: Conf. Ser. 1317, pp. 1–6.

[5] Antrakusuma B, Masykuri M and Ulfa M 2018 Validity of Scientific Based Chemistry Android Module to Empower Science Process Skills (SPS) in Solubility Equilibrium International Conference on Science Education (ICoSEd), 11 November 2017, Universitas Negeri Surabaya, Indonesia, IOP Conf. Ser.: J. Physics: Conf. Ser. 1006, pp. 1–9.

[6] Vakili MM and Jahangiri N 2018 Content validity and reliability of the measurement tools in educational, behavioral, and health sciences research J. Med. Educ. Develop. 10(28), pp. 106–119.

[7] Lestari S, Rusilowati A and Handayani O W K 2018 Development of Breast Self-Examination (BSE) instrument on midwifery student J. Educ. Res. and Eval. 7(1), pp. 70–77.

[8] Suyasa P W A, Kurniawan P S, Ariawan I P W, Sugandini W, Adnyawati N D M S, Budhyani I D A M and Divayana D G H 2018 Empowerment of CSE-UCLA model based on glickman quadrant aided by visual application to evaluate the blended learning program on SMA Negeri I Ubud J. Theor. Appl. Inf. Technol. 96(18), pp. 6203–6219.