IAES International Journal of Artificial Intelligence (IJ-AI)
Vol. 13, No. 2, June 2024, pp. 1388~1397
ISSN: 2252-8938, DOI: 10.11591/ijai.v13.i2.pp1388-1397

User interface design of context-input-process-product evaluation application based on weighted product

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Article Info

Article history:

Received Jul 21, 2023
Revised Oct 18, 2023
Accepted Nov 19, 2023

Keywords:

Blended learning
Context-input-process-product
Design user interface
Evaluation application
Weighted product

ABSTRACT

This study aimed to show the user interface design form of the context-input-process-product (CIPP) evaluation application based on weighted product as a measuring tool for the effectiveness level of blended learning in health colleges. This research approach was development research. The development model used was Borg and Gall. It focused on the design stage, initial trials, and revisions. The initial test of the user interface design involved 32 respondents. The tool for conducting it was in the form of a questionnaire, which contains 16 questions. The research was at the health colleges in Buleleng Regency. The data analysis technique of the initial test results was quantitative descriptive. It compared the percentage level of user interface design quality from the weighted product-based CIPP evaluation application with a quality standard which referred to a five scale. The results of this study indicated that the quality of the user interface design was relatively good. The research result's impact on educational evaluation was new knowledge for pedagogic evaluators in maximizing the development of digital-based evaluation tools by integrating the decision support system method (weighted product) with the educational evaluation model (CIPP model).

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1. INTRODUCTION

Blended learning is still suitable for facilitating the learning process in the post-covid-19 pandemic era in universities [1]–[3], especially in health colleges. The effectiveness of the implementation of blended learning is highly dependent on competent human resources, adequate facilities and infrastructure, and the completeness of the material content available on the platform [4]–[6]. Sometimes, it is not following the desired expectations to realize the effectiveness of blended learning implementation in health colleges. Therefore, efforts are needed to determine the effectiveness of blended learning implementation. Later, it will be appropriate recommendations can be given for the improvement of blended learning in health colleges. One effort is to evaluate blended learning implementation in health colleges.

If you use the right evaluation tool, the evaluation will be good. The appropriate evaluation tool needed to evaluate the effectiveness of blended learning in health colleges is an evaluation tool that can determine the most dominant indicator as a trigger for the blended learning effectiveness. Based on these

needs, there is an innovative evaluation tool that is a combination of the context-input-process-product (CIPP) evaluation component and the weighted product method. It can accurately determine the most dominant indicator as a trigger for the effectiveness of blended learning. The CIPP evaluation model component is used as a standard criterion for the effectiveness of blended learning. The weighted product method is used to determine the most dominant indicator as a determinant of effectiveness. Referring to these innovations, the research question that needs to be uncovered and answers sought is how is the user interface design of the weighted product-based CIPP evaluation application as a measuring tool for the level of effectiveness of blended learning in health colleges? From that question, the specific purpose of this research was to find out the user interface design form of the weighted product-based CIPP evaluation application as a measuring tool for the effectiveness level of blended learning in health colleges.

The previous studies that became the basis for the emergence of innovations in this study were research related to the CIPP model and the weighted product method. Ariawan *et al*. [7] showed the initial design of the CIPP evaluation model integrated with the simple additive weighting (SAW) method to determine the effectiveness of ICT-based learning in medical tertiary institutions. The limitation of this research is not showing the user interface design of the model application development. Satyawati *et al.* [8] indicated the function of the CIPP model to evaluate online learning. The limitation is that it has not shown indicators that cause the effectiveness of implementing online learning. Santosa *et al.* [9] demonstrated the function of the CIPP model to evaluate online learning during the covid-19 pandemic. Research limitations is that it has not shown the most dominant indicators that cause the effectiveness of implementing online learning. Aminudin *et al.* [10] demonstrated the function of the weighted product method in applications to measure employee performance. The limitation research is not showing the user interface design of the application. Sinaga and Maulana [11] showed the calculation process to obtain evaluation results on technician performance using the weighted product method. It doesn't show the user interface design of the evaluation application. Januantoro and Mandita [12] showed the function of the weighted product method to evaluate children's growth and development. The limitation of this study is that it does not specify the design of the user interface. Kustiyahningsih *et al.* [13] showed the use of a decision-support system method to measure the quality of blended learning. There is no application user interface design for these measurements.

2. METHOD

This study used a development approach. As a development model in this study, researchers used Borg and Gall. It has ten stages of development [14]–[26]. The development stage only focuses on design development, initial design trials, and revision of initial trial results on the user interface design of the weighted product-based CIPP evaluation application. The subjects involved in the initial trial phase of the user interface design of the weighted product-based CIPP evaluation application were one education expert, one informatics expert, ten lecturers, and 20 students at health colleges in Buleleng Regency. The research team revised the user interface design.

The data collection tool in this study was a questionnaire. The research location was the health colleges in Buleleng Regency. The analysis technique in this research was descriptive quantitative. It compared the percentage level of user interface design quality from the weighted product-based CIPP evaluation application with the standard of it. It referred to a five scale. The formula used to determine the quality percentage level of user interface design of the weighted product-based CIPP evaluation application is in (1) [27]–[32]. Quality standards that refer to a five scale are in Table 1 [33]–[41].

$$P = \frac{f}{N} \times 100\% \quad (1)$$

where P is the quality level percentage of user interface of the weighted product-based CIPP evaluation application, f is total acquisition value, and N is total maximum value.

Table 1. User interface design quality standards referring to a five scale

Quality category	Percentage of quality	Follow-up
Excellence	90-100	No revisions
Good	80-89	No revisions
Moderate	65-79	Need revision
Less	55-64	Need revision
Poor	0-54	Need revision

3. RESULTS AND DISCUSSION

3.1. Results

Referring to the development stages that were the focus of this research, there were several research results shown. Some of the results of this study include design, initial design trial, and revision of the initial trial results on the user interface design of the weighted product-based CIPP evaluation application. There were eight user interface designs that were initially tested as a result of this research.

3.1.1. User interface design of the weighted product-based context-input-process-product evaluation application

There were several forms resulting from the creation of a weighted product-based CIPP evaluation application user interface design. The making of this user interface design using Balsamiq Mockups 3 software. Its forms intended are in Figure 1 to Figure 7.

Figure 1 shows the form for entering the username and password of a user who has been registered and has access rights to the application. This form consists of two textboxes which function to enter username and password characters. Besides the textboxes available, this form also provides a login button to enter the weighted product-based CIPP evaluation application.

Figure 2 shows the main menu form which functions as a pointer to other forms. In the main menu form, there are combobox facilities that direct access to the master data form, process form, and reports form. There are three menu options in the data master combobox, including evaluation aspects, evaluation indicators, and experts' weight. There are two menu options in the process combobox, including significance rating for each indicator and calculation process of CIPP-weighted product. There are two menu options in the reports combobox, including ranking calculation process and determined evaluation results.

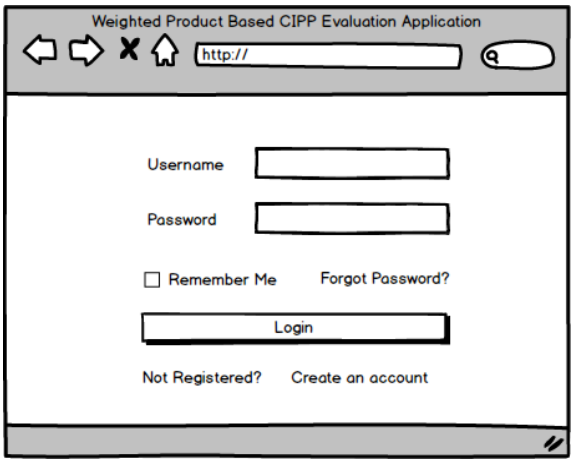

Figure 1. Form login

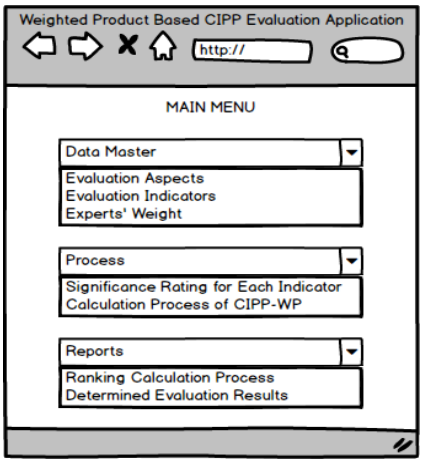

Figure 2. Main menu form

Figure 3 shows a form that functions to input evaluation aspects. In this form, there are textbox facilities which are used as place to enter data on evaluation aspects. This form also provides combobox are used as facilities for selecting data of evaluation components. Figure 4 shows the form that functions to input evaluation indicators. In this form, there are textbox facilities which are used as place to enter data of evaluation indicators. This form also provides combobox are used as facilities for selecting data of evaluation aspects.

Figure 5 shows the form that functions to input the significance rating score for each indicator. In this form, there are textbox facilities which are used as place to display data of indicators and evaluation components automatically. This form also provides combobox are used as facilities to select a significant rating as a determinant of the score for each evaluation indicator. Figure 6 shows the form that functions to input the weight score for each evaluation component. In this form, there are combobox facilities which are used as facilities to select a weight score from experts for each evaluation component. There is a "weights revision" button which is used as a facility to calculate improvements to the experts' weight scores so that it will produce a total score of 1.

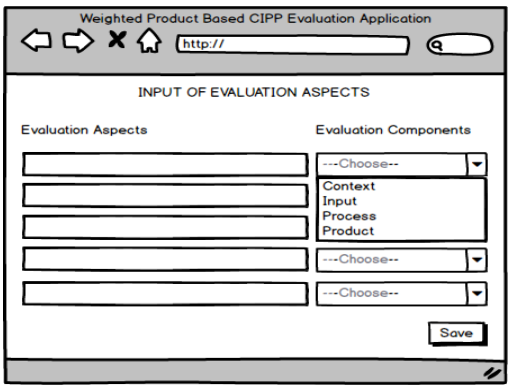

Figure 3. Evaluation aspects input form

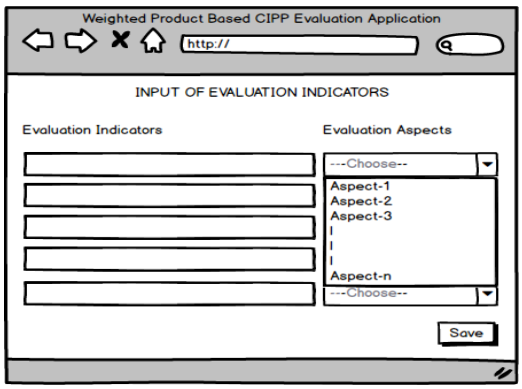

Figure 4. Evaluation indicator data input form

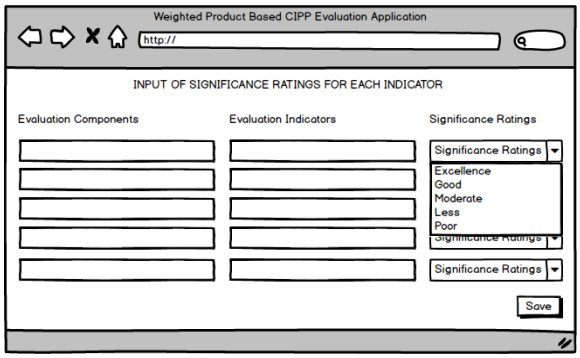

Figure 5. Form input skor significance rating for each indicator

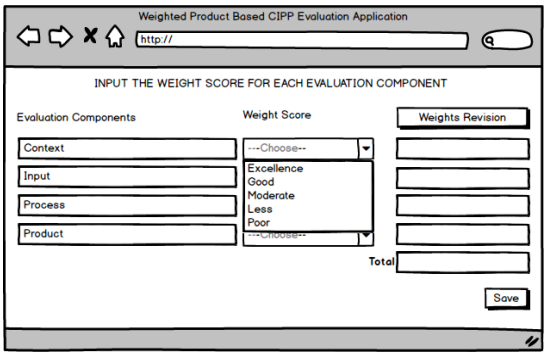

Figure 6. Form input the weight score for each evaluation component

Figure 7 shows the form that functions for the calculation process of CIPP-weighted product. In this form, there are textbox which are used as facilities to display evaluation indicators, scores for each evaluation component, vector-S scores, and vector-V scores. There is a process button which is used as a facility to calculate vector-S scores and vector-V scores. Save button to save calculation data. Figure 8 shows the form that functions for ranking calculation process and determined evaluation results. In this form, there are textbox which are used as facilities to display evaluation components, evaluation indicators, vector-S scores and vector-V scores for each evaluation indicator. There is a "process" button which is used as a facility for determining ranking. Textboxes of "obstacles" and textboxes of "recommendations" to show the evaluation results in the form of obstacles and recommendations/solutions for solving obstacles. Save button of "save" to save calculation data and evaluation results.

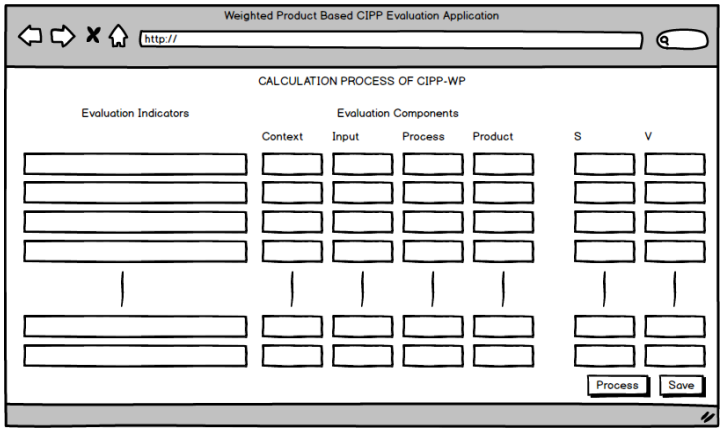

Figure 7. Calculation process of CIPP-weighted product

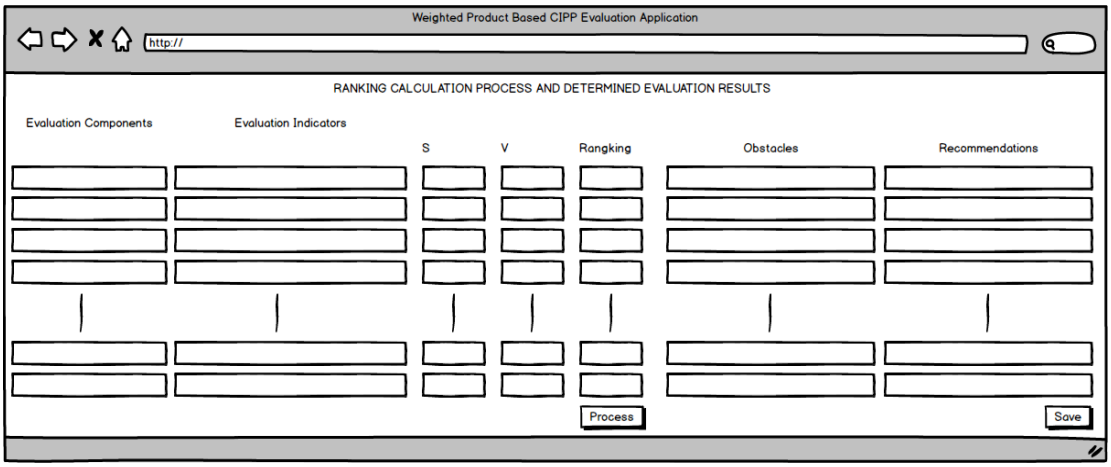

Figure 8. Ranking calculation process and determined evaluation results

3.1.2. Preliminary trial results of the user interface design of weighted product-based CIPP evaluation application

Researchers used 32 respondents for the initial trial of the user interface design of the weighted product-based CIPP evaluation application. Respondents assessed 16 questions related to the user interface design of the weighted product-based CIPP evaluation application. The initial trial results are in Table 2. Several suggestions by respondents when conducting initial trials of the user interface design of the weighted product-based CIPP evaluation application were used as material for revising or improving the user interface design. Some of these suggestions are in Table 3.

Table 2. Preliminary trial results

Respondents	Items-																Percentage of quality
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
EX-01	5	4	4	3	3	4	4	4	4	4	4	4	4	4	4	4	84.00
EX-02	4	5	4	4	4	5	5	5	4	4	4	5	5	5	5	5	97.33
LR-01	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	85.33
LR-02	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	5	89.33
LR-03	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	84.00
LR-04	4	4	4	4	3	4	3	4	4	4	4	4	4	4	4	4	82.67
LR-05	5	4	4	4	4	4	3	4	4	4	4	5	5	5	4	3	88.00
LR-06	4	3	4	5	5	4	4	4	3	4	3	4	4	4	3	5	84.00
LR-07	4	4	4	4	4	4	4	4	4	4	3	5	4	4	4	4	85.33
LR-08	5	5	5	5	4	4	4	5	5	4	4	4	3	4	4	4	92.00
LR-09	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	85.33
LR-10	4	4	4	4	5	5	4	5	4	4	4	5	5	4	4	3	90.67
ST-01	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	84.00
ST-02	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	85.33
ST-03	5	5	5	4	4	4	4	5	5	5	4	4	4	4	5	4	94.67
ST-04	4	4	4	4	3	4	3	4	4	4	3	3	4	4	4	3	78.67
ST-05	5	4	4	4	4	4	3	5	4	4	4	4	5	5	4	4	89.33
ST-06	4	3	4	5	5	4	4	4	3	4	4	4	4	4	3	3	82.67
ST-07	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	85.33
ST-08	5	5	5	5	4	4	4	5	5	4	4	4	4	4	4	4	93.33
ST-09	4	4	4	4	4	4	4	4	4	4	4	3	4	3	4	4	82.67
ST-10	4	4	4	4	5	5	4	4	4	4	4	5	5	4	4	4	90.67
ST-11	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	3	82.67
ST-12	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	4	88.00
ST-13	4	4	4	4	3	4	3	4	4	4	3	4	4	4	5	5	84.00
ST-14	5	4	4	4	4	4	3	5	4	4	4	4	4	4	4	4	86.67
ST-15	4	3	4	5	5	4	4	4	3	4	3	4	4	5	5	4	86.67
ST-16	4	4	4	4	4	4	4	4	4	4	3	5	4	4	4	4	85.33
ST-17	5	5	5	5	4	4	4	5	5	4	4	4	3	4	4	5	93.33
ST-18	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	85.33
ST-19	4	4	4	4	5	5	4	4	4	4	4	5	5	4	4	4	90.67
ST-20	4	4	4	4	4	4	3	4	4	4	5	5	5	5	5	5	92.00
																Average	87.17

Table 3. Respondents' suggestions on the initial test

Respondents	Suggestions
EX-01	Please create a user interface design that displays expert weight updates.
LR-04	Please create a user interface design that makes it easier for decision-makers to update recommendations.
ST-06	Please add facilities to demonstrate the convenience of updating expert weights for each evaluation component.
ST-09	Please create a user interface design that shows decision makers can easily update recommendations.

3.1.3. Revision of preliminary trial results on the user interface design of weighted product-based CIPP evaluation application

Revisions to the user interface design of the weighted product-based CIPP evaluation application were carried out based on some of the suggestions in Table 3. Suggestions from respondents EX-01 and ST-06 were answered by showing the revisions in Figure 9. Revisions for suggestions from respondents LR-04 and ST-09 are in Figure 10. Figure 9 shows the form that functions for updating the weight score for each evaluation component. In this form, there are textbox which are used as facilities to display the evaluation components, revision weights for each evaluation component. The most important part shown in Figure 9 is the green button. This button functions to update the weight score. Figure 10 shows the form that functions for updating of the recommendations. In this form, there are textbox which are used as facilities to display evaluation components, evaluation indicators, vector-S scores, vector-V scores, rankings, obstacles, and recommendations. The most important part shown in Figure 10 is the green button. This button functions to update the recommendations.

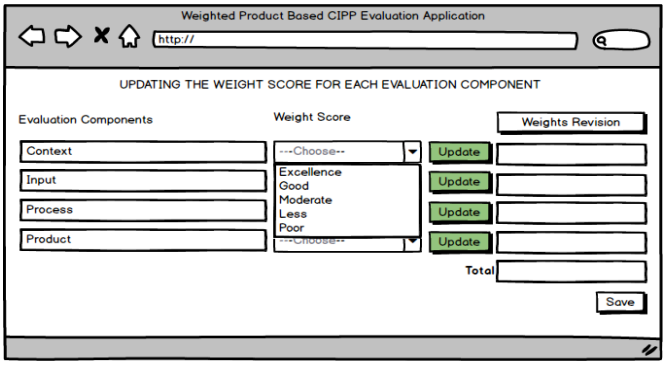

Figure 9. Updating the weight score for each evaluation component

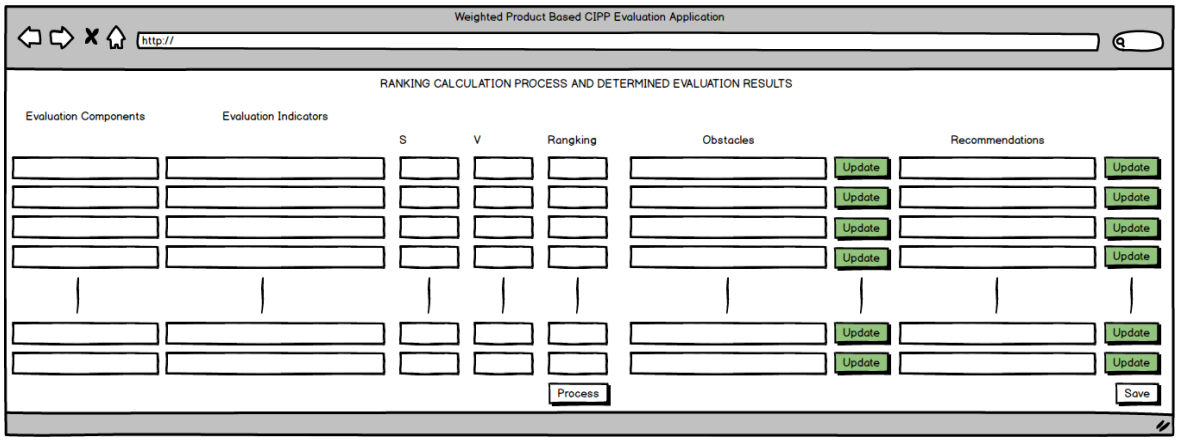

Figure 10. Updating of the recommendations

3.2. Discussion

Figure 1 shows the user interface design display for the login form. This login form serves as the initial gateway to enter the application. It also serves as an initial safeguard so that no one who is not responsible for misusing it. Figure 2 shows the user interface design display for the main menu form. This main menu form functions as a navigator to enter other menus. Figure 3 shows the user interface design display for a form that functions as a facility for inputting evaluation aspects. Figure 4 shows the user

interface design display for a form that functions as a facility for inputting evaluation indicators. Figure 5 shows the user interface design display for a form that function as a facility for inputting the significance rating score for each evaluation indicator. Figure 6 shows the user interface design display for a form that functions as a facility for inputting the weight score for each evaluation component. Figure 7 shows the user interface design display for a form that functions as a calculation process facility between the CIPP model and the weighted product method. Figure 8 shows the user interface design display for forms that function as ranking calculation process and determined evaluation results. Figures 9 and 10 shows the revised results of the suggestions given by the respondents during the initial trials of the user interface design of the weighted product-based CIPP evaluation application.

If seen from the trial results shown in Table 2, it was clear that the user interface design of the weighted product-based CIPP evaluation application was of good quality. It was because the average quality percentage of 87.17% was included in the good category range when viewed from the quality standard that referred to a five scale (such as the categorization data shown in Table 1). Respondents answered 16 questions to get a quality average percentage of the user interface design. The sixteen questions include: i) item-1 regarding the appearance of the user interface design of the login form in the weighted product-based CIPP evaluation application, ii) item-2 regarding the completeness and clarity of the properties contained in the login form to describe its function, iii) item-3 regarding the display of the user interface design of the main menu form in the weighted product-based CIPP evaluation application, iv) item-4 regarding the completeness and clarity of the properties contained in the main menu form to describe its function, v) item-5 regarding the appearance of the user interface design of the evaluation indicator data input form in the weighted product-based CIPP evaluation application, vi) item-6 regarding the completeness and clarity of the properties contained in the evaluation indicator data input form to describe its function, vii) item-7 regarding the appearance of the user interface design of the input significance rating for each indicator form, viii) item-8 concerning the completeness and clarity of the properties contained in the input significance rating for each indicator form to describe its function, ix) item-9 regarding the appearance of the user interface design of the input the weight score for each evaluation component form, x) item-10 regarding the completeness and clarity of the properties contained in the form input the weight score for each evaluation component to describe its function, xi) item-11 regarding the display of the user interface design of the CIPP-weighted product calculation process form, xii) item-12 of the completeness and clarity of the properties contained in the form of the calculation process of CIPP-weighted product to describe its function, xiii) item-13 regarding the ease of user understanding of the calculation process of CIPP-weighted product through this form of user interface design, xiv) item-14 regarding the appearance of the user interface design of the ranking calculation process and determined evaluation results form, xv) item-15 regarding the completeness and clarity of the properties contained in the ranking calculation process and determined evaluation results form to describe its function, and xvi) item-16 regarding the ease of user understanding of the ranking calculation process and determined evaluation results through this form of user interface design.

This research results shows advantages that does not have in other research in view of user interface design for evaluation applications. The user interface design for the evaluation application in this research was created using Balsamiq Mockup 3 software. In general, the importance of user interface design has not been explained by other research. In principle, user interface design is very important to know and create before proceeding to the stage of creating an evaluation application in physical form. The user interface design created using Balsamiq Mockup 3 software in this research has been able to answer the limitations of several previous studies. Those previous study intended, included: study in [7]–[13] which generally does not indicate the user interface design of an application. In principle, this study also has similarities with several studies, including research in [42]–[46] which shows the user interface design of an application in digital format.

The novelty of this study was the user interface design of an application that combines the decision support system method (weighted product) with the educational evaluation model (CIPP) so that it becomes the basis for developing quality evaluation applications. In addition to being a novelty, this research also had obstacles. The obstacle of this research was that there is no calculation simulation of the weighted product method that integrates with the CIPP evaluation model.

4. CONCLUSION

This research has answered the research question. That was by demonstrating a good quality weighted product-based CIPP evaluation application user interface design. The presence of this user interface design has a positive impact on evaluators in the field of education. It is about new knowledge that they can use as a basis for the maximum development of digital-based evaluation tools. Besides that, education evaluators are aware that it is notable to integrate the science of educational evaluation with other sciences. Then it will improve the quality and results of evaluation activities. To overcome the obstacles of this

research is to carry out more intense future work through a simulation of calculating the weighted product method which is integrated with the CIPP evaluation model.

ACKNOWLEDGEMENTS

The authors express their deepest gratitude to the Head of Research and Community Service Institute, Universitas Pendidikan Ganesha, which has provided funding to complete this research. Funding for this research refers to the research contract No. 1079/UN48.16/LT/2023.

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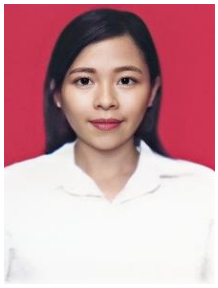

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