

User Interface Design for DIVAYANA Evaluation Application Based on Positive-Negative Discrepancy

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Abstract

The DIVAYANA (Description-Input-Verification-Action-Yack-Analysis-Nominate-Actualization) evaluation application based on Positive-Negative Discrepancy is an information technology-assisted evaluation tool. This tool is very suitable for getting positive and negative inequality scores occur in the flipped learning implementation. The physical form quality of the DIVAYANA evaluation application based on Positive-Negative Discrepancy depends on user interface design. Therefore, educational evaluators need to clearly know the form of user interface design for the DIVAYANA evaluation application based on Positive-Negative Discrepancy. Besides the form of user interface design, educational evaluators must also know the user interface design quality of the DIVAYANA evaluation application based on Positive-Negative Discrepancy. This study aimed to show the form and quality of user interface design of the DIVAYANA evaluation application based on Positive-Negative Discrepancy. The method in this research was a development method that used the Borg and Gall model. The development refers to the design stage, initial design trials, and revisions to initial design trials. Tests on user interface design involved 104 respondents. The instrument was a questionnaire consisting of 15 questions. Analysis of the trial data used a quantitative descriptive technique. The results of the study show that the form and quality of the user interface design was good category. The finding of this research is a suitable user interface design for use as a basis for creating the physical form of a DIVAYANA evaluation application based on Positive-Negative Discrepancy. The contribution of this research to stakeholders (educational evaluators) is that it becomes a source of new knowledge that can increase the understanding of educational evaluators about the importance of user interface design functions in realizing evaluation applications.

Keywords: Design User Interface, Evaluation Application, DIVAYANA, Positive-Negative, Discrepancy.

1. Introduction

The independent learning policy provides students the opportunities to study independently. It is both through online and offline learning spaces. In addition, the independence policy gives students freedom. It is to develop themselves broadly by participating in various courses that can be followed online or offline outside the classroom. Flipped learning is one of the learning models that students can use in the learning process and online courses [1-6]. Even though this independence policy has provided good opportunities for students in the learning process optimally through flipped learning, but there are positive and negative inequalities that arise in its implementation. Based on that, it is necessary to evaluate the implementation process of flipped learning. Many evaluations model types there are in evaluating the flipped learning implementation. But no evaluation model can quantitatively measure the presence of positive and negative inequalities in flipped learning implementation.

Therefore, it needs innovations in the form of an evaluation tool to measure the existence of positive and negative inequalities in flipped learning implementation. One of the innovations is the DIVAYANA evaluation application

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based on the Positive-Negative Discrepancy. This application was created by combining the DIVAYANA and Discrepancy evaluation model to find positive and negative inequalities in flipped learning implementation. User interface design needs to be created before realizing the evaluation application in physical form. This is to make it easier for evaluation experts and application developers to create the application. The ideal condition that is expected to occur in the field is that evaluation experts and evaluation application developers know the concept and are able to user interface design of an evaluation application. However, the main problem found in the field is that many evaluation experts and even evaluation application developers do not understand and are unable to create a quality user interface design. Based on this, the research question was how is the user interface design of the DIVAYANA evaluation application based on Positive-Negative Discrepancy. Referring to the research question, the research purpose and also the motivation for this research is to show readers the form of user interface design for the DIVAYANA evaluation application based on Positive-Negative Discrepancy.

Some of the research results that baseline the appearance of this research are related to the use of user interface design in an application or some of the limitations found in research on evaluating application development. Samrgandi's [7] study showed the user interface design of an evaluation application. However, Samrgandi's [7] study limitation is that it has not yet provided a detailed explanation of the function of each feature in the user interface design. Research by Diehl et al. [8] showed recommendations from an existing user interface design. They proposed a series of practical chit become a basis for various technologies development. The limitation of the study by Diehl et al. [8] is that it has not fully demonstrated the form of user interface design that forms the basis of technology development. Research by Keselj et al. [9] showed the existence of machine learning that they used to evaluate user interface designs. The research limitation of Keselj et al. [9] is that it has not yet shown in detail the function of the features in the machine learning used to evaluate the user interface design. The difference is visible from the research by Keselj et al. [9] when compared with this research is the position of user interface design. The focus of this study was to demonstrate the user interface design of an evaluation tool used to evaluate program implementation. The research by Keselj et al. [9] showed the learning machine used to evaluate the results of the user interface design. Research by Pradana et al. [10] showed an improvement in the user interface design of an application. But it was not visible before revision and after revision. Veza's [11] research showed the web-based evaluation application that Veza [11] used to assess teacher performance. The limitation of Veza's [11] study is that it has not demonstrated the existence of a user interface design for the web-based evaluation application. Research by Heriyandi et al. [12] showed the user interface design for e-commerce applications. The limitation is that it does not show all the existing e-commerce application functions in the user interface design. Jomsri's [13] research showed the creation of user interface designs from mobile devices based on user experience. The limitation of Jomsri's [13] study is that it has not shown in detail the function of the features from the user interface design of the mobile device. Research by Ahmad et al. [14] showed the importance of the usability factor in making mobile applications. But they did not clearly show the user interface design of the mobile applications. Based on the problems/facts occur in the field and the objectives of this research, the authors are interested and motivated to invite readers to find out about the existence of user interface design for DIVAYANA evaluation application based on Positive-Negative Discrepancy.

2. Literature Review

2.1. User Interface

User interface design plays a pivotal role in enhancing the overall user experience across various technological platforms. It encompasses the creation of interfaces that not only elucidate the functionality of an application but also do so in a manner that is intuitive and user-friendly. By crafting interfaces that are visually appealing and logically organized, user interface design ensures that users can seamlessly navigate through computers, equipment, machines, mobile communication devices, software applications, and websites. The primary goal is to eliminate the need for users to engage with the actual application to comprehend its workings [15]. This approach significantly contributes to an efficient and enjoyable interaction, as users can effortlessly grasp the intricacies of the technology at hand. In essence, user interface design is a multidimensional discipline that prioritizes the user's journey, aiming to create interfaces that are not only aesthetically pleasing but also foster a positive and seamless interaction with the digital realm [16].

2.2. DIVAYANA (Description-Input-Verification-Action-Yack-Analysis-Nominate-Actualization) Evaluation Model

The DIVAYANA model is a model used to evaluate IT-based education services, IT-based learning processes, IT education policies, and other activities in the field of IT education. Seeing from the name, the DIVAYANA model is an acronym for the following words: Description, Input, Verification, Action, Yack, Analysis, Nominate, and Actualization [17]. The main objective of this evaluation model is to determine the priority of recommendations from the highest to the lowest level from a number of recommendations. The stages in this model included [18]:

- 1) Description stage
At this stage, descriptions of the existence of the object being evaluated and the problems found in the field related to the object being evaluated are carried out.
- 2) Input Stage
At this stage, things are described that can be used as input to support the existence of the object being evaluated.
- 3) Verification Stage
At this stage, a suitability check is carried out between several alternative solutions offered and the existing problems.
- 4) Action Stage
At this stage, field trials are carried out on several alternative solutions that have been verified.
- 5) Yack Stage
At this stage, discussions are involving experts and evaluators to get qualitative and quantitative data obtained from the test results at the action stage.
- 6) Analysis Stage
At this stage, analysis is carried out regarding quantitative and qualitative data obtained from the action stage and the Yack stage.
- 7) Nominate Stage
At this stage, a priority ranking of recommendations is carried out. The formula used for ranking calculations is the DIVAYANA formula which consists of three equations [19-22]. Equation (1) is to determine the weighted average improvement, Equation (2) is to determine the D-vector value as the normalization value, and Equation (3) is to determine the R-vector value as the ranking value.

$$(W_{Yack})_j = \frac{\bar{x}_j}{\sum_{j=1}^n \bar{x}_j} \quad (1)$$

Notes:

\bar{x} = The average of weights given by the evaluators/experts through joint discussion

W_{Yack} = The average scores of weights improvement

$$D_i = \frac{\prod_{j=1}^n x_{ij}^{(W_{Yack})_j}}{m} \quad (2)$$

Where:

$$\sum (W_{Yack})_j = 1; \text{ and } i=1, 2, 3, \dots, n.$$

Notes:

D = D-vector

x = Scores of assessments for each criterion

m = Total of all experts

$$R_i = \frac{D_i}{\sum_{i=1}^n D_i} \quad (3)$$

Notes:

D = D-vector

R = R-vector

8) Actualization Stage

At this stage, the highest priority recommendations obtained at the previous nomination stage are internalized or implemented in the wider environment.

2.3. Discrepancy Evaluation Model

The Discrepancy model is an educational evaluation model that shows the existence of disparities/differences between evaluation results in reality and predetermined evaluation standards [23]. The Discrepancy model consists of four evaluation components, including definition, installation, process, and product [24]. The position of the Discrepancy model is used in the DIVAYANA evaluation application based on Positive-Negative Discrepancy. That position determines whether there is a discrepancy/inequality in the evaluation results in reality with the predetermined evaluation standards.

2.4. Daiwi Asuri Sampad

Daiwi Sampad is a Hindu religious philosophy that shows the good deeds carried out by humans, while Asuri Sampad is the bad deeds that humans tend to do [25][26]. Daiwi Sampad is good actions from within humans, while Asuri Sampad is bad actions from within humans [27][28]. The concept of Daiwi Sampad is used in determining positive inequality. Negative inequality is determined based on a review of the Asuri Sampad concept. Positive inequality is used as a basis for maintaining aspects that support the success of flipped learning. Negative inequality is used as a basis for making revisions/improvements to flipped learning.

2.5. The DIVAYANA Evaluation Application Based on Positive-Negative Discrepancy

This evaluation application is an application based on a combination of the DIVAYANA and Discrepancy models which are integrated with the concept of local Balinese wisdom, namely Daiwi Asuri Sampad. It is hoped that this evaluation application can provide appropriate recommendations regarding aspects that show inequality/discrepancy in the implementation of flipped learning at IT vocational schools in Bali. These inequalities/discrepancies are positive and negative. Positive discrepancy was obtained based on a review of the Daiwi Sampad concept, while negative discrepancy was obtained based on a review of the Asuri Sampad concept.

3. Method

This research approach is research and development. The development model used in this research was Borg and Gall. It consists of ten stages of development [29-34]. The ten stages, included: 1) research and field data collection, 2) research planning, 3) design development, 4) initial trial, and 5) revision of initial trial results. The 2022 research had been in two stages, including: 1) field trials, and 2) revision of the results of field trials. The 2023 research had been in three stages. It was 1) trial use, 2) revision of the final product, and 3) dissemination and implementation of the final product.

The development stages in this study focused on design development, initial testing of the design, and revising the results of the initial trials from the user interface design. The subjects involved in the initial trial stage of “user interface design for DIVAYANA evaluation application based on Positive-Negative Discrepancy” were two education experts, two informatics experts, 50 teachers, and 50 students at several IT vocational schools in Bali. It was the research team that revised the user interface design.

The data collection instruments in this study were questionnaires. The research location was at several IT Vocational Schools in six regencies in Bali, including Gianyar, Buleleng, Tabanan, Badung, Klungkung, and Denpasar. The analysis technique in this research was descriptive quantitative. It compared the percentage level of quality from application user interface design with quality standards of user interface design that refer to the five scales. The formula used to determine the percentage level of quality from application user interface design is Equation (4) [35-37]. The quality standard that refers to the five scales can be seen in Table 1 [38-40].

$$P = \frac{f}{N} \times 100\% \quad (4)$$

Notes:

P= Percentage level of application user interface design quality

f = total acquisition value

N = total maximum value

Table 1. Quality standards of user interface design referring to the five scales

Percentage of Quality	Quality Category	Follow-up
0-54	Poor	Need Revision
55-64	Less	Need Revision
65-79	Moderate	Need Revision
80-89	Good	No Revision
90-100	Excellence	No Revision

4. Result and Discussion

4.1 Results

There were several results based on the research objectives. Those results, included: 1) the design user interface of “DIVAYANA evaluation application based on the Positive-Negative Discrepancy”; 2) initial trial results; and 3) revising initial trial results. The user interface design intended can be seen in Figure 1-Figure 9.

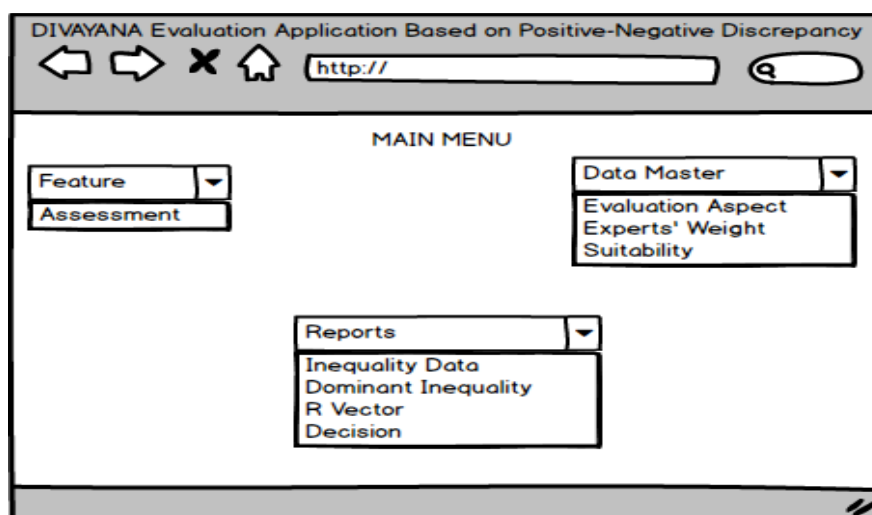


Figure 1. Main menu form

Figure 1 shows the user interface design display from the main menu form. Several facilities of the main menu are features, master data, and reports. On the features menu, there is an assessment sub-menu. In the master data menu, there are several sub-menus, including the evaluation aspect data menu, the expert weight menu, and the suitability menu. The facilities of the reports menu are several sub-menus, including the inequality data menu, the dominant inequality data menu, the R-vector menu, and the decision menu.

Figure 2. Form of evaluation aspect data input

Figure 2 shows the display of the user interface design from the evaluation aspect data input form in the evaluation application. In this design, there are several textboxes to input descriptions of evaluation aspects. Besides, several combo-boxes to provide ratings based on significant ratings for each evaluation aspect.

Figure 3. Master data form

Figure 3 shows the user interface design display of the master data form in the evaluation application. Several text boxes in this design show several fields. Those fields, included: id, data on the causes of flipped learning, constraints in flipped learning implementation, constraint alternative solutions, flipped learning success standards, and the percentage of flipped learning effectiveness.

Figure 4. Weight input form

Figure 4 shows the user interface design display of the expert weight input form in the evaluation application. This design displays the weight of experts for each evaluation standard. This form is also equipped with ID, date, and name of the expert who inputted the weight score.

Figure 5. Alternative adjustments and evaluation standards form

Figure 5 shows the display from the user interface design of the alternative adjustment and evaluation standard form in the evaluation application. This design displays the data on alternative constraint solving and the standard of successful implementation of flipped learning. Besides, the design also displays the suitability results between the alternatives and the success standard.

Figure 6. Determination form of positive and negative discrepancy-based inequality scores

Figure 6 shows display of the determination form of positive and negative discrepancy-based inequality scores in the evaluation application. This design displays positive inequality scores and negative inequality scores for each alternative. Besides, this form also displays alternative data, minimum effectiveness standard percentage, and respondents' perception.

Figure 7: Form of the most dominant inequality score using the *DIVAYANA* formula

The interface displays two sections for determining the most dominant inequality scores for eight alternatives (Alternative-1 to Alternative-8).

The Most Dominant Positive Inequality

	Alternative-1	Alternative-2	Alternative-3	Alternative-4	Alternative-5	Alternative-6	Alternative-7	Alternative-8
Alternative-1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Alternative-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Most Dominant Negative Inequality

	Alternative-1	Alternative-2	Alternative-3	Alternative-4	Alternative-5	Alternative-6	Alternative-7	Alternative-8
Alternative-1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative-7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Alternative-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 8: Determination form of R-vector scores with the *DIVAYANA* formula

The interface displays two sections for determining the R-vector scores for positive and negative inequality for eight alternatives (Alternative-1 to Alternative-8).

The R-Vector for Positive Inequality

<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>

The R-Vector for Negative Inequality

<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>

Figure 8. Determination form of R-vector scores with the *DIVAYANA* formula

Figure 8 shows the user interface design of determination form of R-vector scores with the *DIVAYANA* formula in the evaluation application. This design displays the R-vector scores for positive and negative inequality. In this design, eight R-vector scores are shown for each positive inequality and negative inequality.

Figure 9. Form of decision-making

Figure 9 shows the user interface design of the decision-making form in the evaluation application. In this design, a decision is displayed based on the ranking of each alternative that refers to positive and negative inequality scores. Besides that, this design also displays recommendations for positive and negative inequality.

The initial trial results on the user interface design for DIVAYANA evaluation application based on Positive-Negative Discrepancy were obtained from the assessment scores given by two education experts, two informatics experts, 50 teachers, and 50 students from several IT vocational schools in Bali. The initial trial results of the intended user interface design can be seen on Table 2.

Table 2. Initial trial results of user interface design

Respondents	Items-															Percentage of Quality
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
EX-01	5	5	4	3	4	4	5	5	4	4	4	4	4	4	4	84.00
EX-02	4	5	3	4	4	5	5	5	5	3	3	3	3	5	5	82.67
EX-03	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
EX-04	3	4	4	4	4	3	3	4	4	4	5	4	5	4	4	78.67
TR-01	5	5	5	5	5	4	4	3	3	4	4	4	4	4	4	84.00
TR-02	4	4	3	4	5	4	5	4	5	5	5	5	5	5	5	90.67
TR-03	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	81.33
TR-04	4	3	4	3	4	4	4	4	4	4	4	4	4	4	4	77.33
TR-05	5	4	4	3	3	4	4	4	4	4	4	4	4	3	3	76.00
TR-06	4	5	4	4	4	5	5	4	4	4	4	4	4	4	5	85.33
TR-07	4	4	4	4	4	4	4	3	4	5	5	5	5	5	4	85.33
TR-08	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	81.33
TR-09	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	81.33
TR-10	4	4	4	4	3	4	3	4	4	4	4	4	3	4	3	74.67
TR-11	5	4	4	4	4	4	3	3	4	4	4	4	4	3	4	77.33
TR-12	4	3	4	5	5	4	4	4	5	5	4	4	4	4	4	84.00
TR-13	4	4	4	4	4	4	4	4	4	4	3	4	5	5	4	81.33
TR-14	5	5	5	5	4	4	4	4	4	4	4	4	4	4	3	84.00
TR-15	4	4	4	4	4	4	4	4	4	3	4	3	4	4	4	77.33
TR-16	4	4	4	4	5	5	4	4	4	4	4	3	3	3	3	77.33

Respondents	Items-															Percentage of Quality
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
TR-17	4	4	4	4	4	4	3	4	5	5	4	4	4	4	4	81.33
TR-18	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	78.67
TR-19	5	5	5	4	4	4	4	4	4	3	3	4	4	4	4	81.33
TR-20	4	4	4	5	5	3	3	5	5	4	4	5	5	5	5	88.00
TR-21	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	84.00
TR-22	4	4	4	5	5	4	4	4	4	5	5	3	3	3	3	80.00
TR-23	3	3	3	4	4	5	5	3	3	4	4	4	4	4	4	76.00
TR-24	4	4	4	5	5	4	4	4	4	4	4	5	5	5	5	88.00
TR-25	4	4	4	4	4	3	5	4	4	4	4	4	4	4	4	80.00
TR-26	5	5	5	5	3	4	4	5	5	5	5	3	3	3	3	84.00
TR-27	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
TR-28	3	3	3	4	4	4	4	3	3	4	4	4	5	4	5	76.00
TR-29	4	4	4	5	5	5	5	4	4	3	3	4	4	4	4	82.67
TR-30	4	4	4	4	3	4	5	4	5	4	5	5	5	5	5	88.00
TR-31	5	4	4	4	4	4	4	4	4	4	5	4	4	4	4	82.67
TR-32	4	4	4	3	4	3	4	4	4	4	4	4	4	4	4	77.33
TR-33	4	4	4	4	4	3	3	4	4	4	4	4	4	4	4	77.33
TR-34	5	4	5	5	4	4	4	5	5	4	4	4	4	4	4	86.67
TR-35	3	4	4	4	4	4	4	4	4	3	4	5	5	5	5	82.67
TR-36	4	5	5	4	4	4	4	4	4	4	4	4	4	4	4	82.67
TR-37	4	4	4	4	4	4	4	4	3	4	3	4	4	4	5	78.67
TR-38	5	4	4	5	5	4	4	4	4	4	3	5	5	5	4	86.67
TR-39	4	4	4	4	4	3	4	5	5	4	4	4	4	4	4	81.33
TR-40	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	78.67
TR-41	5	5	5	3	4	4	5	5	5	5	3	3	3	3	4	82.67
TR-42	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	81.33
TR-43	4	5	4	4	4	4	3	3	4	4	4	5	4	5	4	81.33
TR-44	5	5	5	5	5	5	4	4	3	3	4	4	4	4	4	85.33
TR-45	4	4	4	3	4	5	4	5	4	5	5	5	5	5	4	88.00
TR-46	4	4	4	4	4	4	4	4	4	5	4	4	4	4	3	80.00
TR-47	4	4	3	4	3	4	4	4	4	4	4	4	4	4	4	77.33
TR-48	4	4	4	4	3	3	4	4	4	4	4	4	4	4	3	76.00
TR-49	4	4	5	4	4	4	5	5	4	4	4	4	4	4	4	84.00
TR-50	5	5	4	4	4	4	4	4	3	4	5	5	5	5	4	86.67
ST-01	5	3	4	5	3	4	4	5	5	5	5	3	3	3	3	80.00
ST-02	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
ST-03	4	4	4	4	4	4	4	3	3	4	4	4	5	4	5	80.00
ST-04	5	5	5	5	5	5	5	4	4	3	3	4	4	4	4	86.67
ST-05	4	3	4	4	3	4	5	4	5	4	5	5	5	5	5	86.67
ST-06	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	81.33
ST-07	3	4	3	3	4	3	4	4	4	5	4	4	4	4	4	76.00
ST-08	4	4	3	4	4	3	3	4	4	4	4	4	4	4	4	76.00
ST-09	5	4	4	5	4	4	4	5	5	4	4	4	4	4	4	85.33
ST-10	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	81.33
ST-11	4	4	4	4	4	4	4	4	4	4	5	5	5	5	4	85.33
ST-12	5	3	4	5	3	4	4	5	5	4	4	4	4	4	3	81.33
ST-13	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	81.33
ST-14	4	4	4	4	4	4	4	3	3	4	4	4	4	3	5	77.33
ST-15	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	89.33
ST-16	4	3	4	4	3	4	5	4	5	5	5	4	4	4	5	84.00
ST-17	4	4	4	4	4	4	4	4	4	4	4	3	4	5	4	80.00
ST-18	3	4	3	3	4	3	4	4	4	4	4	4	4	4	4	74.67
ST-19	4	4	3	4	4	3	3	4	4	4	3	4	3	4	4	73.33
ST-20	5	4	4	5	4	4	4	5	5	4	5	4	4	4	4	86.67
ST-21	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	81.33
ST-22	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
ST-23	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	78.67
ST-24	5	3	4	4	5	5	5	5	3	5	4	5	5	5	5	90.67
ST-25	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
ST-26	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	81.33
ST-27	5	5	5	3	4	4	5	5	5	3	4	4	4	4	3	84.00
ST-28	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	78.67
ST-29	4	4	4	4	4	4	3	3	4	4	5	5	4	4	4	80.00

Respondents	Items-															Percentage of Quality
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
ST-30	3	4	5	5	5	5	4	4	3	3	4	4	3	4	5	81.33
ST-31	4	4	4	3	4	5	4	5	4	5	4	4	4	4	4	82.67
ST-32	4	4	4	4	4	4	4	3	4	4	4	3	4	3	4	76.00
ST-33	5	3	4	4	5	5	5	5	3	3	4	4	4	3	3	80.00
ST-34	4	4	4	4	4	4	4	4	4	3	5	5	4	4	4	81.33
ST-35	4	4	5	3	4	4	5	5	5	5	4	4	3	4	4	84.00
ST-36	5	5	4	4	4	4	4	4	4	4	4	3	3	4	4	80.00
ST-37	4	3	4	4	4	4	3	3	4	4	5	4	4	5	5	80.00
ST-38	4	4	5	5	5	5	4	4	3	3	4	4	4	4	4	82.67
ST-39	3	4	4	3	4	5	4	5	4	5	4	5	5	3	3	81.33
ST-40	4	4	4	4	4	4	4	4	4	5	3	4	4	4	4	80.00
ST-41	5	4	3	4	3	4	4	4	4	4	4	4	4	5	5	81.33
ST-42	4	4	4	4	3	3	4	4	4	4	4	4	4	4	4	77.33
ST-43	4	5	5	4	4	4	5	5	5	4	4	4	4	4	4	86.67
ST-44	4	4	4	4	4	4	4	4	4	3	3	4	5	5	5	81.33
ST-45	4	4	4	5	3	4	4	5	5	5	5	5	5	3	3	85.33
ST-46	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	82.67
ST-47	4	4	4	4	4	4	4	3	3	3	3	4	4	4	5	76.00
ST-48	4	4	5	5	5	5	5	4	4	4	4	3	3	4	4	84.00
ST-49	3	3	4	4	3	4	5	4	4	5	5	4	5	5	5	84.00
ST-50	3	4	4	4	4	4	4	4	4	4	4	4	5	4	4	80.00
Average																81.53

There were several respondents' suggestions when conducting initial trials of the user interface design for *DIVAYANA* evaluation application based on Positive-Negative *Discrepancy* so that later applications made would be of higher quality. The respondents' suggestions can be seen in Table 3.

Table 3. Respondents' suggestions when conducting initial trials of user interface design

Respondents	Suggestions
EX-02	Please add facilities to be able to edit the importance rating scores
EX-04	Please add facilities to activate the master data
TR-04	Add facilities to update data on alternative adjustments and evaluation standards
TR-10	We recommend that you add facilities to activate the master data
TR-47	There needs to be a facility to edit the importance rating scores given by the respondents
ST-07	It is necessary to provide facilities for activating master data
ST-42	Add facility to edit importance rating scores

User interface design needs to be improved based on suggestions from respondents. Figure 10 shows revision evidence of the respondent suggestions from EX-02, TR-47, and ST-42. Figure 11 shows revision evidence of the respondent suggestions from EX-04, TR-10, and ST-07. Figure 12 shows revision evidence of the respondents' suggestions from TR-04.

The screenshot shows a web application window titled "DIVAYANA Evaluation Application Based on Positive-Negative Discrepancy". The main content area is titled "THE PROCESS OF EDITING THE SIGNIFICANCE RATING SCORES". It contains a table with four columns: "ID", "Rating Name", "Rating Scores", and "Action". There are five rows of data, each with input fields for the first three columns and two buttons ("Update" and "Delete") in the "Action" column. A "Save" button is located at the bottom right of the form.

Figure 10. Form for the process of editing the significance rating scores

Figure 10 shows the user interface design of the form for editing the significance rating score. Figure 10 shows two updates and delete buttons in the "Action" section as a facility for editing the significance rating score. In this form, there is a save button in the bottom right corner to save the results of the editing process.

Figure 11. Form for the process of master data activation

Figure 11 shows the user interface design of the form for activating master data. It shows combo-boxes as facilities to activate master data according to the selected feature category. In this form, there is a save button in the bottom right corner to save the results of activating master data.

Figure 12. Form for the updating process of data adjustment of alternatives and evaluation standards

Figure 12 shows the user interface design of the form for updating alternative adjustment data and evaluation standards. In this design, there are also two updates and delete buttons on the “Action” section as a facility to obtain adjustment data between alternatives and evaluation standards. In this form, there is a save button in the bottom right corner to save the results of updating process.

4.2. Discussion

Based on the results of the initial trial of the user interface design for DIVAYANA evaluation application based on Positive-Negative Discrepancy, it appears that the percentage of quality is 81.53%. It proved that the evaluation application’s user interface design is good. The user interface design can develop into a physical application and be ready to test in the field.

There were 15 instruments used as a basis for conducting assessments by the respondents. The fifteen items include: 1) Suitability of the Balsamiq Mockup 3 software used in creating user interface designs, 2) display of the user interface design of the main menu form in the evaluation application, 3) display of the user interface design of the evaluation aspect data input form in the evaluation application, 4) clarity of the significance rating scores for each aspect of the evaluation shown in the user interface design, 5) display of the user interface design from the master data form in the evaluation application, 6) clarity of data update facilities on the master data form shown in the user interface design, 7) design display user interface of the expert weight input form in the evaluation application, 8) clarity of the weight update facility in the weight input form shown in the user interface design, 9) display of the user interface design of the “alternative adjustment and evaluation standard” form in the evaluation application, 10) display of user interface

design of the determination form of positive and negative discrepancy-based inequality scores in the evaluation application, 11) clarity of positive and negative inequality scores shown in the user interface design, 12) display of the user interface design of the most dominant inequality score using the DIVAYANA formula in the evaluation application, 13) display of the user interface design of determination form of R-vector scores with the DIVAYANA formula in the evaluation application, 14) display of the user interface design of the decision-making form in the evaluation application, and 15) clarity of positive and negative inequality ranking scores that appear in the user interface design.

This research was able to be an answer to the constraints of previous studies, such as research by Samrgandi [7], research by Diehl et al. [8], research by Keselj et al. [9], research by Pradana et al. [10], research by Veza [11], research by Heriyandi et al. [12], research by Jomsri [13], and research by Ahmad et al. [14], which in principle has not shown a complete user interface design both in terms of appearance design and functionality. This study had similarities with several other studies, they were research by Suratno and Shafira [40], research by Che-Embi [41], research by Wheler et al. [42], research by Jitnupong and Jirachiefpattana [43], and research by Jung and Yim [44], concerning the use of user interface design to show the initial physical design from an application being developed.

The novelty of this study is the display of the user interface design for the DIVAYANA evaluation application based on Positive-Negative Discrepancy that clearly shows innovations in the field of educational evaluation. This innovation shows there is combination of the DIVAYANA evaluation model, the Discrepancy evaluation model, and the Balinese local wisdom concept of Daiwi Sampad and Asuri Sampad. This innovation can be used to show positive and negative inequalities in the implementation of flipped learning.

Despite the novelty, this research also has limitations. This research limitation is no database design has been shown to support the formation of the DIVAYANA evaluation application based on Positive-Negative Discrepancy. However, in principle, database design is also important as a conceptual description of the application to be developed.

5. Conclusion

The results of this study have been able to answer the research objectives by presenting a clear and high-quality user interface design for DIVAYANA evaluation application based on Positive-Negative Discrepancy. The quality of the user interface design was good. The quality percentage of 81.53% indicated it. There are nine user interface designs formed as a result of this study, including main menu form, form of evaluation aspect data input, master data form, weight input form, alternative adjustments and evaluation standards form, determination form of positive and negative discrepancy-based inequality scores, form of the most dominant inequality score using the DIVAYANA formula, determination form of R-vector scores with the DIVAYANA formula, and form of decision-making. There are three additional user interface designs as result of revisions from the initial trials of user interface designs. Those are: a form for the process of editing the significance rating scores, a form for the process of master data activation, and a form for the updating process of data adjustment of alternatives and evaluation standards. The Future work to overcome this research obstacle is to design a database for the DIVAYANA evaluation application based on Positive-Negative Discrepancy to obtain an optimal conceptual image of the evaluation application. The impact of this research results is the new knowledge for evaluators regarding the importance of the user interface design of an evaluation application. It functions to support the formation of an optimal physical evaluation application.

6. Declarations

6.1. Author Contributions

Conceptualization: D.G.H.D. and P.W.A.S.; Methodology: D.G.H.D. and P.W.A.S.; Software: D.G.H.D., N.W.R.M., and A.W.O.G.; Validation: D.G.H.D., P.W.A.S., I.P.W.A., and G.A.D.S.; Formal Analysis: D.G.H.D. and P.W.A.S.; Investigation: D.G.H.D. and I.P.W.A.; Resources: D.G.H.D. and N.W.R.M.; Data Curation: D.G.H.D., P.W.A.S., and I.P.W.A.; Writing Original Draft Preparation: D.G.H.D. and I.P.W.A.; Writing Review and Editing: I.P.W.A. and G.A.D.S.; Visualization: N.W.R.M. and G.A.D.S.; All authors, D.G.H.D., P.W.A.S., I.P.W.A., N.W.R.M., G.A.D.S., and A.W.O.G., have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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