Implementation of Discrepancy Evaluation Application Based on *TOPSIS-TTA*

Dewa Gede Hendra Divayana [1], Agus Adiarta [2], P. Wayan Arta Suyasa [1]

[1] *Department of Informatics Education, Universitas Pendidikan Ganesha, Singaraja, Bali, Indonesia*
[2] *Department of Electrical Education, Universitas Pendidikan Ganesha, Singaraja, Bali, Indonesia*

Abstract – One of the developments in the field of educational evaluation utilized as an evaluation tool to identify the key elements that drive the success of blended learning is the *TOPSIS-TTA*-based *Discrepancy* evaluation application. This evaluation application combines the *TTA* (*Tat Twam Asi*) concept, the *TOPSIS* (*Technique for Order of Preference by Similarity to Ideal Solution*) method, and the *Discrepancy* evaluation model concept. The purpose of this study is to demonstrate the implementation outcomes of the *TOPSIS-TTA*-based *Discrepancy* evaluation application at IT vocational schools in Bali, as well as the results of usage trials, final product revisions, and its dissemination. The research method used focused on the usage trial stage, final product revisions stage, dissemination stage, and implementation stage. The usage trials comprised 39 respondents, while the application test involved 150 participants. For the final product revisions, three research team members were engaged, along with 150 respondents during the dissemination activity. The assessment instruments employed during the trial usage and application testing were questionnaires.

Bali's IT vocational schools served as the study's location. The study's data analysis method was descriptive quantitative by converting the results of the application effectiveness percentage which has been compared with the standard effectiveness scale of eleven.

The findings of this investigation suggest the effectiveness level of evaluation application including the advanced category, so that in general the evaluation application is ready to be implemented on a wide scale in the field. The significance of this study in the field of educational evaluation lies in its ability to simplify the process for evaluators in choosing high quality evaluation tools, relying on dependable trials of application implementation and usage.

Keywords – Implementation, application evaluation, discrepancy, *TOPSIS*, Tat Twam Asi.

1. Introduction

At Bali's IT vocational schools, blended learning is one of the teaching approaches most frequently used to support learning during and after the COVID-19 pandemics. Various learning platforms, both premium and free, can be used to realize blended learning [1], [2]. Google Classroom and Moodle are two instances of platforms that are frequently utilized to enable blended learning [3], [4].

Although the two examples of those platforms are frequently used to support the adoption of blended learning, their efficacy in use varies from school to school [5], [6]. Therefore, it is important to assess if blended learning is effective at IT vocational schools.

Many different evaluation models are frequently employed to assess the efficacy of blended learning including the *CIPP*, Countenance, Formative-Summative models, and others [7], [8], [9]. The effectiveness of integrating blended learning in Bali's IT vocational schools, however, cannot be fully evaluated using these methods. Based on this phenomenon, research in 2022 created an evaluation application called the *TOPSIS-TTA*-based *Discrepancy* evaluation application.

This application can identify the key factor that drives blended learning's efficacy. Research in 2021 was limited to initial trials of the evaluation application [10]. The limitations that occur in the 2022 research are that there have not been trials for use, revision of the finished work, and widespread use of evaluation applications [11]. Based on this, in 2023 usage trials, revisions of final product, and the *TOPSIS-TTA*-based *Discrepancy* evaluation application implementation will be carried out.

Several earlier investigations served as the foundation for the development of this research, such as research conducted by Marzuki *et al*. [12] showed the evaluation results of blended learning in the initial trial domain and field trials only. Limitation of Marzuki *et al*.'s research was that it had not shown a trial use of the blended learning application. Research by Risdianto & Mayub [13] showed the stages of developing case-based blended learning. The flaw in Risdianto & Mayub's research was that it did not demonstrate the effects of the final product revision during the development of blended learning.

Although the field trials outcomes of the application of blended learning had not been revealed in detail, Moon & Park's research [14] showed the evaluation findings of its use.

Soniawan *et al*.'s research [15] showed the gradual development of blended learning and also showed the trial results of implementing the blended learning. However, the limitation was that the revised results of the final product from the blended learning had not been developed yet. Research by Ma & Lee [16] showed the results of evaluating the effectiveness of implementing blended learning. The flaw in Ma & Lee's research was that it did not demonstrate any tools that could identify the key factors that impact how well blended learning is implemented.

Considering the field's actual events as well as some of the limitations of earlier studies, the research problem that needs to be solved is how are the results of use trials, the results of final product revisions, and the results of implementing the *TOPSIS-TTA*-based *Discrepancy* evaluation application at Bali's IT vocational schools? The purpose of this study was to find out the use trial results, final product revision results, disseminations and implementation results of the *TOPSIS-TTA*-based *Discrepancy* evaluation application at Bali's IT vocational schools.

2. Method

This research was a developmental research conducted from 2021 to 2023. The development model employed in this study was Borg and Gall. Borg and Gall has ten developmental stages [17], [18], [19], [20]. In 2021, five stages had been carried out, including: 1) research and field data collection, 2) research planning, 3) design development, 4) initial trials, and 5) revision of initial trial results. The 2022 research had been carried out in 2 stages, including: 1) field trials, and 2) revision of the results of field trials. The 2023 research had been carried out in 3 stages, including: 1) trial use, 2) revision of the final product, and 3) dissemination and implementation of the final product.

Based on the research question previously stated, this paper focuses on the usage test phase, final product revision, and dissemination and implementation of the final product. The subjects involved in the trial phase of the use of the *TOPSIS-TTA*-based *Discrepancy* evaluation application were two informatics experts, two education experts, 25 teachers, and 10 evaluators. The revision of the *TOPSIS-TTA*-based *Discrepancy* evaluation application was carried out by three research teams. The implementation of the *TOPSIS-TTA*-based *Discrepancy* evaluation application was carried out by 20 evaluators, 50 teachers, and 80 students.

The questionnaire is used as a tool to collect quantitative data in trials of use, and implementation of *Discrepancy* evaluation applications based on *TOPSIS-TTA*. The research location was carried out at several IT vocational schools spread across six regencies in Bali, including Tabanan, Denpasar, Klungkung, Badung, Buleleng, and Gianyar Regencies. A quantitative descriptive analysis method was used in this research. This technique was carried out by interpreting the percentage of effectiveness level of the implementation results of the evaluation application which refers to the effectiveness standard on a scale of eleven. The formula used to determine the percentage level of effectiveness of the implementation results of the evaluation application can be seen in equation (1) [21], [22], [23], [24], [25], [26], [27], while the effectiveness standard scale of eleven can be seen in Table 1 [28], [29], [30], [31], [32], [33], [34].

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

Notes:

P = the effectiveness percentage of the evaluation application implementation results

f = total acquisition value

N = total maximum value

Table 1. Effectiveness standard of eleven's scale

Effectiveness Percentage	Effectiveness Category	Follow-up
95−100	Excellent	No revision
85−94	Good	No revision
75−84	Advanced	No revision
65−74	Intermediate	No revision
55−64	Enough	Needs to be revision
45−54	Elementary	Needs to be revision
35−44	Less	Needs to be revision
25−34	Very Less	Needs to be revision
15−24	Bad	Needs to be revision
5−14	Very Bad	Needs to be revision
0−4	Poor	Needs to be revision

3. Results and Discussion

There are several important results that need to be shown and discussed regarding the implementation of the Discrepancy evaluation application based on *TOPSIS-TTA* at IT vocational schools in Bali. The complete results and discussion can be explained as follows.

A. Results

Referring to the purpose of this research, there were several things that become the results of this research, including: 1) results of use trials, 2) results of final product revisions, and 3) dissemination and implementation of the final product.
Some of the research results referred to, can be shown as follows.

1) Usage Trial Results

The usage trial of the *TOPSIS-TTA*-based *Discrepancy* evaluation application was carried out by two informatics experts, two education experts, 10 evaluators, and 25 teachers.
The results of the usage trial can be seen in Table 2.

Table 2. Usage trial results

Respondents	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Percentage of Effectiveness
EXP_1	4	4	4	4	4	5	5	3	3	4	4	4	4	4	4	80.00
EXP_2	5	5	5	5	5	4	4	4	4	3	3	4	4	4	4	84.00
EXP_3	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	85.33
EXP_4	4	4	4	5	5	4	4	5	5	4	4	4	4	4	4	85.33
TCR_1	4	4	4	4	4	5	5	4	4	5	5	3	3	3	3	80.00
TCR_2	5	5	5	5	5	4	4	3	3	4	4	4	4	4	4	84.00
TCR_3	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	82.67
TCR_4	5	5	5	4	4	4	4	4	4	3	3	4	4	4	4	81.33
TCR_5	4	4	4	5	5	3	3	5	5	4	4	5	5	5	5	88.00
TCR_6	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	84.00
TCR_7	4	4	4	5	5	4	4	4	4	5	5	3	3	3	3	80.00
TCR_8	3	3	3	4	4	5	5	3	3	4	4	4	4	4	4	76.00
TCR_9	4	4	4	5	5	4	4	4	4	4	4	5	5	5	5	88.00
TCR_10	4	4	4	4	4	3	5	4	4	4	4	4	4	4	4	80.00
TCR_11	5	5	5	5	3	4	4	5	5	5	5	3	3	3	3	84.00
TCR_12	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
TCR_13	3	3	3	4	4	4	4	3	3	4	4	4	5	4	5	76.00
TCR_14	4	4	4	5	5	5	5	4	4	3	3	4	4	4	4	82.67
TCR_15	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	85.33
TCR_16	5	5	5	3	3	3	3	4	4	4	4	4	4	4	4	78.67
TCR_17	4	4	5	4	4	4	4	3	5	4	4	4	4	4	4	81.33
TCR_18	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
TCR_19	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	86.67
TCR_20	4	4	4	4	4	3	3	4	4	4	4	5	5	5	5	82.67
TCR_21	4	4	4	4	4	4	4	5	5	5	5	4	4	4	4	85.33
TCR_22	5	5	5	5	5	4	4	4	4	4	4	4	5	5	5	90.67
TCR_23	4	4	4	4	4	5	5	3	4	4	4	4	4	4	4	81.33
TCR_24	4	4	4	4	4	4	4	4	3	3	4	4	4	4	5	78.67
TCR_25	4	4	4	5	5	3	3	4	4	4	4	4	4	4	4	80.00
EVL_1	4	4	4	4	4	4	4	5	4	5	5	4	4	4	4	84.00
EVL_2	5	5	5	4	4	4	4	4	5	4	4	5	5	5	5	90.67
EVL_3	4	4	4	4	4	5	5	3	4	4	5	4	4	4	4	82.67
EVL_4	4	4	4	4	4	4	5	4	5	4	5	4	4	4	4	84.00
EVL_5	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	81.33
EVL_6	5	5	5	5	5	4	4	4	4	3	4	3	4	4	4	84.00
EVL_7	4	4	4	4	4	4	4	4	4	4	3	4	5	4	4	80.00
EVL_8	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	82.67
EVL_9	4	4	4	4	4	4	4	3	4	5	5	4	4	4	4	81.33
EVL_10	4	4	4	4	4	4	4	4	4	4	4	3	3	4	4	77.33
														Average		**82.56**

Besides obtaining quantitative data, qualitative data was also obtained from the results of this usage test. The respondents' comments/suggestions about several issues still present in the *TOPSIS-TTA*-based *Discrepancy* evaluation application made up the qualitative data. The respondents' comments/ suggestions are shown in Table 3.

Table 3. Respondents' comments/suggestions on the usage test

Respondents	Comments/Suggestions
EXP_2	Please add the facility to print decision reports in .pdf format
EXP_3	Please add facilities to set the activation time for the respondent's assessment
TCR_8	Add the activation time setting for filling in the score by the respondent on the evaluation indicators
TCR_16	Add facility to print decision reports in .pdf format
EVL_6	Setting the activation time for filling in the evaluation indicators' score needs to be provided so that users can easily make an assessment
EVL_10	The activation time for the input value of the evaluation indicators' score needs to be properly regulated so that it can be used according to the interests of the user

2) Results of Final Product Revision

Based on the suggestions in Table 3, several improvements had been made to perfect the *TOPSIS-TTA*-based *Discrepancy* evaluation application. Product revision was carried out by three people, such as one research team leader and two research team members. Suggestions from EXP_2 expert and TCR_16 teacher were answered by making a rating management form which can be seen in Figure 1. Suggestions from EXP_3 expert, TCR_8 teacher, EVL_6 and EVL_10 evaluators, were answered by making setting forms access rights which can be seen in Figure 2.
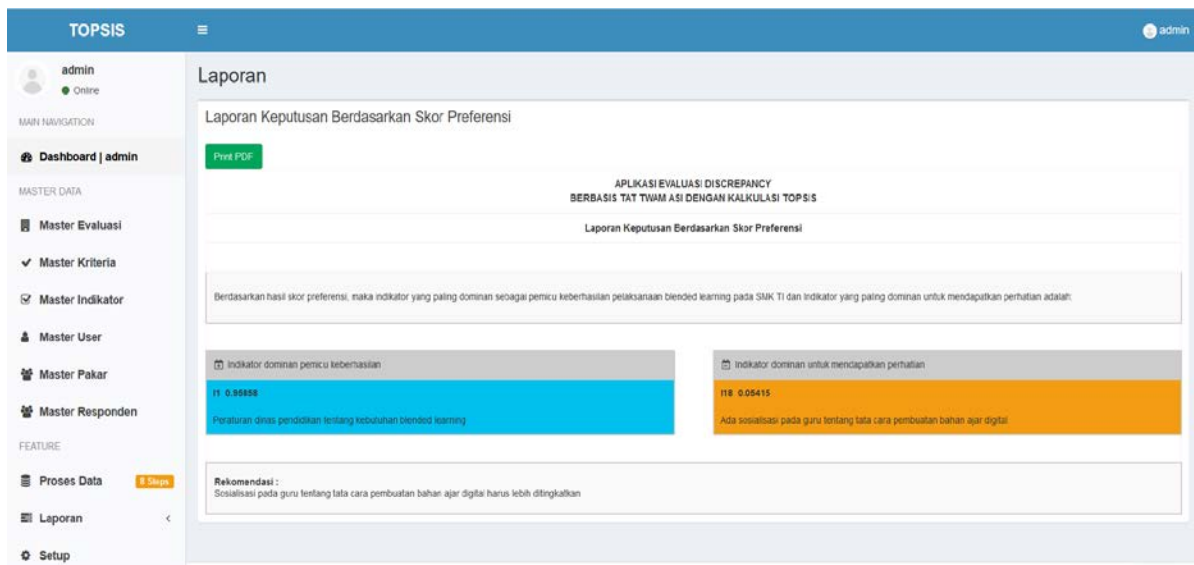

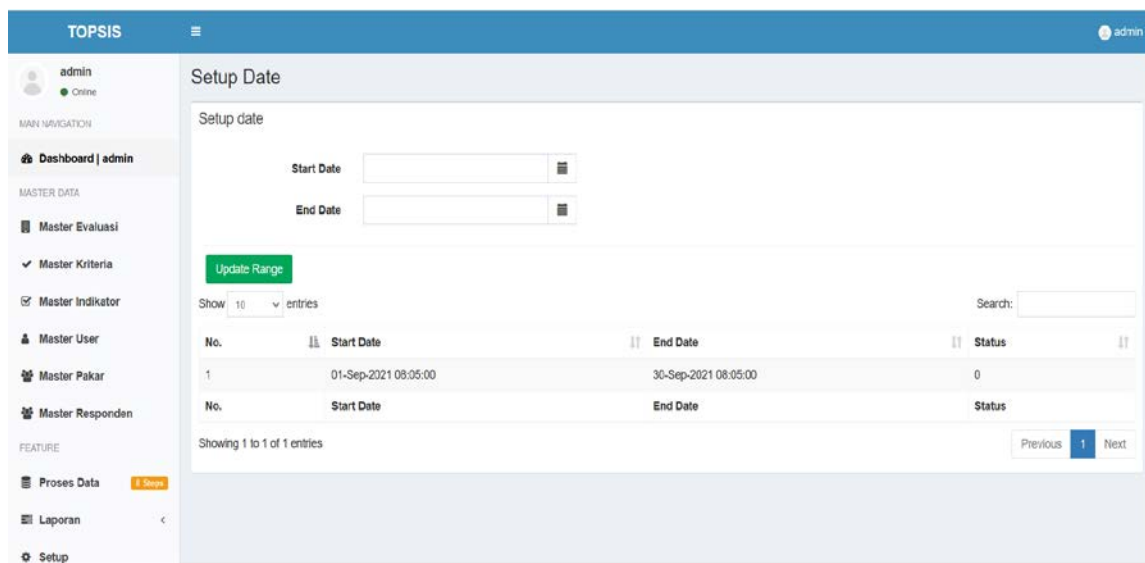*Figure 1. Facility of decision report printing in .pdf format (in Bahasa)*

Figure 2. Facility of activation setting of assessment score input toward evaluation indicators (in Bahasa)

3) Product Dissemination

At the dissemination stage, information was disseminated regarding the introduction of features and procedures for using the *TOPSIS-TTA*-based *Discrepancy* evaluation application at several Bali's IT vocational schools.

Information dissemination was carried out through workshops by inviting several potential application users including 20 evaluators, 50 teachers, and 80 students from several Bali's IT vocational schools. Table 4 lists the topics that were discussed during the dissemination's implementation.

Table 4. The material discussed in the dissemination

No.	Materials
1	Application User Roles
2	Login Feature
3	Feature of Respondent Register
4	The input of Indicators' Questionnaire and Evaluation Criteria
5	Dashboard Admin
6	Field Evaluation Data Process
7	Expert Weight Data Process
8	Preliminary Data Processing
9	R Matrix Normalization Process
10	Y Matrix Weighted Normalization Process
11	The Ideal Solution Process
12	Preference Score Process
13	Process of Determining Decisions and Recommendations Entries
14	Respondent Data Reports
15	Expert Data Reports
16	Evaluation Data Reports
17	Criteria Data Reports
18	Indicators Data Reports
19	Reports of Field Evaluation Result Data
20	Reports of *TTA*(*Tat Twam Asi*)-Based Expert Weight Data
21	Reports of *TOPSIS* Preliminary Data
22	Reports of Data Ideal Solution
23	Reports of Preference Score Data
24	Report of Decision Data

The dissemination activity of introducing features and procedures for using the *TOPSIS-TTA*-based *Discrepancy* evaluation application at several Bali's IT vocational schools was carried out online using the zoom facility. The documentary evidence of the dissemination activity is shown in Figure 3.
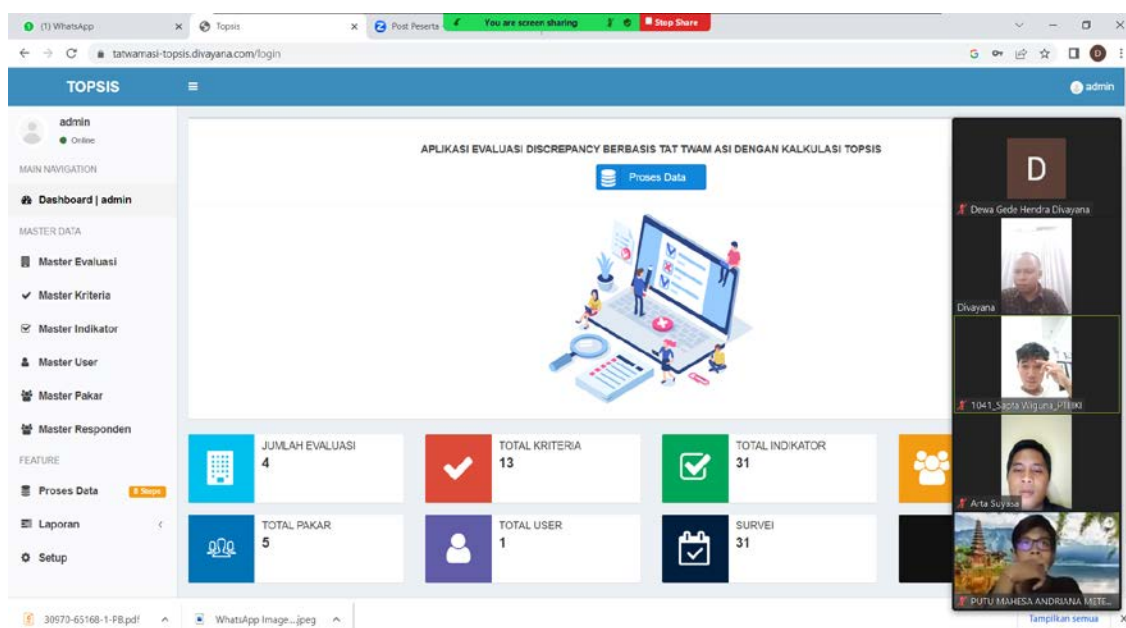

Figure 3. Evidence of dissemination activities

4) Final Product Implementation

An evaluation by several respondents was used to determine the success of applying the *TOPSIS-TTA*-based *Discrepancy* evaluation application at IT vocational schools in Bali.

The respondents included 20 evaluators, 50 teachers, and 80 students from several Bali's IT vocational schools. Table 5 displays the findings of respondents' evaluations of the *TOPSIS-TTA*-based *Discrepancy* evaluation application's implementation at IT vocational schools in Bali.

Table 5. Results of respondents' test on the implementation of the TOPSIS-TTA-based Discrepancy evaluation application

Respondents	Items-1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Percentage of Effectiveness
EVL_1	5	5	5	4	4	3	3	4	4	4	4	4	4	4	4	3	3	78.82
EVL_2	4	4	4	5	5	4	4	4	4	4	5	3	3	5	5	4	4	83.53
EVL_3	5	4	4	4	4	4	4	3	3	4	4	4	4	4	4	4	4	78.82
EVL_4	4	5	5	3	3	5	5	4	4	5	5	4	4	4	4	5	5	87.06
EVL_5	5	4	4	4	4	4	4	4	4	4	4	5	5	3	3	4	4	81.18
EVL_6	4	5	5	4	4	4	4	5	5	3	5	4	4	4	4	4	4	84.71
EVL_7	3	4	4	5	5	3	3	4	4	4	4	3	5	4	4	4	4	78.82
EVL_8	4	5	5	4	4	4	4	4	4	5	3	4	4	5	5	5	5	87.06
EVL_9	4	4	4	3	5	4	4	4	4	4	4	5	5	4	4	4	4	82.35
EVL_10	5	5	3	4	4	5	5	5	5	3	3	4	4	5	5	3	3	83.53
EVL_11	4	4	4	5	5	4	4	4	4	5	4	4	4	4	4	3	3	81.18
EVL_12	3	3	3	4	4	5	5	3	3	4	5	3	3	5	5	4	4	77.65
EVL_13	4	4	4	4	4	4	4	3	3	4	4	4	4	4	4	4	4	77.65
EVL_14	4	4	5	3	3	5	5	4	4	4	5	4	4	4	4	5	5	84.71
EVL_15	5	5	4	4	4	4	4	4	4	5	4	5	5	3	3	4	4	83.53
EVL_16	4	4	5	4	4	4	4	5	5	4	5	4	4	4	4	4	4	84.71
EVL_17	3	3	4	5	5	3	3	4	4	4	4	3	5	4	4	4	4	77.65
EVL_18	4	4	5	4	4	4	4	4	4	3	3	4	4	5	5	5	5	83.53
EVL_19	4	4	4	3	5	4	4	4	4	4	4	5	5	4	4	4	4	82.35
EVL_20	5	5	3	4	4	5	5	5	5	4	4	4	4	4	3	3	3	82.35
TCR_1	4	4	4	5	5	4	4	4	4	5	3	3	5	5	4	4	4	83.53
TCR_2	4	4	3	4	4	5	5	3	3	4	4	4	4	4	4	4	4	78.82
TCR_3	5	5	5	5	5	4	4	4	4	5	4	4	4	5	5	4	89.41
TCR_4	4	4	4	4	4	3	3	4	4	4	5	5	3	3	4	4	5	78.82
TCR_5	4	4	4	4	4	4	4	5	5	5	4	4	4	4	4	4	4	83.53
TCR_6	5	5	5	5	5	4	4	4	4	4	3	5	4	4	4	4	5	87.06
TCR_7	4	4	4	4	4	5	5	3	4	3	4	4	5	5	5	5	4	84.71
TCR_8	4	4	4	4	4	4	4	4	3	4	5	5	4	4	4	4	5	82.35
TCR_9	4	4	4	5	5	3	3	4	4	3	4	4	5	5	3	3	4	78.82
TCR_10	4	4	4	4	4	4	4	5	4	4	4	4	4	4	3	3	4	78.82
TCR_11	5	5	5	4	4	4	4	4	5	5	3	3	5	5	4	4	5	87.06
TCR_12	4	4	4	4	4	5	5	3	4	4	4	4	4	4	4	4	4	81.18
TCR_13	4	4	4	4	4	4	5	4	5	5	4	4	4	5	5	4	85.88
TCR_14	4	4	4	4	4	4	4	4	5	4	5	5	3	3	4	4	4	81.18
TCR_15	5	5	5	5	5	4	4	4	4	5	4	4	4	4	4	4	4	87.06
TCR_16	4	4	4	4	4	4	4	4	4	4	3	5	4	4	4	4	4	80.00
TCR_17	4	4	4	4	4	5	5	4	4	3	4	4	5	5	5	5	4	85.88
TCR_18	4	4	4	4	4	4	4	3	4	4	5	5	4	4	4	4	4	81.18
TCR_19	4	4	4	4	4	4	4	4	4	3	4	4	5	5	3	3	4	78.82
TCR_20	4	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	4	82.35
TCR_21	5	4	4	4	4	4	5	5	4	4	4	4	4	5	5	3	3	83.53
TCR_22	4	4	4	5	5	3	4	4	4	4	5	5	3	4	4	4	4	82.35
TCR_23	4	4	4	4	5	4	4	4	4	4	4	5	4	5	5	4	4	84.71
TCR_24	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5	5	83.53
TCR_25	5	5	5	4	4	4	5	5	5	5	4	4	4	4	5	4	4	89.41
TCR_26	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	80.00
TCR_27	4	4	4	5	5	4	4	4	4	4	5	5	4	4	3	4	4	83.53
TCR_28	4	4	4	4	4	3	4	4	4	4	4	4	3	4	4	5	5	80.00
TCR_29	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	81.18
TCR_30	4	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	4	82.35

Respondents	\multicolumn{17}{c}{Items-}	Percentage of Effectiveness
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
TCR_31	5	4	4	4	4	4	5	5	4	4	4	4	4	5	5	3	3	83.53
TCR_32	4	4	4	5	5	3	4	4	4	4	5	5	3	4	4	4	4	82.35
TCR_33	4	4	4	4	5	4	5	4	4	4	4	5	4	5	5	4	4	85.88
TCR_34	4	4	4	4	4	4	5	4	4	4	4	4	4	5	4	5	5	84.71
TCR_35	5	5	5	4	4	4	4	5	5	5	4	4	4	4	5	4	4	88.24
TCR_36	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	80.00
TCR_37	4	4	4	5	5	4	4	4	4	4	5	5	4	4	3	4	4	83.53
TCR_38	4	4	4	4	4	3	4	4	4	4	4	4	3	4	4	5	5	80.00
TCR_39	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	78.82
TCR_40	4	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	4	82.35
TCR_41	5	4	4	4	4	4	5	5	4	4	4	4	4	5	5	3	3	83.53
TCR_42	4	4	4	5	5	3	4	4	4	4	5	5	3	4	4	4	4	82.35
TCR_43	4	4	4	4	5	4	4	4	4	4	4	5	4	5	5	4	4	84.71
TCR_44	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5	5	83.53
TCR_45	5	5	5	4	5	4	5	5	5	5	4	4	4	4	5	4	4	90.59
TCR_46	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	80.00
TCR_47	4	4	4	5	4	4	4	4	4	4	5	5	4	4	3	4	4	82.35
TCR_48	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	5	5	81.18
TCR_49	4	4	4	4	5	5	4	4	4	4	4	4	4	4	3	4	4	81.18
TCR_50	4	4	4	5	4	4	4	4	4	4	5	4	5	5	4	4	4	84.71
STD_1	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	3	4	77.65
STD_2	5	5	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	83.53
STD_3	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	5	4	82.35
STD_4	4	4	5	4	4	4	4	4	4	5	5	4	4	4	4	4	5	84.71
STD_5	4	4	4	4	4	4	5	5	3	4	4	4	4	5	5	3	4	82.35
STD_6	4	4	4	5	4	4	4	5	4	4	4	4	4	4	5	4	5	84.71
STD_7	4	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	5	83.53
STD_8	5	5	4	4	4	4	5	5	5	4	4	4	4	4	4	4	4	85.88
STD_9	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_10	4	4	5	5	4	4	4	4	4	5	5	4	4	5	5	4	4	87.06
STD_11	4	4	4	4	3	4	4	4	4	4	4	3	4	4	4	3	4	76.47
STD_12	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	5	82.35
STD_13	4	4	4	4	5	5	4	4	4	4	5	5	5	4	4	4	4	85.88
STD_14	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_15	4	4	5	5	4	4	5	5	4	4	4	4	4	5	5	4	4	87.06
STD_16	4	4	4	5	4	4	4	4	3	4	4	4	4	4	4	3	4	78.82
STD_17	4	4	3	4	5	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_18	5	5	4	5	4	4	4	4	5	4	4	4	4	4	4	5	4	85.88
STD_19	4	4	4	4	4	5	4	4	4	4	4	4	5	4	4	4	5	83.53
STD_20	5	5	4	4	4	4	5	5	5	4	4	4	4	5	5	3	4	87.06
STD_21	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5	82.35
STD_22	4	4	5	5	4	4	4	4	4	5	5	4	4	4	4	4	5	85.88
STD_23	4	4	4	4	3	4	4	4	4	4	4	3	4	4	4	4	4	77.65
STD_24	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_25	4	4	4	4	5	4	4	4	4	4	4	4	4	5	5	5	4	84.71
STD_26	4	4	4	4	4	5	5	4	4	4	4	4	4	4	4	4	4	82.35
STD_27	4	4	5	5	3	4	4	5	5	5	5	4	4	4	4	4	5	87.06
STD_28	4	4	4	5	4	4	4	4	4	4	4	3	4	4	4	4	4	80.00
STD_29	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_30	5	5	4	4	5	4	5	5	4	4	5	5	4	4	4	4	4	88.24
STD_31	4	5	5	4	4	5	5	4	4	4	4	4	3	4	4	4	4	83.53
STD_32	4	4	5	4	4	4	4	3	4	4	4	4	4	4	4	4	4	80.00
STD_33	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	81.18
STD_34	5	4	5	5	4	4	4	5	4	4	4	4	4	4	4	4	5	84.71
STD_35	4	4	4	4	5	4	4	4	4	4	4	5	5	4	4	4	4	83.53
STD_36	5	4	4	4	4	5	5	5	4	4	4	4	4	4	4	4	4	84.71
STD_37	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	4	4	82.35
STD_38	4	5	5	4	4	4	4	4	5	5	4	4	4	4	4	3	4	83.53
STD_39	4	4	4	3	4	4	4	4	Items	4	3	4	4	4	4	4	4	77.65
STD_40	4	4	4	4	4	4	4	4	9	5	4	12	4	14	3	4	4	80.00
STD_41	4	5	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	80.00

| Respondents | Items- | | | | | | | | | | | | | | | | | Percentage of |
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Effectiveness
STD_42	4	4	4	4	4	4	4	4	4	5	4	4	4	4	5	4	4	82.35
STD_43	4	5	4	4	4	4	5	4	4	4	4	5	4	4	4	4	4	83.53
STD_44	4	4	4	5	4	4	4	4	4	4	4	4	5	5	5	4	4	84.71
STD_45	4	4	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	83.53
STD_46	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	5	5	84.71
STD_47	5	5	4	4	4	4	4	5	4	5	4	4	4	4	3	4	4	83.53
STD_48	4	5	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	80.00
STD_49	4	4	4	4	4	4	4	4	4	5	4	4	4	4	5	4	4	82.35
STD_50	4	5	4	4	4	4	5	4	4	4	4	5	4	4	4	4	4	83.53
STD_51	4	4	4	5	4	4	4	4	4	4	4	4	5	5	5	4	4	84.71
STD_52	4	4	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	83.53
STD_53	4	4	4	4	4	4	4	4	5	5	4	4	4	4	4	5	5	84.71
STD_54	5	5	4	4	4	4	4	4	4	5	4	4	4	4	3	4	4	82.35
STD_55	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_56	5	4	4	4	4	4	5	5	4	4	5	4	4	4	5	4	4	85.88
STD_57	4	3	4	4	4	4	4	4	3	4	4	5	4	4	4	4	4	78.82
STD_58	4	4	4	4	4	4	5	4	4	4	4	4	5	5	5	4	4	84.71
STD_59	4	5	5	4	4	4	4	5	5	5	4	4	4	4	4	4	4	85.88
STD_60	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_61	5	4	4	5	5	4	5	4	4	4	4	4	5	5	4	4	5	88.24
STD_62	5	4	4	4	5	4	3	4	4	4	4	4	4	4	3	4	4	80.00
STD_63	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	81.18
STD_64	5	4	4	4	4	4	4	5	5	4	4	4	4	5	5	5	4	87.06
STD_65	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	81.18
STD_66	4	4	4	5	5	4	5	4	4	5	5	4	4	4	4	4	5	87.06
STD_67	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_68	5	4	4	4	5	5	5	4	4	4	4	4	5	5	4	4	5	88.24
STD_69	4	3	4	4	4	4	4	3	4	4	4	4	4	4	3	4	4	76.47
STD_70	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4	81.18
STD_71	4	5	5	4	4	4	4	5	5	4	4	4	4	5	5	5	4	88.24
STD_72	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_73	5	4	4	5	5	5	5	4	4	5	5	4	4	4	4	4	5	89.41
STD_74	5	4	4	4	5	5	5	4	4	4	4	3	4	4	4	4	4	83.53
STD_75	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_76	5	4	4	4	5	5	5	4	4	4	4	5	4	4	4	4	4	85.88
STD_77	4	4	5	4	4	4	4	4	5	4	4	4	4	4	4	5	4	83.53
STD_78	4	3	4	5	4	4	4	4	4	5	5	5	4	4	4	4	5	84.71
STD_79	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80.00
STD_80	5	3	4	4	5	5	5	4	4	4	4	4	5	5	4	4	3	84.71
																	Average	**82.86**

The assessment activity carried out by respondents regarding the *TOPSIS-TTA*-based *Discrepancy* evaluation application implementation at several Bali's IT vocational schools was carried out by filling out a questionnaire. The documentary evidence of the application test activities are shown in Figure 4.
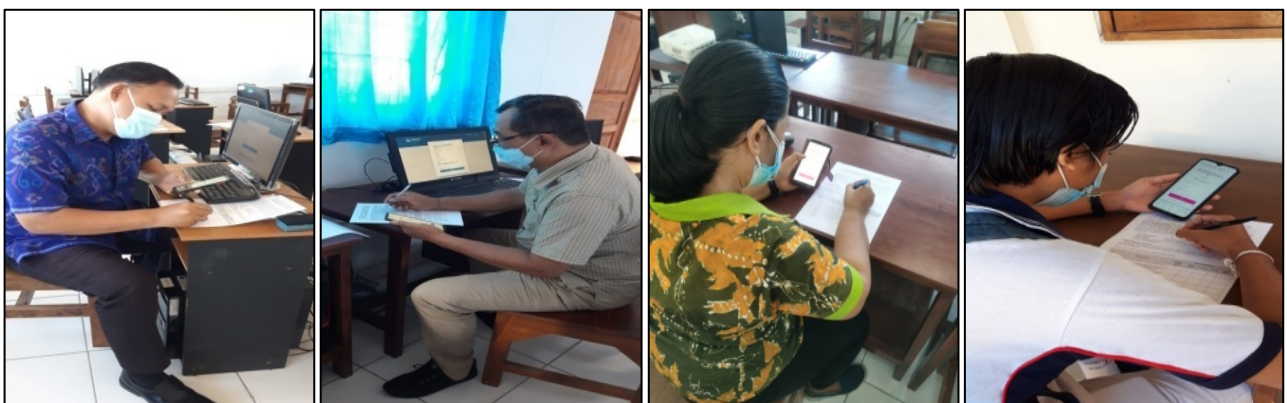

Figure 4. Evidence of test activities of evaluation application implementation

B. Discussion

The *TOPSIS-TTA*-based *Discrepancy* evaluation application is one of the innovation evaluation tools that can be used to determine the dominant aspects that trigger the effectiveness of blended learning. This application has 24 features, including 1) feature that regulates the application user role, 2) feature for logging in, 3) a feature for registering respondents, 4) feature for inputting questionnaires, 5) feature of dashboard admin, 6) feature to process of field evaluation data, 7) feature to process of expert weighted data, 8) feature to process of initial data, 9) feature to perform of R matrix normalization process, 10) feature to perform of Y matrix weighted normalization process, 11) feature for carrying out the ideal solution process, 12) feature for carrying out the preference score process, 13) feature for carrying out the decision making process and recommendation entries, 14) feature for opening respondent data reports, 15) feature for opening expert data reports, 16) feature for opening evaluation data reports, 17) feature for opening criteria data reports, 18) feature for opening indicator data reports, 19) feature for opening field evaluation result data reports, 20) feature for opening *TTA* (*Tat Twam Asi*)-based expert weight data reports, 21) feature for opening *TOPSIS* preliminary data reports, 22) feature for opening ideal solution data reports, 23) feature for opening preference score data reports, and feature for opening decision data reports. This application is realized by combining the concept of an evaluation model in the field of education, a decision support method in the field of computer science, and the Balinese local wisdom concept. The evaluation model concept in the field of education is the *Discrepancy* model. The *Discrepancy* model is used to determine whether there is a discrepancy in the score between the percentage of field effectiveness test results and effectiveness standards. One of the decision support methods in the computer science field intended is the *TOPSIS* method. The dominant aspects that influence the efficacy of blended learning implementation are identified using the *TOPSIS* method. The concept of local wisdom intended is *TTA* (*Tat Twam Asi*). In principle the *Tat Twam Asi* concept shows a justice/balance in life. Therefore, this concept is suitable for use in *Discrepancy* evaluation applications based on *TOPSIS-TTA* to determine the balance of determining the weight score given by experts to each evaluation criterion.

If seen from the results in Table 2, the average percentage of effectiveness in the use trial was 82.56 indicating that the effectiveness of the evaluation application was categorized at the advanced level. The number of instrument items used as a basis for conducting a trial use was 15 items.

Item-1 relates to the suitability and accuracy of the login feature. Item-2 is related to the suitability and completeness of the respondent's registration feature. Item-3 relates to the suitability and completeness of the input indicator feature. Item-4 relates to the suitability and completeness of the criteria input features. Item-5 relates to the suitability and completeness of the field evaluation data process features. Item-6 relates to the suitability and completeness of the expert weight data processing features refers to the *Tat Twam Asi* concept. Item-7 relates to the completeness and suitability of the initial data process features. Item-8 relates to the completeness and suitability of the normalization process features of R matrix. Item-9 relates to the completeness and suitability of the Y matrix's weighted normalization process feature. Item-10 relates to the completeness and suitability of process features for determining the ideal solution. Item-11 relates to the completeness and suitability of the feature of the preference scoring process. Item-12 relates to the completeness and suitability of the process feature for determining decisions and recommendation entries. Item-13 relates to the suitability of the *TOPSIS* calculation results manually and the calculation results in the application. Item-14 relates to the consistency of the appearance of the user interface design of application. Item-15 relates to the suitability of the coloring of each form in the application.

Table 4 shows some of the material presented in the dissemination activities regarding the features and workings of the *TOPSIS-TTA*-based *Discrepancy* evaluation application. The dissemination activity was carried out to make it easier for respondents to know and understand thoroughly about the application, so that later it would be easy to test the implementation of the *TOPSIS-TTA*-based *Discrepancy* evaluation application at Bali's IT vocational schools.

The results shown in Table 5 indicate that the effectiveness of the evaluation application had been categorized at advanced level because the percentage of the effectiveness level was 82.86. There were 17 items used in testing by respondents. Item-1 to Item-15 were in principle the same as the points used in the usage test, but there were 2 additional items in the application implementation test, namely item-16 and item-17. Item-16 relates to the suitability of the .pdf format report feature. Item-17 relates to the suitability of features for setting the activation time for filling in evaluation indicator scores.

The novelty of this research is that there is a process of trial use, revision of the final product, dissemination, and implementation of the application which is demonstrated systematically and in detail.

Besides that, there are new innovations that are demonstrated through the application of evaluation applications made in digital form by combining three scientific concepts. The three scientific concepts include: Educational evaluation science, computer science, and cultural science.

This study results have similarities with several studies, such as Zhou and Zhang's research [35], Munawas's research [36], Sahidan's research [37], and Simonet *et al*.'s research [38], related to trials of the use and implementation of a web-based application which is the basis for the emergence of this application. This research also has similarities with Kertih's research [39], and Sriartha *et al*.'s research [40], in view of integration the concept of educational evaluation model with local Balinese wisdom which is used to optimize evaluation results.

In general, this study results have been able to answer the limitations of Marzuki *et al*. [12], research by Risdianto & Mayub [13], research by Moon & Park [14], research by Soniawan *et al*. [15], and Ma & Lee's research [16], by demonstrating in full and in stages the usage trials, final product revisions, dissemination, and the *TOPSIS-TTA*-based *Discrepancy* evaluation application implementation at Bali's IT vocational schools. However, there is one limitation found in this study, namely that the impact test of the *TOPSIS-TTA*-based *Discrepancy* evaluation application has not been carried out after it was implemented at IT vocational schools in Bali.

4. Conclusion

In general, this study shows the level of effectiveness in the advanced category for the *TOPSIS-TTA*-based *Discrepancy* evaluation application which has passed the usage test and was applied to several IT vocational schools in the Province of Bali. This study results also show the complete process of usage trial, revision of the final product, dissemination, and the evaluation application implementation which is the aim of this research and as an answer to the constraints of other studies. In order to address the challenges identified in this research, future work should involve testing the effects of implementing an evaluation application using one of the evaluation models, specifically *CIPPO* (*Context-Input-Process-Product-Outcome*). The impact arising from the results of this study is that educational evaluators and observers in the educational evaluation field know in detail the importance of conducting usage trial, final product revisions, dissemination, and implementation of the *TOPSIS-TTA*-based Discrepancy evaluation application to obtain a quality evaluation tool, so making it easier to determine the dominant aspects that trigger the success of blended learning.

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